HANDBOOK OF RESEARCH ON

Electronic Collaboration and Organizational Synergy

Janet Salmons & Lynn Wilson

VOLUME I

SALMONS & WILSON

Handbook of Research on Electronic Collaboration and Organizational Synergy

VOLUME I

REFERENCE

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Handbook of Research on Electronic Collaboration and Organizational Synergy

VOLUME II

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For Hannah, Zak, Sammy, and Alex:
May you grow up in a world where no boundaries obstruct the ful.llment of your dr eams.

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Section III
Interorganizational Collaboration in Government and Social Sector

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In this chapter, factors in.uencing virtual multicultural team work are described and a training design used for students and company members is presented. So far, little attention has been paid to behavioral factors influencing virtual team work. Studies that do exist draw conclusions from what is known about face-to-face teams. In this study, bottom-up research with empirical data collected directly from the field, such influences are presented. Using grounded theory method, factors influencing team members´ behavior and team processes such as isolation, leadership, trust, commitment, conflict, information sharing, or culture are described.

This chapter examines a qualitative study of an international online collaborative learning experience involving pre-service teacher education classes at the University of Calgary, Canada, and the University of Southern Queensland, Australia. The authors' flexible online collaborative learning framework was used to explain the design and the implementation of the project. Recommendations are made for designing and facilitating collaborative learning on the digital global frontier.

This chapter introduces Collaboration Engineering as an approach to developing more effective collaborative sessions for interdisciplinary teams. The chapter identifies key facets of how interdisciplinary teams develop and evaluate potential solutions. The central position of this chapter is that Collaboration Engineering based on proven group processes and guided by design recommendations specific for interdisciplinary team collaboration can result in session designs that improve outcomes for interdisciplinary teams.

This chapter looks at how the ways teachers utilize electronic technology in the classroom can respect cultural differences and instill the importance of basic communication skills in their students. The chapter presents several examples of how schools and teachers are using the Internet to collaborate and share ideas and resources between staff and students.

This chapter presents and analyzes the scholarly basis and empirical work that resulted in the development of Techscape, the application of collaborative technology use as one approach to achieving the larger aims of Civilscape. Civilscape, a loosely networked collaborative university-wide effort of a state-supported university campus in the United States, was designed to achieve two major goals: (a) to advance equivalent opportunity for full participation as a civil right for all qualified students; and (b) to expand the reach and benefits of the university and for the advancement of societies in which universities exist. The chapter presents the theoretical and empirical background for the project and concludes with points for future consideration.

This chapter reports on a global collaboration: a case study where the focus is the writing of a scholarly article between authors from Australia, England, and South Africa. The challenges of different time zones, academic calendars, and managing the collaboration are outlined in this chapter. Findings from the case study suggest that the key elements of success are related to the individuals and project management techniques and not the technology per se. Constructivist learning theory as well as the e-Moderation model are supported by this work and thus extend their application to the academic writing process.

This chapter describes the case of National Writing Project teachers from around the United States who attended a Professional Writing Retreat in Santa Fe in 2004 and continued their collaboration via electronic technologies. This chapter examines the progress of the group's commitment to communicate by electronic means about writing about teaching.

This chapter reports on a study that develops a multi-dimensional model of team learning and examines the impact of the multi-dimensional collective identity on learning in virtual teams. Additionally, it seeks to determine if using various technologies influences this relationship. Results suggest that the basis for a team's collective identity does impact team learning. Implications for management education and development are explored.

Volume II

Section II
Interorganizational Collaboration in Business

This chapter draws on the work of organizations, cognitive theory, and information systems researchers. It offers a framework that describes the key components underlying collaborative technology adoption in global virtual teams by integrating both social and instrumental aspects of group work.

This chapter presents an e-business industry study that develops a statistically significant path model using multivariate linear regression (n=3995), revealing transformational leadership and knowledge sharing factors are mediated by a latent construct of collaborative synergy, which predicts project performance and stakeholder satisfaction. Rival theories are evaluated to stimulate future research.

Recent industry and business trends can be described as shorter life cycle, increased speed to market, customizability, and a wide variety (rather than mass production) of products. A variety of collaborative information systems and tools are actively being used in the enterprises making collaborative efforts among supply chain partners using digital technologies. This chapter examines tools, proper policy and support from users and management required to maximize business impacts in the new business environment.

This chapter uses the structural and relational dimensions of social capital theory as the lens for examining the factors affecting a firms' intention to adopt electronic commerce (EC). The study looked at trust in social networks, which was found to significantly influence the intention to adopt EC. The

implication of the findings is Thai SME owner/managers may not be getting accurate information about the benefits and costs involved in EC adoption through input coming mostly from their strong ties with family and friends.

This chapter contends that while online collaboration experiences may entail problems with trust and relational synergy, the problems are exacerbated in international online or e-Collaborative groups. The chapter discusses why the development of trust is essential to relational synergy and warmth that fosters successful task and social goal accomplishment. It offers some practical suggestions for facilitating and sustaining trust and relational synergy in international online collaborations using information communication technologies (ICTs).

This chapter examines collaborative networks and suggests a possible architecture that proposes a frame contract as the principal means of coordination, and describes how such a contract can be designed and enacted. The chapter proposes a method to negotiate these models among the member organizations of the network and to enact them with the help of an inter-organizational workflow system.

This chapter reviews research in distributed work, relating it to the way organizations manage collaboration between home-based customer support agents. The analysis focuses on the importance of shared identity to development of trust and social capital. The discussion concludes that the most effective organizational strategy for home-based customer support enables knowledge sharing by blending face-to-face meetings with other employees and management, and distributed work online.

This chapter considers communication in organizations as a process of information and knowledge exchange between two or more individuals or social aggregates such as teams, groups, and departments. It presents the KMmaster framework, a Web-based enterprise software to support electronic collaboration and knowledge transfer across intra- and inter-organizational boundaries.

The practice of science is a domain that is undergoing significant change as a result of the trend toward increased collaboration. This chapter describes efforts to promote collaboration among geographically dispersed multidisciplinary science teams in the NASA Astrobiology Institute. The lessons learned regarding the importance of recognizing and addressing the complex and inter-related dimensions of collaboration have implications not only for science but also for many other contemporary domains of activity.

Chapter L

The concluding chapter offers the editors' insights into the book chapters' combined contribution. Using the editors' the editors' Collaborative Integration Paradigm, they examine types of collaborations described, the electronic technologies used, and the kinds of research and theories discussed by contributing authors. They consider commonalities in electronic collaboration across sectors and the significance of inter-organizational or intra-organizational structure. The editors recommend future research as well as theory-building needed to advance the field.

Foreword

The new *Handbook of Research on Electronic Collaboration and Organizational Synergy* edited by Janet Salmons and Lynn Wilson is a timely and comprehensive collection of chapters by authors from a number of countries focused on the emerging phenomenon of virtual collaboration. The breadth of topics and expertise contributing to the book are impressive. Even more impressive is the empirical basis for the chapters. Several books on this topic are available with practical tips and tools and high level guidance but none emphasize empirical work that examines techniques and strategies for electronic collaboration across distance and boundaries in education.

Why is this book timely? The world is changing. Globalization is a fact. Retired citizens can sit in their homes and log onto Web sites around the world for material that enriches their lives or communicate with family and friends at a distance. Small businesses can easily develop customer and supplier relationships around the world. Large businesses operate more efficiently and effectively, particularly in developing countries, because of virtual communications. Expertise in a variety of disciplines can be brought together from many locations to focus on particular problems and issues. More importantly, with the change in how we communicate comes change in how we think and work. The development of these trends which began a decade or more ago has accelerated. Everyone's life is now affected by globalization and electronic collaboration.

This era has several labels attached to it by observers including "information age," "knowledge age," "innovation economy," and "creativity economy." All are accurate and represent fundamental shifts in how we create value and what we value. Electronic communication has made that possible.

Electronic collaboration has limited value without purpose in a knowledge-driven age. Knowledge and its form as intellectual capital flows rapidly around the globe, grows quickly, and leads to changes that transform our lives. The ability to generate, share, and utilize knowledge for problem solving and change lies at the foundation of society and the economy. The world has become more complex and the possibilities more unlimited.

Collaboration involves people coming together to work on a problem or opportunity together. Collaboration is not new. Work teams in industry represent a form of collaboration that has been studied for 80 years beginning with the Hawthorn studies in the U.S.A. and the long wall coal mining studies in England. New forms of collaboration have continued to evolve and now include forms that rely heavily on electronic communications. The newest forms of collaboration are referred to as mass collaboration which has quickly become popular for sharing knowledge and opinions. Wikis and blogs and social sites represent popular examples of mass collaboration. One extraordinary example is open source product development. It began with the UNIX community, but has spread as a method of collaborating across product development and problem solving in industry as open collaboration.

When people collaborate, they organize into social-intellectual systems for sharing goals, energies, and knowledge. When people e-collaborate, their sharing is moderated by technology. That technical

dependence adds hurdles to the collaboration that demand extra effort, patience, and competency. Ignoring the need for that extra investment results in mediocre or poor quality outcomes—a waste of resources we cannot afford. The term "social-intellectual" is hyphenated to emphasize the interdependency of the two. Knowledge sharing, learning, and the creative generation of synergies in knowledge are socially determined. Relationships are a key. Social contructivist, social cognition, and collaborative learning theories explicitly described in some of the *Handbook* chapters make a similar point. The question in e-collaboration becomes: how can we minimize the negative impact of the technical on the social in collaboration or find ways that help build the relationships that lead to learning and creativity?

Competencies developed in most schools have continued to emphasize traditional and basic areas including reading, writing, and arithmetic which are fundamental for dealing with information in our society. However, the changes driven by globalization and new technology have created a new playing field with evolving rules for success. The new field requires additional competencies for managing information and communication. Primary among those competencies is relationship building—the skills that enable a student to recognize and appreciate diverse points of view, integrate multiple sources of input, communicate ideas effectively to a broad audience, and think systemically. Such competencies are needed for daily face-to-face interaction, but are even more essential in e-collaboration. Communicating at a distance imposes hurdles that can only be overcome through competence, sensitive, and persistent efforts. Schools described in this *Handbook* are exposing students to e-collaborations and diverse student bodies across the world through classroom assignments that prepare them for the future. The pedagogy around that competency has yet to be developed. These chapters provide an early glimpse of what it will look like in 10 years when the majority of schools have begun to pay attention to what pioneers are doing today.

E-collaboration is becoming ubiquitous if one includes mass collaboration such as wikis, blogs, and social Web sites. However, the study of e-collaboration is limited by our access to data and the methodologies and instruments we have available. Chapters in the *Handbook* have done a good job of adapting existing methodologies to this new social-intellectual environment. The use of electronic portfolios, digital repositories, content analyses, multiple judges using scoring rubrics, interventions with mentors or facilitators, and so on illustrates the possibilities that will make cumulative research in e-collaboration a reality, so our joint wisdom about collaborating through technology will grow.

Through most of history, people have tended to live in geographic, political, intellectual, and social silos. Boundaries have been taken for granted or relied on for convenience and a sense of safety. Globalization challenges that historic pattern. E-collaboration creates opportunities to transcend boundaries. In science, the crossing of boundaries leads to creation of new disciplines, such as bio-technology or biochemistry. In business, boundary crossing creates new markets and joint ventures. In education, boundary crossing develops students with new competencies. The ability to communicate effectively with other cultures is rare. Europe may have less of a problem than most of the rest of the world, but even there, the importance of building cultural competency and boundary crossing skills has been recognized and researchers and teachers are addressing it in their work with students. Chapters in the *Handbook* from several European countries illustrate this trend. An extreme perspective might be captured by a statement like "one world or no world" as a way of communicating the critical nature of educating the next generation with global consciousness and global skills to minimize the isolation and lost opportunity that silo thinking creates.

Globalization through communications, trade, and immigration has forced the crossing of many boundaries and created a demand for new levels of collaboration. The change results in individuals struggling with strange circumstances, groups attempting new synergies, organizations responding to new sources of competition, and institutions changing their missions. School systems are being pushed

to change. The new global environment demands new competencies for collaboration, communication, valuing diversity, and so on. Pioneering teachers and schools have begun the work to find ways of building those competencies. The *Handbook* provides examples of such schools and of the methods they used to prepare their students for this new world. In addition, there are chapters included in the *Handbook* that have done evaluation work to determine if the methods are working and to identify how to improve them. As with earlier areas in the research on collaboration, these pioneering efforts will be the forerunners for a wide range of innovations in theory and practice in the next decade.

Within the emerging field of e-collaboration, e-research or e-science is rapidly evolving with scientists across the globe working together on complex projects. Some of the research questions in science address the challenges of climate change, the energy crisis, the problem of clean water, disease epidemics, war, poverty, and fragile economies that require investigators and instrumentation that is geographically dispersed. Climate predictions, currency studies, migration of fish, tsunami studies, and so on, must reach beyond local conditions to global conditions to look at subsystems embedded in larger systems. Areas like these cannot be studied without collaborations that transcend national boundaries. E-science is a new way of organizing researchers. Studies of e-science have just begun. Studies of the competencies of e-scientists should drive curriculum decisions but few exist. The chapters in this book that address e-science point us toward the next generation of studies as we look for ways of making the social and intellectual processes that must be communicated electronically more effective, so answers to critical questions in science can develop more quickly and policies and practices be better informed by their results.

The authors of the chapters in the *Handbook* are leading the way with their e-collaboration experiments and publication of the results. There is a growing community of thoughtful, passionate educators working on the issues related to e-collaboration. However, as with most new ideas and technologies, adoption by the masses can take time. The next challenge will be technology transfer or diffusion of the frameworks, methods, and practices described in this *Handbook*. For the ideas and methods described in the *Handbook* to have the impact they deserve, a critical mass of schools needs to be practicing them around the world. The students in today's classroom will be living and working in a world changed radically by technology and globalization. Preparing them to enter that world as young adults is a challenge worth committing to. The authors in the *Handbook* have modeled that behavior for the rest of us.

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March 26, 2008

Preface

People who collaborate in our digitally connected 21st century society require a new combination of strategic, cross-cultural, team, and technical skills. Incorporating electronic communications within and across fields is a requirement, not a choice, for many contemporary collaborative efforts. Scholarly researchers are challenged to study the complex changes associated with technological innovation and to illuminate impacts of these changes, evaluate effective approaches, and address related needs of organizations and individuals. This book presents a collection of empirical work that examines techniques, strategies and effects of electronic collaboration across disciplines and sectors.

Examples of online collaboration in practice are evident across the World Wide Web. People write collaboratively on wikis, even creating an encyclopedia. They collaborate to design, implement, test, and improve upon open source software. They collaborate to contribute to the blogosphere, build virtual environments in Second Life, and organize events for the people who visit those environments. Immediate two-way communication through e-mail, instant messaging, voice over Internet, online conferencing, virtual environments, mobile devices, and other modes has changed the way organizations operate by opening the door for dialogue where monologue had been the norm. The early Internet supported text-only exchanges between scientists and government researchers. Today, increased access to the Internet and wide availability of sophisticated software enable colleagues and partners, teachers and students, businesses, and customers to easily use audio, visual, and text to communicate, regardless of geographic location.

Business writers point out that "mass collaboration on the Internet is shaking up business. The economic role of social behavior is increasing" (Hof, 2005, p. 1). Peer-to-peer exchange is moving from entertainment to other industries including finance, publishing and energy (McGonigal, 2008; Stalnaker, 2008; Tapscott & Williams, 2008). Work is shifting toward greater interdependence among individuals to create collective and synergistic products and services using advanced technology. Companies, social sector agencies, and individuals are collaborating to solve complex problems (Clark, 2008; Cooper, 2007; Easton, 2003, p. 87). Others are brought to electronic collaboration out of necessity because of geographically dispersed teams, budgets that no longer support travel for face-to-face meetings, or to access a specific member or expert. Governmental agencies relate to other agencies and to citizens across the Internet (Makia, 2006). Online education—which typically requires learners to discuss and exchange ideas electronically—is a growth industry at all levels, from K-12 to Ph.D. (Seaman, 2007).

As technology has enabled more people in more places to work online, the expectations placed on electronic collaborations have multiplied, sometimes in advance of the social, technological, or administrative structures to appropriately support them. New approaches to education and training benefit those in any field who will lead, manage and work collaboratively. Some managers and educators perceive these shifts, and are purposefully using assignments and projects that require online collaboration to encourage development of Information and Communication Technology (ICT) skills.

In this changing environment one point is evident: to succeed in any field, scholars and practitioners must cross boundaries between disciplines and cultures. Peter Senge, a leading thinker in organizational systems theory, observes: "it's no longer possible to create positive results in isolation" (Senge, 2003, p. 3). The *Handbook of Research on Electronic Collaboration and Organizational* is designed to introduce readers to important examples across sectors broadly categorized as education, business and government/social sector. Electronic collaboration is very different in each sector, allowing readers to explore potentially transferrable approaches and methodologies.

Exploring El Ectronic c ollabora tion in Educa tion, b usin Ess and g ov Ernm Ent/ s ocial sE ct ors

The *Handbook of Research on Electronic Collaboration and Organizational Synergy* is divided into three sections. Each section includes chapters concerning collaboration between entities (Inter-Organizational Collaboration), as well as collaboration within entities (Intra-Organizational Collaboration). While the term "organization" is used, collaborative partners may be individual learners, writers, consultants, or entrepreneurs.

Education, for the purpose of this book, refers to schools, academic institutions, and higher education. Inter-Organizational Collaboration includes partnerships between educational institutions, between those institutions and other types of organizations, or working relationships between researchers at different institutions. Intra-Organizational Collaboration in this context focuses on pedagogy for collaborative e-learning and team learning in the classroom or mentoring between peer learners or instructors and learners. Intra-Organizational Collaboration additionally includes professional development or administrative practices between individuals or departments of the institution.

Business, for the purpose of this book, refers broadly to the private sector. Inter-Organizational Collaboration describes partnerships, alliances or exchanges between businesses, businesses and other entities, or businesses and customers. Intra-Organizational Collaboration in this context describes collective efforts by virtual work groups or teams within a single organization; it could also describe the technologies or systems used to facilitate such collaboration.

Government/Social Sector, for the purpose of this book, refers primarily to the public sector. This broad category encompasses governmental bodies or agencies, non-governmental organizations (NGOs) and non-profit organizations. Inter-Organizational Collaboration describes partnerships, alliances or exchanges between entities including governments and citizens. These collaborations serve policy formation, implementation or service delivery. Intra-Organizational Collaboration in this context describes collective efforts by virtual work groups within an organization or community.

Some of the chapters on inter-organizational collaboration cross sectors. Contributions represent twenty countries and half of the chapters that deal with inter-organizational collaborations describe work that crosses cultures and national boundaries. Intra-organizational collaborations may still cross functions or departments. Taken together, these chapters offer a diverse picture of the possibilities for e-collaboration.

dEfining "c ollabora tion"

The word *collaborate* has its origins in the Latin word *collaborare,* "to work together" (OED, 2005). Theorists and researchers have expanded on this basic definition.

The working definition for this book is: *collaboration is an interactive process that engages two or more participants who work together to achieve outcomes they could not accomplish independently.* The particular interest of this book is electronic collaboration, where the "interactive process" is conducted using information and communications technologies (ICT). Since participants typically work in an organizational context, other enabling or obstructing factors may exist. Those are explored through the study of *organizational synergy*, which is defined for this book as: *an open, integrated process (strategic, operational, procedural, and cultural) that fosters collaboration and encourages participants to expand connections beyond typical boundaries and achieve innovative outcomes.*

Building on these definitions, the editors have developed a model with roots in multiple disciplines. The *Collaborative Integration Paradigm* offers a conceptual framework for investigating and classifying inter- and intra-organizational processes. It is presented in the chapter "Analysis and Recommendations for Future Research" to aid readers who want to analyze the dimensions of collaboration described in this Handbook.

Handbook of rEsEarcH on ElEctronic collaboration and organizational synErgy : a contribution to tHE litEraturE

How are scholars studying these phenomena and what are they adding to the knowledge of online collaboration, and the organizational practices that support it? The Handbook is designed to address three major gaps evident in contemporary scholarly work:

1. *Need for new theories and models that focus on organizational practices necessary for successful online collaboration.* Few studies specifically examine communication processes, organizational or leadership practices that encourage or hinder the development of working relationships needed to build and sustain online collaboration. Studies from public-private sector management and education disciplines lack adequate focus on the structure, organization, and developmental process of collaboration or degrees of collaboration. Much of the literature and most of the theories were conceived prior to the advent of the Internet for very different purposes and realities than those present today. Without theoretical models that explain such distinctions, research cannot address questions of how to match different types of collaboration to different circumstances.
2. *Need for interdisciplinary exchange of findings.* Electronic collaboration is being used and studied in different fields, but the findings are typically shared in journals or at conferences within disciplinary boundaries.

   For example, the literature shows commonalities between public and private sector management and education disciplines with regard to the relationship between collaboration and learning. Whether it entails transfer of knowledge, exchange of expertise or creative problem solving, learning occurs through collaborative experiences whether in the workplace or the classroom. Analyzing research from both fields shows where the findings reinforce each other. At the same time, the literature points to ways through which cross-pollination between education, the social and private sectors could be mutually beneficial by improving understanding of successful instructional design or teaching practices. Researchers looking at collaboration and learning might be able to address common problems more comprehensively by working together. Yet, as Chris Huxham points out:

   Little attempt has been made to clarify the ways in which the [collaboration] literature inter-relates ...There is little cross-referencing of material from one discipline to another and many authors appear oblivious to any other relevant research (Hibbert & Huxham, 2005, p. 1).

Huxham observes similar issues among practitioners, in which people found it difficult to "communicate across different professional and natural languages and different organizational and professional cultures" (Huxham, 2003 p. 406). Few conduits exist for communicating theories, research methods or findings across disciplines. As a result, advances in one field are rarely transferred to others.

3. *Need to consider potential impact of electronic communications.* Many researchers use electronic tools to communicate with research associates, or may explore situations in which research subjects use electronic tools to communicate. However, they rarely collect data or analyze the effects of those online communications on the success of the project. They do not consider added factors involved when the interaction occurs through written, rather than verbal communication. Studies typically lack empirical exploration of factors such as cost-effectiveness, inclusion and participation in collaborative projects that use electronic technologies.

In this book, contributing authors begin to address these needs using diverse models and examples that demonstrate scholarly exploration of online collaboration. They examine the process of collaboration and, in many cases they exemplify collaborative processes in their own co-authorship. By presenting studies from education, business and the social sectors side by side, it is hoped that the book can open up new opportunities for cross-disciplinary exchange. Readers who explore methods and theories from their own and other disciplines may find that they can use the Handbook of Research as a platform for new and innovative discoveries about electronic collaboration. Whether you are in a classroom, research institution, corporate office, laboratory or social service agency, we invite you to be active in the study and practice and contribute to the future research in this evolving field.

Janet Salmons & Lynn Wilson
Editors

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We are grateful to the many peer reviewers, whose careful reading and constructive comments enabled the authors to improve and develop their chapters. We appreciate the interest and support of the editorial board.

The enthusiasm of the IGI Global staff for this Handbook of Research encouraged us to keep the project moving forward.

Finally, we thank you, the reader, for giving this book your attention. We hope that after reading this handbook you will be motivated to use and study new collaborative approaches with your colleagues, learners and friends. We hope that when a future call for chapters goes out, you will be ready to share your discoveries by contributing a chapter.

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About the Editors

Janet Salmons has served on the graduate faculty for the Capella University School of Business and Technology since 1999. Her consulting practice, Vision2Lead, Inc. (www.vision2lead.com), supports the development of virtual community and elearning for educational institutions, nonprofit and business organizations. She has extensive experience teaching, training and coaching on topics related to leadership, teamwork, and collaboration. Dr. Salmons is a frequent conference and webinar presenter. Current publications include chapters in the *Lexicon of Online and Distance Education* (2009), *Encyclopedia of Information Technology Curriculum Integration* (2008), and in *Student Plagiarism in an Online World Problems and Solutions* (2007). She is author of *Online Interviews in Real Time* (2009), and *Taxonomy of Online Collaboration: Theory and Applications in E-Learning* (2009). Dr. Salmons earned a PhD in interdisciplinary studies, concentration in educational leadership from Union Institute & University, an MA in policy studies from the State University of New York's Empire State College and a BS in adult and community education from the College of Human Ecology at Cornell University

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Section I
Interorganizational Collaboration in Education

Chapter I
E-Research Collaboration, Con.ict and Comp romise

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a bstract

In this chapter, we consider two multi-institution, multinational education research projects in Europe that used a variety of technology to facilitate online collaboration as virtual communities of practice. While judged as successes by their funding bodies, the projects both exhibited symptoms of conflict that were subsequently resolved. We apply a personal inquiry technique and draw on situational analysis to identify and explore the conflict resolution processes associated with issues of leadership, organization, and technology in e-research. We contend that the communication technologies themselves must support the development of a collaborative community; and that the social, technical, and cultural facets of electronic collaboration evolve integrally over time. We conclude by proposing strategies that may assist colleagues in setting up a successful e-research project.

introduction

This chapter draws its empirical base from experiences on two multi-institution, multinational education research projects in Europe: DELFEE and EQUEL. These were undertaken largely online using a range of software. The projects achieved their overall objectives and were innovative in their respective approaches to electronic collaboration, but each took time to establish ways and means of working amongst team members. Areas of conflict included the choice of software platform, the language in which the teams communicated and the mechanisms for intersite communication. Interventions were necessary to resolve these areas of conflict.

Individually, project members were highly literate in electronic communication and had experience of successful collaborations in the past. In these new e-research groupings, however, there were unanticipated barriers to realizing the organizational synergy offered by electronic collaboration across educational institutions. A previous examination of the features of these projects explored the extent to which they mirror global and national initiatives to introduce virtual research environments (King & Deepwell, 2006). Here we review and extend our thinking using personal inquiry and drawing on situational analysis to analyze the development of organizational synergies in both projects in terms of Leadership, Organization, and Technology.

We contend that the development of a community of practice (Wenger, 1998) has, in each case, enabled operational, procedural, and cultural norms to be established, and the consequential innovative, cross-border outcomes achieved. Furthermore, we believe that the communication technologies themselves must support the development of this collaborative community; and that the social, technical, and cultural facets of electronic collaboration evolve integrally over time.

Against the background of relevant literature, and the general context of the two projects, this chapter will:

1. Examine how the classic features of a community of practice translate to an e-research environment;
2. Explore the barriers to successful electronic collaboration and its development as a functional community of practice that may be pertinent to other e-research projects;
3. Discuss approaches to resolving the conflicting expectations, skills, and cultural norms of electronic collaboration team members, and thereby achieving synergies through technology;
4. Propose strategies that may assist colleagues in setting up successful e-research projects.

b ackground

We first examine the term e-research, then the application of the concept of virtual communities of practice and, finally, the synergies that technology may offer.

De.ning E-r esearch

When we set out to understand the difficulties we had encountered as researchers on the collaborative projects described in this chapter, we found a vast raft of literature concerning computer supported cooperative working, e-research and virtual research environments (King & Deepwell, 2006). We saw the term "e-research" used to define the information and communications technology infrastructure and processes developed to support collaborative virtual research, as well as the research itself. The UK's Joint Information Systems Committee asserts that e-research extends the term "e-science" to encompass other nonscientific disciplines and smaller scales of collaboration (Joint Information Systems Committee [JISC], 2007a), even including researchers "wishing to collaborate more effectively with a handful of colleagues world-wide in the same field of interest" (JISC Support of Research Committee, Virtual Research Environments Working Group [JCSR VRE], 2004, pp. 2). In addition to data manipulation and analysis which are essential to e-science, research activities which information and communications technology might integrate include "marshalling of resources, scholarly discourse and publication, and the creation and maintenance of collaborations, across disciplines, institutions and countries, including support for meetings and organizational processes" (JCSR VRE, 2004, p. 3).

Paradoxically, there is a competitive drive between nation-states to develop information and communications technology infrastructure to support their own e-research and e-science. JISC's activities are part of a well-developed UK

strategy (JISC, 2007b), while in the USA, the National Science Foundation (NSF) continues to invest in "cyberinfrastructure" to enable effective super-computing global collaborations in, for example, astronomy and biomedical research (National Science Foundation [NSF], 2003). A similar strategic push is seen in Australia (E-research Coordinating Committee, 2006). In Europe, there is now a move to transcend national barriers, at least for large-scale collaborative e-science, through the e-infrastructure initiative (Leennaars, 2005). Schroeder (2007) notes the contradiction between the global promotion of e-research, and apparently nationally self-interested developments. He also highlights the complications arising from commercial involvement: while technical e-infrastructures become more robust, tensions are emerging over the extent to which elements will be open as opposed to proprietary. The costs of engaging with proprietary software have historically been problematic for academic researchers as exemplified by our case studies.

Within our own sphere of interest, e-learning Sakai (http://sakaiproject.org), is an open and global initiative which integrates teaching, learning, and research collaboration. In the UK, Sakai is being trialed as a virtual research environment by a number of funded projects, to some effect (Rimpiläinen & Carmichael, 2006). As early adopters of online learning and enthusiastic users of virtual learning environments, we understand why our case study project teams tried to adapt learning environments into research environments. The advantages are clear: a virtual learning environment is Web-enabled and supports anywhere, anytime, and increasingly, any device access; a virtual learning environment is designed to provide document storage and communication facilities. Furthermore, use of an existing virtual learning environment (or acquisition of a new virtual learning environment) can be offered as part of an institution's contribution towards the cost of setting up an e-learning research project. A virtual learning environment, however, is not designed to support electronic project management and will inevitably be found wanting. As we demonstrate through our case studies, where the collaboration platform is found by team members to be inappropriate or difficult, it risks being rejected by them in favor of more familiar and less sophisticated software solutions, or the collaboration reverts to face-to-face encounters.

From our review of the current literature, we find that the two cases described below are far from atypical. Research projects continue to make do with a variety of ad hoc communication and data sharing technologies. Unaware of national and international e-research developments, many project teams rely on what is familiar, what is affordable, what project partners promote most volubly, and what is most easily available. Here lie many potential sources of conflict.

Supporting Synergy through Technology

The concept of a community of practice has been widely adopted in both commercial and academic spheres to describe the ways in which professionals work together to construct knowledge. Dubé, Bourhis, and Jacob (2003) consider that "virtual community of practice" is the most appropriate term for a distributed community of practice which communicates largely through information and communications technology. In a commercial setting, Smith (2005) prefers the term "communities of competence" and suggests that the drivers to their creation are globalization, the complex needs of projects in terms of specialisms and other resources, and the economic advantages of involving developing and other countries in manufacturing. Schroeder (2007, p. 2) considers, as do we, that "a more accessible technical infrastructure will produce more effective knowledge dissemination; and the opposite, a fragmented infrastructure with limited access will yield narrower social benefits and slow the advance of knowledge."

An e-research project represents a virtual community of practice whose aim would normally be to set, investigate, and attempt to answer particular research questions through cooperative knowledge construction. Virtual communities of practice occur in commercial, academic, and composite spheres (for example: Foth (2006); and Lawrence (2006)). As may easily be imagined, particular issues associated with virtual communities of practice primarily concern their geographic dispersion and dependence on technology to emulate face-to-face interaction. While it may be natural to assume that information technology and information systems should be able to assist communities of practice in sharing and managing their constructed knowledge, Grudin (2006) notes the many reports of information systems projects which attempted to capture the reified knowledge of communities of practice but which had limited impact, or, indeed, which failed. However, our growing familiarity with Web-based applications and their increasing ease of use suggest that virtual communities of practice will employ any suitable technologies to work around the short-comings of formal information systems and virtual research environments to encourage "contribution and discussion" (Rimpiläinen & Carmichael, 2006).

Wenger, in 1998 and subsequently, contends that full members of a community of practice are identified by their active participation in knowledge construction and their self-identification with the community of practice. The community of practice facilitates learning which enables its members to develop their sense of identity as practitioners. Here we encounter a difficulty, as individual academics have a wide variety of reasons for being associated with a particular e-research project and, while they may feel a sense of belonging, may have little reliance on it for developing their sense of identity. As may be seen later in our case studies, one reason for this is that an e-research project is likely to represent only one of many concurrent commitments undertaken by its team members who will tend to develop their academic identities through their everyday practice.

If we analyze the central aspects of Wenger's Communities of Practice in turn, we see firstly that a community of practice develops out of a sense of "joint enterprise." In e-research, this would normally be effected through the project we jointly undertake. However, only a subset of project team members will have been involved in designing the project proposal or developing the bid document which originally won the project funding. Furthermore, the different individuals, institutions, and specialisms represented may have different motivations or may attract different rewards for participating in the project. Hence, the team members are likely to start their involvement in an e-research project with differing levels of commitment, interest, and understanding. Again, as may be seen though our case studies, the sense of joint enterprise may never be achieved.

Secondly, according to Wenger, a community of practice develops and requires a "shared repertoire" of key concepts, tools, artefacts, and stories to communicate effectively. An e-research project may have very little time in which to establish this repertoire and multidisciplinary projects, such as that described by Lawrence (2006), face further difficulties when specialist terminology is not understood (or not recognized) by team members from other disciplines. Multilingual e-research teams are likely to experience further difficulties even where one language is selected for internal communication. Key concepts can be shared by careful selection and distribution of project documentation (by any appropriate means) to team members. Tools and artefacts potentially present technical difficulties because of the differences in information and communications technology platforms used by project team members in different institutions. Stories can be shared within an e-research project, but this requires a level of interaction beyond the purely pragmatic. Occasional face-to-face interaction may provide the opportunity for sharing (and creating) stories as is seen in our cases.

A third element which underpins a community of practice is the activity or practice which represents "mutual engagement." Project teams can make actual or apparent progress through independent task completion; however, collaborative knowledge construction requires that community of practice members interact, and here, the geographic separation between e-research team members creates barriers. Virtual collaboration can be achieved with the support of information technology—just as with co-located collaborators who exchange documents electronically. However, the lack of face-to-face interaction can result in misunderstandings, slow turnaround and poor social cohesion as is demonstrated by one of our cases. E-research project leaders must be alert to these potential problems and actively seek ways to minimize their impact.

A virtual community of practice such as an e-research project group has to make efforts to convert newcomers into "old-timers." Smith (2005) highlights the problems attendant on newcomers "who fail to make the transition from being an outsider to being accepted as active participants" (pp. 9). Inevitably, people will join the project partway through and find it difficult to establish themselves. While the lone researcher in an institution may find that a virtual community of practice enables them to overcome geographic exclusion, peripherality by reason of time-zone may be an unforeseen problem. For example, Hildreth et al. (2000) describe the exclusion of one community of practice member whose location in Japan meant that she was unable to take part in electronic meetings with other members based in the UK and USA because of the time differences. There is further potential for peripherality when some members of a research team are co-located and others are at a distance. There are opportunities for ad hoc exchanges and additional collaborations amongst those who are located locally. Indeed, research thinking may develop quite considerably off-line before reconnecting online with remote research colleagues.

Summarizing the findings of over sixty relevant references published between 1995 and 2005, Romano Jr. and Fjermestad (2006) present a table of opportunities and challenges faced by virtual teams. While their ten opportunities represent benefits to the speed, cost and quality of academic and commercial projects, their twenty challenges relate, not to technology, but to social interaction, morale, and project leadership. Dubé et al. (2003) go so far as to suggest that a "coach" might be necessary to overcome the challenges facing virtual communities of practice. Lesser and Storck (2001) and Gilchrist (2004) are among those emphasizing the importance (and the difficulties) of developing social rapport within a virtual community of practice. Foth (2006) reminds us that global communication mechanisms are just as useful for those co-located or closely-located as those widely separated, but that "research that situates itself within the nexus of people, place and technology has to cope with the complex sum of the individual characteristics that each variable brings to the study" (pp. 207). Finally, Sugden (2004) proposes a range of characteristics for an education research multipartner "Web," the most interesting of which would be the "means to recognize, highlight and resolve conflicts and tensions [since] rather than suppress[ing] this rivalry by holding it in place within a hierarchy, a Web pulls it out through engagement and involvement" (p. 116).

This analysis of communities of practice has served as a useful lens through which to view the challenges of virtual research environments. We will now go on to introduce our own case studies and frames of analysis.

E-rE s Earc H c ommuniti Es of practic E

Introduction to the Cases

The first case study is DELFEE (Diffusion de l'Entreprise en Ligne pour la Formation profes-

sionnelle des Etudiants Européens, that is: Dissemination of the European Students' Online Training Company). This European Union funded project involved thirty-four individuals from thirteen academic and commercial partners in European countries including Bulgaria, France, Greece, Lithuania, Sweden and the UK. It ran from October 2003 until September 2005. Its purpose was to demonstrate a set of e-learning tools and employability-enhancing approaches with students from a range of higher education institutions using input from commercial companies. Virtual collaboration was supplemented by four full-group face-to-face meetings held over the two-year lifespan. One of the authors (King) acted as a passive project observer for part of the project and as an active project participant over a sixteen-month period, having access to project communication media throughout. These reflections and case study review were undertaken after the completion of the project using Web access, project documentation and personal notes taken in situ.

The second project is EQUEL (e-quality for e-learning). This European funded project brought together senior and junior researchers, and e-learning practitioners in universities from across Northern Europe. There were fourteen institutional partners, and over fifty individual members with varying involvement in the project. The project was organized into a project management group, seven special interest groups, a development team and an evaluation team. It ran from November 2002 to May 2004, and has successfully completed its objectives, reported and disseminated the findings. Further collaboration between many of the partners continues. The project sought to build greater understanding of e-learning practice and theories and to connect a network of researchers and practitioners. One co-author of this chapter (Deepwell) was a project member and special interest group leader throughout the 19 months of the project and participated actively in each of the three research environments. The analysis and review here are based upon personal reflection, project documentation, and scrutiny of the Web spaces used to support the project.

Analysis Approaches

We examined our case studies' project documentation and communication trails using two complementary analysis approaches: personal inquiry (Mann, 2003), and the ordered situational map (Clarke, 2005). This enabled us to raise both low-level and high-level issues, and provided a framework through which to generate theoretical explanations from personal observations. Together these techniques helped us draw out those elements which concern Leadership, Organization, and Technology, and which are of particular interest here.

Personal inquiry was used by Mann (2003) to explore her experience of adult learning online. Mann's background as a lecturer, and temporary perspective as a learner, gave her insight into the alienation felt by online learners which she could feed back into her teaching and research. Similarly, we bring the weight of our prior experience to our perspectives as team members in order to learn from this critical reflection and to improve our own e-research practice. Our personal inquiry accounts are included in the appendix to this chapter.

Clarke's (2005) variant of Situational Analysis drew on the grounded theory of Glaser and Strauss of the late 1960s to enable the situation itself to become the focus of analysis. Situational Analysis encourages a deeper understanding of a case study through consideration of the many influences and facets that categorize that particular situation, providing a rich view of each project context. This allowed us to identify the most interesting characteristics (perceptions, interpretations and issues arising) which we consider below. Our original analysis was transcribed as "ordered situational maps" and is included in King and Deepwell (2006).

t he c ase of d Elf EE

More detail is given in Appendix 1: A Personal Inquiry into the DELFEE Project.

Leadership issues observed in these descriptions of the DELFEE project included the number of stakeholders, the variety of management structures, and numerous areas of conflict. The personal inquiry account highlights the difficulty of establishing and sustaining a leadership role in a cross-institution academic collaboration. The DELFEE project leader ensured that the project framework was agreed and reporting processes were made clear, but did not attempt to communicate or maintain a vision of project success. As is usual within this sector, administrators were employed to chase up defaulting participants' reports, rather than the project manager priming partners to achieve well ahead of a target date, and then using the associated interaction to enthuse and motivate team members.

Organizational issues presented by the DELFEE project included the essential complexity of the project due to its spread across time-zones and national borders; the separation of the roles of project manager, facilitator, and administrator; and the pressures on individual team members to fulfill project manager expectations while maintaining their fulltime role in their home institution. Face-to-face six-monthly meetings enabled the project team to gel, to communicate their mutual expectations and to make progress.

The effect of project conflict on individual team members varied depending (for example) on their attitude to the project, their experience of similar projects, and their ability to influence project direction.

Technical issues noted for the DELFEE project included unreliable electronic communications, and software system incompatibilities amongst the collaborating organizations. The decision to use a particular virtual learning environment as both a delivery platform and as a virtual research environment was financially and technically justifiable, but remained an area of debate. This environment was a compromise solution which failed to facilitate researcher collaboration. Even if set-up optimally and made available from the start, it would still have proved an inadequate research environment. Recent upgrades and partner software integrations have addressed some of its shortcomings so that voice and video interaction, and the use of wikis and blogging to capture reified knowledge are now possible, but the functionality to plan and manage a multipartner project is still lacking.

t he c ase of EQu El

More detail is given in Appendix 2: A Personal Inquiry into the EQUEL Project.

Leadership issues which were observed in these descriptions of the EQUEL project relate to the devolved management of the project, mix of research experience, and limitations of time. The various special interest groups and other teams working on the project combined those who had worked together previously and newcomers to the group. There was an ideological rationale for using a particular model of virtual research environment, but the decision about who should develop this was taken prior to the start of the project and not fully explained, even when there were delays in delivering a usable platform. For a time during the project, what should have been a joint enterprise became a conflict over virtual workspace. The main project evaluation team was not directed to assist in surfacing issues around the virtual research environment, which might have helped resolve conflicting perspectives. Action was eventually taken by a hastily formed subgroup in the form of an internal heuristic evaluation of the virtual research environment, which recommended changes to the functionality. These could not be done within the available timescale, and the decision was taken to recreate

the research community in a more user-friendly environment.

Organizational issues presented by the EQUEL project include the absence of involvement of the developers of the virtual research environment at the outset. The development team was unable to attend the face-to-face meetings, and there was no virtual evidence of their participation with the emerging research community of the project. A communication protocol was established initially, but this needed to be adapted as the medium switched to two other technological platforms. The central issue of public/private space for the project was an ongoing debate, which impeded use of the virtual research environment. Members of the project were freely discussing, sharing research strategies, and were careful about storing research data in areas known to be private, but were unsure of what to post in the public spaces, and where the responsibilities for this lay. The special interest groups worked as semi-independent teams, and largely online, although dispersed across Europe. This made them effective in terms of output, and good use was then made of the face-to-face meetings to work to develop synergies across the teams.

Technical issues noted for the project are centered on the three platforms used as research environments for the project. With seven special interest groups, some whole project areas, events, and shared resources, the information design of the virtual research environment became critical. The socioconstructivist architecture of the virtual research environment portal had previously been applied in the context of largely co-located full-time research students. The research community for the EQUEL project, on the other hand, comprised researchers, academics, and practitioners working part-time on the project, and used to collaborating online with their own preferred tools. Hence, there was some resistance to this imposed model of collaborating. Added to this was the increasing pressure to become more of an externally facing Web site.

In the end, the final environment was an open-source virtual learning environment which was both simple and easy-to-use, provided sufficient distinction between private and public areas, and offered a wide variety of communication and information handling tools. This final move enabled the co-construction of a bibliography and other shared resources within the discrete areas of the Web site, as well as synchronous and asynchronous collaborative opportunities.

s olutions and rE comm Enda tions

Leadership

For much of the time, an academic works autonomously, creating research outputs, acting as the facilitator of learning for their students, and interacting with many different administrative individuals. Governance within an academic institution is provided by committees and steering groups while professional bodies may exert external influence. An individual academic often has greater commitment to their discipline than to their home institution (Becher & Trowler, 2001). Within research groups, leadership may be embodied in an individual, but more often, a special interest group will determine the direction of activity. The growing trends towards managerialism and performativity in the UK have resulted in ever-increasing measures of academic productivity (in terms of research outputs), more reporting and more bureaucracy, but not necessarily any more leadership.

In bidding collaboratively for education research projects, individual academics from a variety of institutions are acting pragmatically: by demonstrating their diversity, they have a better chance of winning funding. Thus evolved the two case study projects. The project managers here were those best able to put a winning bid together since a winning bid is often founded on a track

record of successful bids. Hence, the more projects you have won in the past, the more you will win in the future (Becher and Trowler (2001), drawing on Merton, call this concentration of resources the "Matthew effect"). The ability to win bids does not necessarily align with strong leadership skills, and, as we have seen, such skills may not be thought appropriate in an academic context. The DELFEE project manager exemplified academic project leadership: she was skilled at bidding, reporting, managing finance, and setting a tone of collegial enterprise, but as we have seen, she was not a leader in the traditional sense. The EQUEL project manager similarly had a strong academic foundation. She also had a strong egalitarian ethos and loyalty to the virtual research environment development team. Leadership was shown by acknowledging the difficulties and enabling a change to occur.

Both projects would have experienced less conflict or earlier conflict resolution, if the project manager had established electronic communication mechanisms early on and kept them under review, neither being swayed by personal platform preferences, nor overly influenced by vocal minorities. While the importance of responding to the project funding body's requirements is recognized, we contend that the project manager's focus should be on achieving innovative outcomes and facilitating collaborative efforts. This would be an appropriate leadership role in this context.

Organization

The necessity to involve geographically dispersed partners in European-funded projects—and the pressures to conduct this work alongside other commitments—means that interorganizational collaboration initiatives are inherently difficult to manage. We concur with Lawrence (2006), who recommends that e-research funding bodies should supply guidelines on the frequency of physical meetings, the overheads for multisite project management, and their necessary budget implications based on lessons learned from successful projects. We contend that electronic project management approaches can be effective, but that they take time to establish in everyday practice, imply a considerable management overhead and, perhaps, would gain greater acceptance if they were modeled on Internet social software. Online research collaboration works effectively for smaller teams of researchers, who can share and develop their work online and build synergies with related teams at face-to-face meetings.

Technology

Our cases suggest along with Fischer (2004), that lone and small-group researchers can realize benefits from electronic collaboration and that, since it is largely an attitude of mind which interprets opportunities as barriers, this can be changed. It is also worth noting that the ideologies underlying software design will make it more, or less, acceptable for members of virtual communities, and these ideological assumptions need to be made explicit. We consider that technical hurdles should be minimized for novice members of a virtual community of practice. Increasingly, research team members are expected to be able to use information and communications technology almost intuitively, yet researchers may have neither the necessary skills nor the time to learn to use new software unaided.

Rather than introduce additional technology, e-research projects should "find ways of using existing tools more effectively" (Lawrence, 2006, p. 408), such as agreeing how to indicate urgency in an e-mail message. Rather than invest in new software, a practical compromise may be to use e-mail system add-ons to arrange meetings and to remind project members to exchange status reports. Grudin (2006) suggests the use of project Weblogs to replace certain categories of e-mail and to create a project archive, but highlights the need to structure and manage them, while Foth (2006) suggests that a discussion board can serve as an online community's "memory."

f utur E t r Ends

We indicated earlier that virtual research environments have evolved from virtual learning environments and are indeed suffering from the criticisms leveled at virtual learning environments of being too monolithic and unwieldy for the purposes to which they are being put. The shift towards new kinds of environments is fuelled by the popular demands of e-learning users for decentralized, robust, and community-based constructivist models of engagement (Weller, 2007). Our analysis of leadership, organization, and technology with respect to the two e-research project cases has highlighted the significance of the following aspects of virtual research environment design:

1. End-user involvement in the ongoing development of a working virtual research environment (joint enterprise);
2. The establishment of protocols and job roles (shared repertoire);
3. Opportunities for working across functional boundaries, or task groups (mutual engagement).

The implementation of this requires projects to build in user analyses early on in the project. Even where the needs of the project members can be articulated in advance, their preferences and behaviors will vary considerably. By considering these, project leaders can minimize the likelihood of disengagement with the chosen research collaboration tools. It is likely, therefore, that adjustments to any research environment will need to be made during the functional life of the project. This is, therefore, our case for compromise.

f utur E rE s Earc H

We are writing at a time of continual change and development in information and communications technology support for e-research. A difficulty with major national and international virtual research environment development is that they become so vast that they cannot respond flexibly to changes in technology and society. The lack of a widely recognized solution to virtual collaborative research needs has resulted, and continues to result, in the use of unsatisfactory information and communications technology provisions which create barriers to effective cooperative work. End-users respond by rejecting these systems and/or by adopting ad hoc compensatory practices. Meanwhile, in their everyday lives, many academic staff have begun to use the intuitive social software, repositories and libraries that proliferate on the Internet. While these kinds of environments have potential for use in e-research, their transience and lack of centralized control is at odds with the conventions of funded research and the search for a more long-lasting solution continues.

c onclusion

Our deliberations for this chapter have led us to promote compromise as the means of overcoming barriers in complex e-research projects. Our insights into the three frames of our analysis have opened up possibilities of improvement.

The personal inquiry accounts reveal the emotional responses to working in e-research environments that do not meet expectations; the situational analysis, on the other hand, made explicit the political and contextual factors at play. The analysis of two e-research projects has drawn out similar issues with regard to leadership, organization, and technology. Each domain requires attention from all project participants in order to identify and implement realistic improvements in project functioning. Mechanisms for review within the project cycle are imperative and need to be carefully managed.

a cknowl Edgm Ent

The authors would like to thank their colleagues on the DELFEE and EQUEL projects. Some of the thinking underpinning this chapter was first used in our occasional paper (King & Deepwell, 2006).

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kEy tErms

Collaboration: Working together; a work group with shared objectives, particularly where the collaborators bring different skills, experience, and/or resources to a project.

Community of Practice: Term coined in the 1980s through the work of Jean Lave and Etienne Wenger, and John Seely Brown and Paul Daguid encompassing the notion of a normally professional, social grouping whose members work actively on a shared interest, solving shared problems, sharing and constructing knowledge over time.

Electronic Project Management: Processes employing a virtual infrastructure to plan, manage, and control the activities of a project team which may be geographically and/or temporally dispersed.

E-Research: Collaborative research undertaken virtually with the support of information and communications technology.

Rei. ed Knowledge: Development of the concept of reification explored by Wenger (1998): knowledge which has been captured in some way; for example as a procedure, a form, a set of instructions, a computerized process. For a virtual community of practice, examples might be found in members' wiki, discussion forum, or blog entries; in diary management procedures; or in project work-effort recording systems.

Virtual Learning Environment: A software system which enables teachers and learners to communicate, and which provides support for course management and assessment.

Virtual Research Environment: A software system which enables researchers to communicate and which provides support for their collaboration.

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"Attending the inaugural project meeting in Paris, I felt overwhelmed by the complexities of the project—so many partners, such ambitious objectives, and such limited technical infrastructure. The project manager was pragmatic: she focused on financial reporting procedures, aware from previous European Union funded projects that it was essential for all participants to get this right. The presence of a bilingual facilitator enabled the two-day meeting to progress largely in French with participants from Sweden, Bulgaria, Lithuania, Greece and the UK keeping up as best they could. I had read the full bid, in French, and a translation of its core aims, yet could not grasp how these related to the activities being discussed. I was obsessed by a line I had read in the bid: that the project would take online training into prisons, amongst other new environments. This daunting prospect never materialized, project dissemination subsequently took place through traditional means. At the time however, there seemed no opportunity to resolve my confusion. Another worry was that my expertise in the application of [particular virtual learning environment] appeared to be irrelevant, apparently all that was wanted from my institution were staff and student training materials for [particular virtual learning environment], not advise on how to adapt it to particular uses.

"The meeting, however, achieved the essentials—the dates and locations for the three subsequent full-project meetings were agreed, membership of three sub-committees was established and [particular virtual learning environment] was confirmed as the project communication environment with module Webs to be created for project management, development, demonstration and dissemination. The intervention of my UK colleague (showing how a user could set their options to display menus in either French or English) was critical in enabling this proposal to be agreed. Alternative suggestions of collaboration software were ignored or rejected. Subsequently, the project manager, facilitator and administrator used e-mail rather than [particular virtual learning environment] for most project communication, thus setting a precedent of circumventing the core collaboration environment.

"The good-tempered and hospitable atmosphere of that meeting disguised the difficulties that subsequently dogged the project—the host team, successful in winning this funding on the back of a previous EU project, were new to [particular virtual learning environment]. Their technical team was slow to set up user access for participants and much of the impetus of the first meeting was lost. Team members were unsure who should take the initiative and drive forward progress. Between the six-monthly meetings, it was difficult to focus on the project. Other, local priorities were much easier to respond to and tended to take precedence, so work on the project proceeded spasmodically. No wonder the project manager felt "all alone" when she visited the Discussion Forums.

"Without the face-to-face meetings, I am convinced that the project would have foundered. While the discussion fora remain largely void of useful academic exchange, the many photographs which were posted of these events reveal a well-founded and developing community of practice. Individuals from different organizations are seen talking together, laughing and working cooperatively. The effort team members put into attending, recording and sharing records of these events went far beyond the minimum necessary. While I never felt part of the project, other project participants

clearly did feel part of this community of practice and the social bonding created at and after these events was significant. One team member wrote that we should 'maintain this open and altruistic spirit, since it is through turning towards others we become ourselves'."

appEndix 2: a pErsonal inQuir y int o t HE EQu El proj Ect

"The e-learning platform first used by the project was a relatively simple discussion board. Access was provided directly after the first face-to-face project meeting. For me, this had the advantage of being easy to use and was an opportunity to begin to share some ideas and discuss what we were intending to achieve within the sub-group I was active in. Contributions were lively, although there was a sense of anticipation, of a "better" research environment which would be launched imminently. The site was being built by a leading research team in Europe.

"When the site was opened to the project members, however, there was an initial sense of dismay—followed by a slow and tentative start to the postings. The screen looked chaotic, text-heavy and with little discrimination between public and private areas. I found that my attention on screen was divided amongst many information windows, some of which were irrelevant but took up a large part of the screen, others of which were vital, but shown in compressed form. There were some elements that I welcomed, for example the "shout" box where any of us could post a quick hello to another project member we found online at the same time as us. Other elements, I found difficult to embrace, such as the repository for file storage, which was not sorted intuitively, could not be edited directly and was not linked to any discussion tool. On further investigation, I found that there were some highly attractive features, such as the ability to "subscribe" to a discussion topic and thereby receive messages in my e-mail inbox with the option to reply straight back into the discussion topic. This is clearly not a new development in technology, so I was left wondering where the technology innovations lay in the virtual research environment system. The site featured a wiki, chat, who's online, file repository, public Web pages, each with some necessary user instructions. Whilst as a member of a research project, I and others in the team were willing to learn how to use the system, it rapidly became clear from the lack of responses to postings that many others had "been put off once" [e-mail correspondence] and were reluctant to engage again.

"Comparison virtual research environments developed by the research team were based around a large and very active community of e-researchers. The researchers in the project in this case, however, were largely teachers who were interested in pursuing research into their e-learning practices and had a considerable degree of experience of using virtual learning environments and other technologies for learning. Our interests were more about the learning processes than the technical issues. My own expectations of a virtual research environment were that it should be intuitive in the first instance, enabling text and images or video clips to be incorporated relatively simply into communication. There were additional steps required of the users, which I reported in a chat about the system design: "you can't easily jump out of typing a forum message to check the URL of the repository item. It is laborious." [extract from chat log]. Reconciling these expectations with the functionality of the virtual research environment was difficult. The separation between public, private (project-wide) and private (sub-group) spaces is a distinction that many virtual learning environments have tackled with varying success. I therefore welcomed the final decision by the project, prompted by an internal evaluation of the virtual research environment, to move the project to a virtual

learning environment with virtual research environment capabilities and pursue the research from there. Within this new VR/LE I was in the end able to conduct productive and collaborative, synchronous and asynchronous work within the research team."

Chapter II
Inter-Organizational E-Collaboration in Education

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abstract

In the world of education, many occasions necessitate interorganizational collaboration. Geographical distance and time constraints are challenges that prevent education professionals from meeting face-to-face to complete a collaborative task, provide ongoing technical assistance, or engage in dynamic professional development. Using electronic tools to bridge distance and overcome scheduling difficulties can be effective; however, research indicates that for these endeavors to be effective, there is a need to consider the purpose, tools, participants, and support structures. This chapter presents an overview of recent research surrounding these issues and its application to electronic collaboration (or e-collaboration) between education professionals.

introduction

Who engages in electronic collaboration? Anyone who needs to work with others, but faces the challenges of geographical distance and time constraints. Most educators cannot leave their schools or organizations to travel to another location during work hours and still fulfill the rest of their job responsibilities. Consider the following scenario:

A university's school of education has just won a bid to create an assistive technology guidance manual for the state department of education. One of the grant requirements is that there are classroom teachers and school building administrators involved in creating the resource, with representation from different grade levels as well as different regions across the state. Funding is available to compensate participants for their participation, but not for travel, food, or lodging.

It has been proposed that a virtual team develop the guidance manual.

The first issue to be addressed in this situation is how to select participants for the virtual team. There are hundreds of educators who might be interested in participating in this collaborative project; however, the group must remain of reasonable size to complete its task. Personal characteristics such as expertise with the subject matter are natural to take into consideration; personal interaction styles and experience in using collaborative technology tools might also be important here.

The project coordinator is a member of a statewide group of educators interested in assistive technology. She has already contacted several of the group's members that she knows fairly well and asked whether they might be interested in being on the team. To the teachers and administrators who showed interest, she e-mailed a short questionnaire that asked about the kinds of work styles they preferred and communication technologies with which they were comfortable.

Early in the process, the roles of team members will have to be considered, including whether a formal leadership role will be created or whether the team will be self-managed. In this case, the project coordinator may be a natural leader for the group. Discussion of policies and procedures will have to be facilitated by the leader or negotiated by the team; these will affect the development of trusting relationships between team members. Additionally, structures must be created to help the team negotiate the task and construct a final product that reflects their shared knowledge.

Who else engages in e-collaboration? In the world of education, effective professional development and technical assistance is often provided not by a single agency, but by a team of specialists who offer a range of expertise across a wide geographic region. The following is a typical example of collaboration across school divisions to create just such a group of experts:

At a recent regional meeting of directors of secondary instruction, several members from small school divisions across the state decided to pool their resources and create a series of after-school, high-quality professional development sessions for newly licensed and alternatively certified teachers. The potential professional developers will include one highly skilled teacher from each division, supported by several specialists from state and regional education agencies. The directors decided that all of the professional development sessions would be presented in some kind of distance education format, with recertification points offered by each school division.

As in the assistive technology scenario, the directors must find a tool to connect the professional developers to the regional and state specialists, to one another, and eventually to the teachers they will be training—all without removing them from the classroom to travel to another location or attend extensive meetings.

The directors need to consider what kind of tools will suit their purposes. They should carefully consider with what kind of e-collaboration tools their potential professional developers would be most comfortable. The directors will try to address potential barriers to communication and structure the tasks in a supportive way so that anyone who may not be "tech savvy" will be able to complete the collaborative planning and deliver the professional development with a reasonable output of time and effort.

Both the assistive technology workgroup and the potential professional developers will have to consider whether to try to arrange face-to-face interaction, and if so, when and how those interactions should occur to have the greatest impact. This chapter presents recent findings indicating that e-collaboration is effective when the right tools, tasks, participants, and structures are in place.

background

As educators, we must continually adjust to new technology use; we should not be surprised that new kinds of learning and working environments are produced when technology tools are used for shared problem solving. Adjusting to reduced nonverbal communication, accepting greater individual involvement, and learning new kinds of turn-taking skills are just some of the changes we face (Häkkinen & Järvelä, 2006). The complexity of some e-collaboration tools can be a genuine challenge for users, who rely on familiar arrangements and traditional methods (Munkvold & Zigurs, 2007). Time management, team coordination, and e-collaboration tool selection and use are all important issues that are currently far from resolved in the literature (Coovert & Thompson, 2001; Spicer & Dede, 2006).

Bridging the time and distance gap, as in the scenarios above, is only one of the strengths of electronic methods of collaboration. Recent studies have found that e-collaboration supported "forced" reflection, that having more time between interactions increased the quality of input from participants, and that electronic discussions in fact focused participants' attention and helped them to see others' viewpoints (Andriessen, 2006; Coovert & Thompson, 2001; Delmonico, Page, Walsh, L'Amoreaux, Daninhirsch, & Thompson, 2000). The shift from face-to-face to e-collaboration, however, requires a significant change in the way we approach group tasks.

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The literature on e-collaboration indicates steps to consider prior to its implementation. These steps include the determination of what the e-collaboration should accomplish, who should participate, and what policies, procedures, and structures should be created to support the collaboration.

Establishing the Purpose of the E-Collaboration

The purpose of the e-collaboration must be clearly stated to inform subsequent decisions regarding participants, tools, and structures. The majority of e-collaboration in education falls into two categories: professional development and virtual team task completion.

Professional Development

In recent years, a focus of K–12 education has been on the requirements for high-quality professional development and the value of mentoring, coaching, and peer support in both drawing teachers to the profession and maintaining a skilled faculty (Spicer & Dede, 2006). The trend is toward connecting inservice educators with high quality support without requiring the resources and time of traditional professional development sessions (Gordon, 2003).

Studies have found that online coaching and distance learning can be effective, high-quality professional development, as the arrangement allows participants to build their skills and knowledge base in a natural setting—their own (Kidwell, Freeman, Smith, & Zarcone, 2004; Williams & Kelly, 2006). Some school divisions have begun creating comprehensive systems of electronic, collaborative professional development. In a case study on the design and pilot of an interactive, Web-based, district-wide professional support portal, Spicer and Dede (2006) describe how a sophisticated system has been created for teachers to access collaborative professional development. A system such as this can be used to provide continual feedback and guidance to professional developers as well as to track participation, progress and difficulties encountered during the e-collaboration (Drinka & Yen, 2003).

Communities of practice are also a natural fit for e-collaboration. Growing in popularity, this method of sharing experiences and collaborat-

ing to expand individual and collective knowledge can be an important method of supporting educators (Dalgarno & Colgan, 2007). Both open- and closed-membership online communities of practice have offered new opportunities for educators to organize and share. Accessing expert knowledge, focusing on specialty areas, and exchanging ideas across the globe is becoming an increasingly viable option for the average educator (Dalgarno & Colgan, 2007; Franz & Gragert, 2003; Gordon, 2003).

Team Task Completion

E-collaboration often takes the form of a virtual team with participants from geographically distant organizations working together to complete a common goal without relying on face-to-face meetings, but instead using electronic media such as e-mail, chat, and Web conferencing (Drinka & Yen, 2003; Munkvold & Zigurs, 2007). The assistive technology workgroup scenario in the introduction to this chapter provides an example of a virtual team created to complete a task; in this case, to create a guidance manual that reflects a multitude of perspectives.

Virtual teams often find that structures taken for granted in traditional, face-to-face teaming require more sophisticated treatment in the electronic environment. Team meetings may use a combination of videoconferencing, teleconferencing, chat, and Web browsing; all of which are simultaneously supporting the other forms of communication (Spicer & Dede, 2006). As we will see in the following sections, such virtual teamwork requires carefully constructed, integrated support for communication processes (Drinka & Yen, 2003; Munkvold & Zigurs, 2007).

Selecting Participants for the E-Collaboration

When creating a collaborative group, considering member attributes such as work style, level of teaming skill, and social interaction method may be advantageous (Cuevas, Fiore, Salas, & Bowers, 2004). Several factors should be addressed, however, when creating an e-collaboration team:

- *Collaborative team members should be highly competent:* In most virtual teams, participants need a high degree of functional area competency to function as a member of the team and complete the task (Andriessen, 2006; Bradley & Vozikis, 2004; Staples & Cameron, 2004). E-collaboration situations focusing on team task completion generally are not good environments for participants to "learn as they go." Even participants in e-collaborative professional development may need at least a minimal level of content knowledge to be able to participate fully without the need for extensive clarification or basic instruction.
- *Collaborative team members should have skill with technology*: Participants should either already be skilled with the technology used by the team or be trained early in the process (Bradley & Vozikis, 2004). One study found that some members of the team assumed that others had greater knowledge of the technology being used than was actually the case (Bielema, Crocker, Miller, Reynolds-Moehrle, & Shaw, 2007); misunderstandings such as these can lead to conflict in the team.
- *Collaborative team members should have the time to participate:* Keep in mind relevant external environmental factors that act on group members (Cuevas et al., 2004). Participants in one study of e-collaboration found that their other job duties as school librarians compromised the increasingly-standard expectation of immediate response (within 24 hours) for e-mail and Web requests for information (Bielema et al., 2007).
- *Collaborative team members should be self-starters:* Members should be able to work

away from supervision and be comfortable doing so. Self-starters also tend to inspire trust in their work and trust others to work the same way (Connaughton & Daly, 2004).

- *Collaborative team members should show willingness to trust:* Consider not only expertise when making up teams, but also interaction style-how a participant handles conflict related to tasks or relationships. Virtual teams with too few or too many extroverts can become aggressive or passive; this leads to low performance (Potter & Balthazard, 2004). As in the assistive technology scenario from the introduction, consider using personality inventories when constructing teams, and then follow-up with team-building activities as needed (Potter & Balthazard, 2004).

Creating Structures to Support the E-Collaboration

Finding the Right E-Collaboration Tool

To prepare for the discussion on selecting tools for e-collaboration, it must be clarified that if one person could complete the task independently, or by collecting information from others could do it independently, there would be no need to have a team in the first place. The true point of the team process is that, by sharing minds, a product is created that is greater than what one could do alone (Klein & Kleinhanns, 2003). If at this point we realize that there is no need for a sharing of the minds, and that one person could simply take on the task of collecting or disseminating information, we have then determined that there is no need for e-collaboration. For tasks that, in fact, require collaboration, we address frameworks for considering e-collaboration tools.

E-collaboration technologies are any of a range of electronic technologies that help individuals work together to complete a common task (Kock, 2006). Many tools for communication and correspondence are billed as "collaboration tools" (Häkkinen & Järvelä, 2006). The reality is that only an electronic tool that actually helps a particular team to collaborate is an effective collaboration tool for that team.

Research on the effectiveness of e-collaboration tools tends to revolve around two theoretical frameworks: media richness and media naturalness. The *media richness* framework focuses on how "rich" a communication medium is, or how much of the texture and depth of typical face-to-face conversation it incorporates. The central concept of the media richness framework is that a rich medium (such as videoconferencing) more closely approximates face-to-face interaction and therefore increases users' comfort levels. Less rich, or "lean," media (such as e-mail, discussion boards, or chat) lack the characteristics of face-to-face communication and may lead to increased communication difficulties that negatively affect group work (Kock, 2006). Recent research has demonstrated that team members' increasing familiarity and comfort with lean media leads to more positive perceptions and a reliance on those tools even when richer media are available (Crider & Ganesh, 2004). Research also indicates that virtual teams working with videoconferencing (a richer medium) did not achieve higher task performance than those working with chat (a leaner one) (Hambley, O'Neill, & Kline, 2007).

Another framework to note is that of *media naturalness*; this view proposes that because people naturally rely on auditory and visual cues for communication, any decrease in the degree of naturalness will result in greater cognitive effort expended and increased ambiguity of messages (DeRosa, Hantula, Kock, & D'Arcy, 2004). Based on these two frameworks, when selecting tools for e-collaboration we should keep in mind the following:

- Matching the richness of the tool to participants' skill and comfort levels should reduce communication difficulties.

- Making adequate auditory and visual cues available to participants should reduce the cognitive effort required to complete tasks.
- Making adequate auditory and visual cues available to participants should reduce the ambiguity of communicated information.

With this in mind, let us consider some typical tools used in e-collaboration.

The time in which the tool allows participants to interact is either synchronous or asynchronous. Synchronous tools are used by participants at the same time (e.g., electronic chat, videoconferencing) while asynchronous tools are used by participants at different times (e.g., e-mail, discussion boards) (Ferris & Minielli, 2004; King, 1998; Munkvold & Zigurs, 2007). Some tools support both synchronous and asynchronous communication (e.g., wikis). In the two scenarios shared in the introduction, there appears to be a need for both synchronous and asynchronous communication.

The way an e-collaboration tool supports participant interaction is called the *medium*. Text, graphics, and shared whiteboards are features available in many e-collaboration tools (Munkvold & Zigurs, 2007). Shared workspaces with whiteboards and chat offer a leaner alternative to the videoconferencing medium (Hinds & Weisband, 2003).

The way in which a medium supports interaction is not always apparent; participants may use typical tools in atypical ways. Typical usage of bulletin boards includes making announcements, posting schedules, offering recognition, and sharing celebrations (Hinds & Weisband, 2003). Groups in one study, however, used an electronic bulletin board as a means to communicate status reports because they perceived the board as a place to put more "permanent" information: they posted complete or partial transcripts of their chat discussions on the bulletin board, using the two media to create both asynchronous and synchronous workspaces (Crider & Ganesh, 2004).

Returning to the scenarios in the introduction, the groups will probably find that several tools are necessary. The assistive technology workgroup will require ways to share perspectives and explain ideas, possibly with graphics and pictures. Some kind of workspace to store completed documents and works-in-progress will also be necessary. In the potential professional development scenario, videoconferencing may be required as well-especially in preparation for the actual instruction of their fellow teachers.

E-collaboration tools can be characterized not only by time and medium, but also by their *structure*. Structure refers to the way in which the tool supports the group's development and product creation. Examples of group tasks include cognitive mapping, brainstorming, consensus building, and decision making (King, 1998; Michinov & Primois, 2005; Munkvold & Zigurs, 2007). Which structures are necessary for the group to have supported by their e-collaboration tools depends on the function of the team. There are differences in what groups are charged with doing: making decisions, completing tasks, brainstorming solutions (Driskell & Salas, 2006). Some tools are intended specifically to support group decision making, and integrate several tools within a larger package: e-mail, brainstorming software, electronic meeting rooms, and other synchronous and asynchronous applications (van der Kleij & Schraagen, 2006). Learning management systems such as BlackBoard and commercial groupware packages such as Lotus Notes have also been used in this way (Ferris & Minielli, 2004; Munkvold & Zigurs, 2007). It is not unusual for a group to create its own package of applications to meet its structural needs (Driskell & Salas, 2006; Kock, 2006).

When selecting e-collaboration tools, realize that media choices matter. Match the media to the task; many tasks do not require rich media such as videoconferencing. Be aware, however, that lean media are not good for tasks such as sharing highly sensitive opinions and handling conflicts

as they lack the ability to provide nonverbal cues (Connaughton & Daly, 2004). Equal access to a given medium, although not discussed here, should be taken into consideration. For example, groups with members in remote areas who rely on dial-up internet connections or unreliable satellite systems should avoid internet video-conferencing and high-bandwidth virtual reality environments. Tool selection must match the task and the participants; only then can the real work of the group begin.

Determining Leadership Roles, Policies, and Procedures

Issues of group management need to be examined prior to the beginning of an e-collaboration effort (Delmonico et al., 2000). Self-managed teams with established policies and procedures have the benefit of a high level of autonomy, while facilitated groups can take advantage of the benefits of centralized coordination. This section presents seven areas of concern when establishing leadership roles, creating policies, and establishing procedures.

Leaders should be knowledgeable of the nuances of e-collaboration. Research indicates that virtual teams are more task-focused than traditional face-to-face teams; leadership therefore is more about enhancing efficacy than directing the work (Bradley & Vozikis, 2004; DeRosa et al., 2004). A study on short- and long-term virtual teams indicated that participants who believed that their teams had low autonomy also had low motivation, low commitment to the task, and low satisfaction with their own work (Staples & Cameron, 2004). Effective leaders of e-collaboration groups often address this by adopting the roles of facilitator, coach, and trainer rather than the traditional roles of director and decision maker (DeRosa et al., 2004).

This may require some changes in leadership styles. For example, "selling" ideas to e-collaborators is more effective than "telling" them what to do (Connaughton & Daly, 2004). Meeting processes also may change: team members were noted to offer little during conference calls when the leadership style constricted interactions (Hinds & Weisband, 2003). Facilitating the creation and implementation of structures and policies for team self-management, therefore, may become an integral part of the leadership role.

The team should have explicit objectives and clearly defined division of tasks. Like their more traditional counterparts, virtual teams require coordination to reach the group's goal. Encouraging and requiring geographically distant group members to adhere to schedules and maintain communication and follow-through is important (Connaughton & Daly, 2004). Each member of the team should understand his or her roles and responsibilities, and a certain amount of shared accountability should be built into team processes and protocols (Klein & Kleinhanns, 2003). This shared accountability, discussed below, increases trust among participants and, in turn, group cohesiveness. To keep the group on track, leaders should make use of automatic documentation of progress provided by the e-collaboration tools to track contributions, progress and problems as well as to facilitate feedback and guidance from stakeholders rather than requiring time-consuming written reports and oral report-outs during meetings (Drinka & Yen, 2003).

The team should manage time in an effective way. Time management is an important concern for many virtual teams; indeed, it is sometimes the reason that the group is using electronic rather than face-to-face collaboration. In studies of synchronous communication use, it is recognized that inefficient discussions lead to a need to have more discussions to complete tasks (Klein & Kleinhanns, 2003). It is important to address missed deadlines and unfulfilled responsibilities early; these lead to reduced trust and wasted time as members must wait for interconnected task components to be completed. When synchronous discussions are scheduled, late arrivals, no-shows,

and multitaskers often increase the amount of time required to update participants on issues. This limits the group's ability to move forward and can become a cycle in which frustrated team members will also begin to demonstrate those behaviors (Klein & Kleinhanns, 2003). Policies and procedures to address these issues may save a great deal of time and frustration during synchronous discussions.

Not all discussion needs to be conducted in real time; participants in a study on computer conferencing preferred asynchronous discussions to synchronous, as they felt that asynchronous discussion gave them the chance to reflect longer (Andriessen, 2006). The matter of time for reflection is addressed in recent literature; an improved quality of input into discussions and idea exchange was obtained due to increased time for reflection and participants investing more time in preparing their responses (Coovert & Thompson, 2001; Delmonico et al., 2000; Häkkinen & Järvelä, 2006; Kock, 2006). It is noted, however, that virtual teams tend to take longer to reach consensus than face-to-face teams; this could be due to increased time for reflection, the lag in putting thoughts into written words or the simultaneous coordination of other activities in an already full workday (Bielema et al., 2007; Coovert & Thompson, 2001; Klein & Kleinhanns, 2003).

The team should establish a formal communication discipline in the beginning. Norms for communication must be established from the start. Should we respond to e-mail within 24 hours? How will we use e-mail attachments and the "reply to all" function? What days and times are reasonable to call? Determining the appropriate communication media and contact information for the type and urgency of a message and establishing documentation procedures, including the uses of e-mail subject headings, file types, and urgency markers are just some of the guidelines that should be decided at the beginning of an e-collaboration effort (Connaughton & Daly, 2004; Cramton & Orvis, 2003; Delmonico et al., 2000; Griffith, Mannix, & Neale, 2003).

A great deal of information is shared in e-collaboration, and it falls into three categories: task information (related to completing the work), social information (related to participants and relationships), and contextual information (related to the situation in which the group is working) (Cramton & Orvis, 2003). Procedures should detail what information should be shared with all participants and what can be unshared, remaining known to only one or a few (Cramton & Orvis, 2003).

Teams should be aware of the challenges posed by the reduction or elimination of social and nonverbal cues when using e-collaboration tools. These seemingly minor aspects of communication are lost when using e-mail, interactive online whiteboards, teleconferences and other lean media, and their absence can interfere with open communication and knowledge sharing (Delmonico et al., 2000; Hinds & Weisband, 2003). Clarifying issues and properly focusing responses can be challenging when nonverbal cues are unavailable (Bielema et al., 2007). Some groups have worked around this by standardizing a set of emoticons, using digital objects to represent nonverbal cues during discussions, or adopting easily-changed avatars that adjust to fit the mood or perspective of the user (Mowbray, 2001).

Leaders should monitor communication by using the automatic documentation of team correspondence and virtual meetings and intervene when problems arise (Bradley & Vozikis, 2004; Cramton & Orvis, 2003; Drinka & Yen, 2003). Some leaders set an example as well as stay in contact by "overcommunicating," making certain to inform everyone of information in the same way and at the same time, maintaining weekly communication, as well as frequently offering and requesting feedback (Connaughton & Daly, 2004; Cramton & Orvis, 2003; Klein & Kleinhanns, 2003). Do not avoid asking basic questions that can be answered quickly if they will clarify an assumed process; one study found that participant pairs relying on e-mail communication often incorrectly assumed that they were using the

same data collection processes as their partner as they had not sufficiently clarified those processes (Hinds & Weisband, 2003).

The team should foster interdependence to build trusting relationships. Although it seems counter-intuitive, there needs to be some group risk in order to build group trust. The team should seek a healthy level of interdependence, in which participants must let go and depend on the actions or knowledge of their team members to complete tasks. This interdependency means that all team members must be competent, capable, and reliable, or trust will be broken (Bradley & Vozikis, 2004; Gibson & Manuel, 2003).

Communication training may improve team trust, as will the participants' perception that a system is in place to prevent other team members from taking advantage of them (Bradley & Vozikis, 2004). Consider including veteran e-collaborators, as participants who have been virtual team members before can increase the trust level of the group (Bradley & Vozikis, 2004).

As obvious as it may seem, it is important to develop trusting behaviors by ensuring that everyone is ascribing similar value to the task. In a recent study of groups collaborating between two universities, participants from university A had only 5% of their grades based on the task, while university B allocated 30%. Not knowing this, participants from university B denounced the "shortcut" attitude of those from the other location as a significant trust-reducer (Evaristo, Watson-Manheim, & Audy, 2007).

A note about e-collaboration tools: they are not necessarily designed to build trust. In one study, a private "whisper" conversation function was available for any pair of participants to privately converse during a meeting without the larger online support group being interrupted. Rather than helping the team to multitask, it was cited by participants as "guilt-producing" and potentially trust-breaking (Delmonico et al., 2000). Lean e-collaboration media lack nonverbal cues about trust; rely on richer media such as videoconferencing if the group becomes beleaguered by trust issues (Bradley & Vozikis, 2004; Gibson & Manuel, 2003).

The team should be aware of the social and cultural aspects of team development. One of the key features of a virtual team is awareness by the participants that they are, in fact, a "team" (Millward & Kyriakidou, 2004). Be sure to build the social identity of the e-collaboration group in a positive and productive way, perhaps by having the group determine a meaningful team name and personalizing their shared electronic work space (Bradley & Vozikis, 2004; Cramton & Orvis, 2003; Hinds & Weisband, 2003). "Small talk" or "water cooler talk" is also cited by experienced virtual team leaders and e-collaboration participants as an important social connection. Participants indicated that celebrations, announcements, and some general social conversation provide an important human link in a virtual environment (Connaughton & Daly, 2004; Crider & Ganesh, 2004; Hinds & Weisband, 2003; Klein & Kleinhanns, 2003; Leonardi, Jackson, & Marsh, 2004).

According to the literature on electronic collaboration, cultural nuances cannot be ignored. Teams with greater cultural differences tend to report less trust (Gibson & Manuel, 2003). Differences in personal and professional experiences may lead to different models being applied to addressing tasks (Hinds & Weisband, 2003).

Conflict and misunderstandings may be avoided by taking steps such as building a shared vocabulary and maintaining awareness of how time concerns (e.g., work schedules, local holidays, personal concerns) may vary for participants (Connaughton & Daly, 2004; Gibson & Manuel, 2003). Lack of information about a colleague from a different subgroup can lead to an exaggerated perception of risk based on group membership (Gibson & Manuel, 2003). Stereotypes based on personal or cultural characteristics, job status, or location may interfere with healthy team development if other, more constructive, pieces of information are not available to replace them.

The team should use processes for effective knowledge building. E-collaboration efforts are knowledge-building communities. To be a knowledge-building community, there must be a sharing of ideas and multiple perspectives, instances of cognitive conflict and resulting discussion, reflection on what has been learned or shared, and synthesis into one or more formal or informal knowledge products (Bielaczyz & Collins, 2006; Hinds & Weisband, 2003). Procedures should be developed to support these processes. E-collaboration tools that allow files to be posted and altered, discussion to be archived, and mental models to be visually represented allow participants to continually discuss issues as well as add new information and adjust existing material. Maintaining this ongoing process has been identified as a problem area by many e-collaboration participants (Connaughton & Daly, 2004; Cuevas et al., 2004).

Considering the Use of Face-to-Face Interactions

At times, groups engaging in electronic collaboration have the ability to arrange one or more face-to-face meetings. There is research supporting the use of in-person interaction to build trust, social connections, and shared understanding (Connaughton & Daly, 2004; Griffith et al., 2003; Hinds & Weisband, 2003; Leonardi et al., 2004). A caveat from Hinds and Weisband (2003) addresses the location of that meeting; they suggest that the group not meet in off-site retreats, but if possible meet in one of the work environments. This builds shared contextual understanding.

Consider the specific situation when making a decision about arranging face-to-face meetings. Meetings at the beginning of an e-collaboration effort can help participants get to know each other and build a sense of belonging, stronger social relationships, and shared knowledge; a recent study found that greater participation was elicited from team members after a midpoint face-to-face meeting than before (Michinov & Michinov, in press). In general, current research on when to introduce face-to-face contact is inconclusive.

f utur E t r Ends

Collaborative communities are increasingly adopting Web 2.0 social networking tools such as wikis, blogs, and virtual reality environments. As Munkvold and Zigurs (2007) point out, the challenge will be in successfully incorporating these "bottom-up" media into organizational environments. What remains to be seen in the world of educational collaboration is whether schools will allow or block access to these emerging technologies, assuming that they have the hardware and bandwidth necessary to connect to them at all.

c onclusion

There is both an art and a science of creating an effective collaboration of any kind, and with the introduction of e-collaboration tools the blend must be even more carefully considered. Experienced virtual team leaders and participants in electronic collaboration efforts indicate that policies and structures must be put in place and supported for e-collaboration across organizations to be successful; this, as we have seen, is supported by research.

As this is published, the world of technology is continually advancing. How might things turn out for the two groups from our scenarios? Perhaps the assistive technology work group would create, in addition to the guidance document, a continually updated wiki to build collaboratively their knowledge of the ever-changing field of assistive technology. The directors of secondary instruction may sponsor a virtual world on a commercially available site that houses their region's regularly scheduled professional development. As social networking tools evolve and expand, so will the

options available in the area of electronic collaboration. Issues of trust and communication, policies and procedures, and matching the right tool to the task at hand, however, will always be important.

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kEy tErms

Asynchronous: Occurs at different times.

Lean Medium: A medium with little of the texture and depth of face-to-face communication.

Media Naturalness: A theoretical framework proposing that because people naturally rely on auditory and visual cues for communication, any decrease in the degree of naturalness will result in greater cognitive effort expended and increased ambiguity of messages.

Media Richness: A theoretical framework focusing on how "rich" a communication medium is, or how much of the texture and depth of typical face-to-face conversation it incorporates. Less rich, or "lean" media (such as e-mail, discussion boards, or chat) lack the characteristics of face-to-face communication and may lead to increased communication difficulties that negatively affect group work.

Medium: The way in which an e-collaboration tool supports participant interaction.

Rich Medium: A medium that more closely approximates the texture and depth of face-to-face communication.

Structure: The way in which an e-collaboration tool supports the group's development and product creation.

Synchronous: Occurs at the same time.

Chapter III
Cultural Issues in Global Collaborative Education[1]

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abstract

This chapter discusses cultural differences in educational practices of the East and West. In East Asian countries, where Confucian philosophy has influenced its educational practices, values of respect for authority, harmony among a group, and diligence in the face of adversity are its overarching principles. Western countries emphasize Socratic principles which value open dialogue and advocate critical thinking among students. This chapter then discusses educational history and practices in Japan as a case study of education in the East. In this age of globalization, educational systems in one culture cannot exist in isolation, and we often have to look at ways to accommodate students from diverse cultural backgrounds in an educational program. Finally, the chapter examines the difficulties students from a Confucian culture will encounter when they enter educational systems in the West to pursue advanced degrees, and suggests the ways for educators to be inclusive of students of differing cultural backgrounds.

introduction

The walls of higher education have been breached so that it can no longer be seen as a sequestered bastion of higher education (Altbach, Berdahl, & Gumport, 1999). Universities can no longer remain isolated from societal change. A great number of social and economic shifts, along with new technologies, have opened a number of gateways to the acquisition of various forms of education. The cultural differences in educational practice become crucial to identify and resolve in an age of globalisation as recent increases in transnational student mobility have occurred.

In other words, large numbers of students from non-English-speaking countries are arriving to study in English-speaking countries, due to the pervasiveness of English as the lingua franca in today's global society.

This phenomenon is exacerbated if you consider distance education through information and communications technologies (ICT). Students are enabled to access online classes offered by institutions abroad all without leaving their homes. Collaborative education had become a topic of discussion since computer conferencing or computer-mediated communication (CMC) was introduced into the learning environment, enabling students to build knowledge collaboratively and to learn from one another. Collaborative education is built upon the principle of the socioconstructivist perspective whereby knowledge is believed to be socially constructed. In this paradigm, teaching and learning cannot be understood without taking into account its sociocultural environment, especially the attendant cultures that participants bring in to the learning environment.

There exist considerable differences between the educational systems of Asian and Western countries. However, little attention has been paid to the significant difficulties that arise for students of Asian origin when classes are taken from a Western institution and they find that they are expected to be "Westernised" into the critical Socratic model. The central issue is usually their participation in classroom discourse, collaborative teams, and group projects. In the West, classroom participation is regarded as central to active learning and as contributing to higher thinking skills and heightened intellectual development (Bronwell & Eison, 1991; Lee, 2003).

In the East, classroom participation is discouraged especially in tertiary education, and writing assignments are evaluated mostly based on whether they are indicative of a solid foundation of knowledge, and not on whether they opine to indicate critical thinking in the Western sense.

In this context, it is imperative for academic teachers to re-examine their pedagogies to accommodate changes in student population. It does not require that there be fundamental changes in pedagogies, but nowadays, teachers need to make the pedagogical assumptions explicit to include those students who have not been exposed to Western norms. Pedagogic alternatives in this new borderless environment need to be understood in nonimperialistic ways, and cultural dimensions of leaning should be addressed in designing and delivering instruction (McLoughlin, 1999; Kim and Bonk, 2002). There have been ongoing reflections about comparative pedagogy, with a focus on contrast between Confucian philosophic and the Socratic-dialectic principle. The former is seen as underlying much of the educational practice in Japan and other countries of East Asia, while the latter is established in educational practice in the UK and other Western countries. Though any such discussion of cultural differences oversimplifies and ignores diversity within, it is nevertheless useful to look at the broader picture of cultural differences.

Education in the East vs. the West

Many academic teachers in multicultural classrooms the author has talked to in the past mention that students from different cultures exhibit differing patterns in their learning styles and in their interactions with their teachers and peers. However, it is often not discussed why such differences exist. As culture consists of "ideas, values, and assumptions about life that are widely shared among people and that guide specific behaviours" (Brislin, 1993), we have to look at those underlying values which guide the specific behaviours of students.

In Western countries, including the UK, teachers value private and public questioning of widely accepted knowledge, and encourage learners at

all levels to question the beliefs of others' and to generate their own hypotheses. This leads to one of the core elements in building teamwork. Agreement is reached through questioning and defending one's understanding of the topic at hand. Conversely, educational philosophy in the East, including Japan, has been influenced overtly and covertly by Confucianism, which values diligence, respect for authority, and pragmatic acquisition of essential knowledge. In the Confucian model of learning, students are not supposed to question authorities who are considered to be knowledgeable and unassailable in their given field. While Socratic methods have been explicitly discussed in the West, the Confucian tradition has permeated a number of East Asian societies for so long and so deeply that many educators in the East view it as beyond question.

Confucius (who was originally named Kong Fu Ze) was born in 551 B.C., and became a high-ranking civil servant in China who trained and educated fellow civil servants. He developed a set of practical ethical guidelines to guide people's behaviour that valued respect for elders and authority, maintaining harmony within a group, and working hard (Hofstede & Bond, 1988). For Confucius, a key goal of teaching is to model the exemplary behaviour of a teacher, and thus enable learners to reform their own behaviour accordingly. Confucius believed that learning is not a mere accumulation of knowledge, but a gradual transformation in the learner's behaviour so as to become more virtuous and more skilled. To be a virtuous person or to hold *Ren,* Confucius said, people have to learn the rites, etiquette, or manners that will enable them to identify themselves properly. He believed that this is done by observing and learning from people who provide (role) model behaviours, and learners were encouraged to find someone superior to them to imitate (Confucius, 1979 (cited in Tweed & Lehman, 2002)).

Confucius referred to himself as a transmitter of ancient knowledge rather than a creator of knowledge, and discouraged excessive focus on generating ideas and expressing personal hypotheses. For him, learning was not focused on questioning, evaluating, or generating knowledge, but on imitating the greatest exemplars in behaviours and characters. The underlying assumption here is that most of the important truths are already known to those exemplary figures. Therefore, in order to learn, a person must pay attention to these exemplary figures. In other words, Confucius did not encourage students to seek truth on their own by testing their personal hypotheses, but to accept and follow what was already accepted as exemplary.

In contrast to Confucius, Socrates, born 82 years after Confucius, consistently and constantly questioned his own and others' beliefs, and valued self-generated knowledge based on personal hypotheses. The teaching method known as "the Socratic method" utilizes repeated questioning to expose what one is ignorant of and thus to arrive at truth. Socrates believed that learning should lead to knowledge, not to merely true belief.

Tweed and Lehman (2002) summarized the differences between Confucian approaches and Socratic approaches to learning along the following six dimensions:

1. Effort-focused conception of learning
2. Pragmatic outcome vs. truth
3. Behavioural reform vs. seeking truth
4. Postponing questioning vs. overtly questioning
5. Acquiring essential knowledge vs. expressing personal hypotheses; and
6. Desire for structured tasks vs. self-directed tasks

In the Confucian philosophy, effort and hard work are central to the learning process; academic success is achieved by effort rather than by inherent ability. In addition, Confucian philosophy focuses on practical outcomes in education such as attaining higher status employment rather than learning for its own sake. Further, questioning of

others is discouraged, because a high value is given to harmony as well as attaining essential knowledge from outside oneself (i.e., from teachers and texts). Thus, Confucian philosophy does not accept the notion of personally developing knowledge, but maintains that students can only, and always, learn best from a competent teacher.

Educational practices in japan

East Asian countries; such as Japan, Korea, and China are influenced heavily by the Confucian philosophy, and here, we will look at the history of educational practices in Japan as an example of educational practices rooted in Confucian philosophy.

In Japan, the influence of Confucian philosophy upon education became prominent during the Edo period (17th to 19th century), when there were four social classes: samurai (warriors), farmers, artisans, and business people, which in practice, split into two: samurai or nonsamurai (commoners). The samurai attended *Hanko* where they primarily learned the teachings of Confucius so as to become political leaders. Commoners attended *terakoya* ("temple schools"), private schools made up of about 20 learners, which focused on teaching basic knowledge required by commoners for their daily lives (reading, writing, and elementary arithmetic using an abacus). The main teaching method at *terakoya* was repetitive drilling. Another type of schooling during this period was *gogakko* where samurai and commoners were usually allowed to study together. Yamamura (2002) analyzed the textbooks used at *gogakko,* and concluded that *gogaku* put more emphasis on Confucianism ethics than *terakoya* education, further codifying and enmeshing the practices of Confucianism into what was the "prescribed method" of teaching.

The Meiji restoration in 1868 brought about the "modern era" of Japan, ending nearly 700 years of the military rule and introducing the notion of "Japanese spirit and Western knowledge." At this time, Japan began to accept educational philosophies and institutions of the West as a layer over the top of traditional teaching forms based on Confucianism. Emperor Meiji issued the Imperial Rescript on Education to illustrate the moral principles based on Confucian ethics and, in 1872, created a modern school system to include a period of six years of compulsory education. After World War II, the education system was modernised under the American occupation. However, it did not radically change the educational practices in Japan, which focus on teaching the skills and knowledge to pass exams as manifested in the Confucian philosophy of education. Actually, the modernization of the educational systems after WWII led further to a highly exam-oriented credentials-needy society at the cost of "true" education as Japan struggled to catch up with other developed nations (Dore, 1976).

The modern Japanese school system has been criticized for its overemphasis on entrance examinations and by the cramming of detailed knowledge over long periods of time (Rohlen, 1983). In response to such criticisms, the Japanese Ministry of Education, Culture, Sports, Science, and Technology (MEXT) relaxed its national curriculum in an attempt to create a more independent-minded and assertive persons, similar to their Western counterparts. However, the policy has recently been criticized for the declining academic skills of students in general, evidenced by the recent OECD's Programme for International Student Assessment (PISA) score, and also for the widening gap between those students who can afford to go to *juku* (i.e., cram schools) for improving their academic skills and those who cannot. Public schools in Japan usually operate based on egalitarian principles, and there is basically no differentiation in treatment based on students' abilities. Teachers tend to focus on the average and below-average students, and above

average students have no option but to attend cram schools at parental expense to obtain additional knowledge and skills for passing entrance examinations to competitive upper schools. In other words, even though the government attempted to change the educational tradition of the Japanese public school system, it failed to change the overall structure and the culture of educational systems as a whole in Japan.

The Confucius philosophy of education tends to focus on a more passive style of learning: rote learning, recitation of said information, and not questioning or any emphasis on critical thinking. Throughout the history of Japanese education, the systems have reinforced such Confucian methods of teaching and learning by using entrance examinations as the main objective of education up to the high school level. In Japan, going to a college has meant enjoying a moratorium between the period of studying excessively for entrance exams and that of being a slave to the employer for the rest of their lives. In many college classrooms in Japan, therefore, little is expected from students in terms of learning activities except for taking exams, and many teachers do not demand active participation from the students. This tradition focuses on individual achievements rather than group achievements on academic matters, and though many intercultural researchers argue that Japan is a collectivist culture in which the goal of a group is prioritized before that of an individual, it may not be the case when it comes to academic achievements.

approac HEs t o c ul tural Educa tional d ifficul ti Es f ac Ed by a dv anc Ed programs in t HE wE st

It is a commonly expressed concern in Western universities that Asian students do not readily participate in discussions during class sessions, that they are reluctant to say anything that might appear critical of their teachers, and that they are generally less critical than is expected. Critical and participatory behaviours, while not compulsorily enforced, are regarded as a significant component of education in the West[2]. Gillett and Weetman (2007) contended: "It is generally accepted that student-student interaction, both formal and informal, is beneficial in higher education." Southall, Rushton, Haga, Kane, and Mccormick (2007) also argued: "A student's previous educational experiences leave ingrained cultural values and is therefore, an issue for all international students and not just those for whom English is a second language. Some of these students may have come from an educational background and a culture where communication is very much one-way from the lecturer or the person in authority and where class participation and critical reasoning are not encouraged."

The influx of students from Asian countries—including Japan to Western educational systems, due to the globalization of educational markets—has made educators in the West aware of the difficulties Asian students encounter when expected to participate equally in their classrooms. In Western classrooms, students speak freely, while Asian students tend to remain silent. Originally attributed it to linguistic difficulties, it was soon realized that the lack of participation was not solely due to language differences. The Confucian concepts of respecting authorities and face-saving discourage Asian students speaking up in class or challenging teachers, and often, they are perceived as less intelligent or shy. However, their silence in classrooms does not always mean that they are not engaged in learning in the classrooms, nor it does not mean the absence of intelligence among those students.

When it comes to online learning, such cultural differences may be less obvious, as many online learning programs encourage autonomous learning, and many interactions are limited to asynchronous varieties. However, online learning, which is usually based on constructivist principles,

emphasizes dialogues and interactions among learners, and cultural differences may become more observable in such programs. For example, Liang and McQueen (1999) compared Asian and Western adult learners based on their participation patterns in a Web-based interactive learning program and observed that Asian students tended to rely more heavily on direction from their teachers than their Western counterparts.

In the Western classrooms, Eurocentric classroom norms and behaviours are expected without explicitly being stated. Those students who have grown up in Western cultures will not typically have problems in the Western classrooms, but those who have not been exposed to these cultural norms may have problems in responding in ways expected by their teachers. Those who are silent or reserved create an "interactional chasm" between Eurocentric standards of participation and the cultural beliefs of those who have grown up in the Confucian culture (Lee, 2003). However, for those Asian students, especially those from a Confucian culture such as China, Korea, or Japan, silence in interpersonal interaction can be regarded as a manifestation of harmony, but oftentimes, the silence can be caused by the fear of looking stupid or foolish as a result of giving incorrect responses (Lee, 2003).

In Japan, silence may have additional deeper meaning; a polite acknowledgment of failure or inability to give a correct answer or a behaviour without disrupting the flow and harmony. Seltman (1991) classified silence in Japanese classrooms into five categories: surprised silence (happens when students are caught off-guard), silence as an expression of agreement or disagreement (usually accompanies nods of the head), silence as an expression of femininity (based on a common belief of an ideal Japanese woman), silence as an expression of defiance (to convey an explicit message), and silence as passive resistance (to show dissatisfaction).

When it comes to online learning, the issue becomes more complex as most learning management systems utilized for online learning have been developed with a bias for Western culture and amplify the norms and expectations of Western classrooms as indicated by McLoughlin (1999). Henderson (1996) also indicates that instructional design to develop a course is an intangible aspect of culture, and once it is built into the tangible course materials, it becomes a product of culture and cannot exist outside of a consideration of culture. Without any nonverbal cues, the silence of Japanese students described above in the online learning environment created for Western classrooms can be regarded as mere nonengagement, even though there are a variety of reasons why the Japanese students do not express opinions in the context.

There is a wealth of literature on cultural differences in the field of intercultural study (e.g., Brislin, 1993; Gudykunst & Nishida, 1989; Hall, 1985; Hofstede, 2001; Markus & Kitayama, 1991). Though the intercultural literature tends to focus on observable behavioural differences without investigating the underlining assumptions to manifest those behaviours, it is often useful to examine cultural differences in behaviours and attitudes using the classifications presented in the literature. Edward T. Hall, a well-known anthropologist in the field of intercultural communication, suggested the dichotomy of high context versus low context cultures.

It suggests that in a high-context culture, there are many contextual elements that signal the culture's rules to its members. As a result, much is taken for granted. This can be confusing unless the "unwritten rules" of the culture are understood. By contrast, in a low-context culture, much is overt and explicit, and therefore, very little is taken for granted. This means that there is less room for misunderstanding. Highly mobile environments where people come and go require a lower-context culture. With a stable population, however, a higher-context culture may develop.

Table 1 is an attempt to link Hall's approach to the uses of cultural variables found in educational contexts.

Although the key question arising from our considerations ought perhaps be whether members of other cultures *should* change their preferred modes of thinking or behaving, we find that student members themselves feel that it could be beneficial to them to do so, if only for a temporary pragmatic outcome.

First of all, teachers in the West should know that most students from Asian countries have rarely been exposed to teaching methods which require interaction between teachers and students or among students that are common in classrooms in the West. That does not mean they are incapable of doing so, but it's just that as they have not been exposed to that kind of instructional method, they don't know what is expected in classrooms in the West. In a Confucian culture, where instruction is rather teacher-dominated, being quiet and obedient is regarded as a sign of respect for teachers, and expressing opposing views as improper and often rebellious. Though memorisation is a central activity in Confucian education, Confucian teaching also emphasizes reflective thinking and treats memorization as a precursor to deeper understanding.

Students from a Confucian culture assume they are expected to continue to behave as they have done in their countries. Therefore, teachers have to start with challenging those students' assumption that a teacher's role is to stand and deliver, while students sit quietly absorbing the proffered wisdom. Teachers have to make the students aware that learning in the Western schools can be very different from what they have been exposed to in education in their own countries, and independent thinking is very much encouraged. Explain to them the concept of active learning, cooperative learning, and critical thinking in simple terms, and make the expectations as students explicit. According to Rij-Heyligers (2002), those students need to be taught how to build up their "intellectual resources" in a specific subject area, including how to use the library, read effectively, complete assignments effectively, and reference and paraphrase appropriately.

Table 1. High- vs. low-context culture in education

Factor	High-context culture in education	Low-context culture in education
Overtness of messages	Confucian	Socratic
Locus of control and attribution for failure	Acceptance of the cultural system and re-doubling of effort when failure is encountered	Trying to find better teachers, coaching, etc.
Use of non-verbal communication	Principles of the educational system not discussed except among scholars. Facial expressions are understood	Overt discussion, debate about methods, etc.
Expression of reaction	Students accept silence and do not explain their problems	Students ask openly for advice
Cohesion and separation of groups	Confucian studies build small learning communities	Socratic methods encourage fluid, open, group discussions
People bonds	This becomes evident within a wider, foreign, community	Teachers, academics, students – feel free to act independently in relation to their work
Level of commitment to relationships	Process of dealing with a task and maintaining a harmony among the group are valued above completing it	High value placed on task is completion
Flexibility of time	Time and effort spent on process is highly valued	High value placed on task completion within a timeframe.

One approach is to require participation and make it important by offering credit points. However, this is only a top-down method that many teachers will find inadequate, and participation is also extremely difficult to measure, especially in a live classroom. In online learning, given that written messages are kept on record, a simple quantitative count is possible, but a qualitative measure of participation would, in most cases, be too time-consuming to be viable. While using such direct measures as offering credit points for participation, teachers may also want to use indirect measures such as encouraging small talk among students to make international students feel part of the class (Seltman, 1991).

A different approach is to avoid confronting learners with potentially embarrassing questioning, but to encourage discussion in as neutral a way as is possible. For instance, if learners are placed in small groups for discussion, and a group leader is appointed to report on what was said, the speaker retains certain anonymity, since s/he is the voice of the group. In this situation, we find that overseas students are more willing to speak.

An even more neutral method of stimulating talk could be that proposed by Dervin and Reinhard (2006) in the context of stimulating cross-disciplinary conversations. A conversational plan is used where students are asked to give their views on how to handle the very problems they are encountering. These conversations serve as a good foundation for peer discussion in multicultural classrooms to foster mutual trusts and to build a foundation for collaboration. The interview script provides the essential structure organized in sets of questions as follows:

- ***About understanding cultural differences***
  What in your judgment are the big unanswered questions?
  How would an answer to that question help you to understand this culture?
  In your judgment, what explains why you did not know the answer?
  What are the biggest difficulties in trying to answer the question?
  What would help you most? How?
- ***About differences between cultures***
  Have you found differences between cultures hindering your understanding?
  Have you found help? How has it helped?
  If you could wave a magic wand, what would help? How?
- ***About the ideal teaching method***
  If you could wave a magic wand and had any amount of money, what would you like to see your teachers do about cultural differences?

Finally, it may be of value to include some cultural studies in the orientation courses than most universities offer to newly-arrived overseas students. A model such as that by Hofstede offers a broad outline for discussion based on the following criteria:

Power Distance

The extent to which less powerful members of institutions and organizations accept that power is distributed unequally. Eastern countries are considered "high-power distance" while Western countries are considered "low-power distance." In other words, people with power such as professors are regarded highly and treated with much respects by students in Eastern countries. Many students from Eastern countries are surprised to hear students calling their professors by first name in Western universities. People are discouraged to disagree with people with power in Eastern culture, but in Western culture, people feel more comfortable disagreeing with people with power.

Uncertainty Avoidance

Uncertainty avoidance refers to the extent to which people feel threatened by ambiguous situations, and have created beliefs and institutions that try to avoid these. Countries with high uncertainty avoidance cultures tend to have a large number of rules people must follow to reduce the level of uncertainty. Western countries are considered to be low in uncertainty avoidance, and Eastern countries high. People in Eastern cultures feel uncomfortable making decisions on their own without rules and regulations and tend to feel more comfortable when they are obeying rules. Students in Eastern cultures feel more comfortable when they are following teachers' instructions, but feel uncomfortable when asked to come up with their own learning agenda.

Individualism vs. Collectivism

Individualism is the tendency of people to only look after themselves and their immediate family. Collectivism is the tendency of people to belong to groups or collectives and to look after each other in exchange for loyalty. Eastern countries are considered to be collectivist societies where goals are much more likely to be attained through group efforts. However, in classrooms, especially in higher education, students in Eastern countries can be more individualistic than they are at their workplace, due to the culture where individual exam scores are highly valued and stressed in their academic achievement. Group projects are less common in the classrooms of Eastern countries because of the prevailing lecture based teaching styles.

Masculinity vs. Femininity

A culture in which the dominant values in society are success, money, and materialistic acquisition scores high on masculinity. A culture in which the dominant values in society are caring for others and quality of life scores high on femininity. Most Eastern countries, especially Japan, are considered to be masculine. Advancement on the job and earnings are the goals of most workers and high positions tend to be held by males. Though this dimension may not be readily apparent in educational contexts, it is a factor which needs to be kept in mind in gender differences in Eastern culture.

c onclusion

The cultural differences in learning and teaching styles between East and West are observable in many of today's international classrooms. However, when it comes to text-based asynchronous online learning, such differences become less observable and easy to overlook or ignore. In traditional face-to-face classrooms, teachers get a sense of how well students understand by observing their nonverbal responses, such as nodding of heads or puzzled looks even when students do not explicitly say anything. In online environments, students have to make an explicit effort to make teachers aware as to whether they understand or not. This can be a daunting task for Asian students who are hesitant to question teachers. If emoticons are built into the system, students can use them to indicate their degree of understanding, allowing teachers a better sense of how well students, including those from Asian countries, understand.

Students need to be made aware of the underlying philosophy or assumptions of the educational system to which they have been exposed. Of course, it would be ideal if such awareness could be realized before the students leave their countries of origin. But oftentimes, students come to realize those cultural differences in educational systems only after they step outside the system which they have been exposed. On the teacher side, teachers of those classes that include students from different cultural backgrounds

need to be aware of differences in the students' approaches to learning. By discussing those differences openly in class, foreign students can overcome their conflicting beliefs in classroom participation and critical thinking. After students are made aware of the cultural differences in educational practices and communication styles, teachers should make classroom expectations for participation explicit to the students. For example, teachers should give students guidelines for participation at the beginning of the course in terms of frequency of participation and its quality to make it necessary to participate, especially in the online environment. Also, teachers should tell students that there are no right or wrong opinions to express in participating in discussions and every opinion counts if it comes from the student's own reflection. In assigning group projects, teachers should specify the role each student takes up in a given group. Eastern students tend to feel more at ease when prescriptive tasks are given to them instead of having them come up with a role themselves in the group.

Online dialogues between teacher and students or among students tend to motivate students to participate in subsequent online class activities. Although asynchronous text-based online discussion has a number of advantages in mixed cultural groups, it will be very helpful in online group projects if the teacher presents opportunities for the group to engage in synchronous sessions to discuss their project throughout the project period as well. Furthermore, it would be even more helpful for students from high context cultures to have synchronous video sessions as they may feel more comfortable being able to read nonverbal clues in video though they may not participate actively in the synchronous video session itself. However, if the synchronous video become the only mean of communication it may become difficult for those students whose native language is not English.

Even though Eastern students have become aware of cultural differences and understand classroom expectations, it may still take a while for them to actually adapt to Western styles of classroom participation and critical thinking. Western teachers may also have to learn to be patient and not to penalize Eastern students for their differences in their approach to learning. Though this is beyond the scope of this chapter, those educational institutions in the East also need to start adopting the Western methods of teaching and learning to educate students to be competitive in the global world.

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kEy tErms

Collectivism: The tendency of people to belong to groups or collectives and to look after each other in exchange for loyalty.

Confucian Philosophy or Confucianism: An ancient Chinese ethical and philosophical system originally developed from the teachings of the early Chinese philosopher Confucius. Confucianism is a complex system of moral, social, political, philosophical, and quasireligious thought that has had tremendous influence on the culture and history of East Asia.

Femininity: It refers to the extent to which values such as caring for others and quality of life are valued in the society.

High-Context Culture: It refers to societies or groups where people have close connections over a long period of time. Many aspects of cultural behaviour are not made explicit because most members know what to do and what to think from years of interaction with each other.

Individualism: The tendency of people to only look after themselves and their immediate family.

Low-Context Culture: It refers to societies where people tend to have many connections, but of shorter duration or for some specific reason. In these societies, cultural behaviour and beliefs may need to be spelled out explicitly so that those coming into the cultural environment know how to behave.

Masculinity: It refers to the extent to which values such as success, money, and materialistic acquisition are valued in the society.

Online Learning: The term similar to e-learning—online education. Educational methods utilize the Internet on which students and teachers interact for given educational objectives.

Power Distance: It refers to the extent to which less powerful members of institutions and organizations accept that power is distributed unequally.

Socratic Model: The instructional method based on Socrates's teaching. It stresses critical thinking and utilizes repeated questioning to expose what one is ignorant of, and thus to arrive

at truth. Socrates believed that learning should lead to knowledge, not to merely true belief.

Uncertainty Avoidance: It refers to the extent to which people feel threatened by ambiguous situations, and have created beliefs and institutions that try to avoid these.

Endnot Es

1 This paper is written based on the presentation given by the author and Anita Pincas, Senior Lecturer, Lifelong Education and International Development (LEID), Institute of Education, University of London, at the international conference, "Learning Together: Reshaping higher education in a global age" on 22–24 July 2007.

2 For a theoretical analysis of the UK position, see Laurillard's (2002) "conversational model" that develops the Socratic emphasis on dialogue and questions for higher education contexts.

Chapter IV
The Development of Collaborative Structures to Support Virtual Classes in Small Schools

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abstract

The Internet and an expanding range of technologies have enabled small schools in rural communities in Atlantic Canada to collaborate in addressing problems faced by senior students through the creation of virtual teaching and learning spaces to complement traditional classrooms. In the search for appropriate ways of organizing and managing knowledge in electronic, collaborative structures, two stages of development have taken place in the Canadian province of Newfoundland and Labrador: (i) e-learning for collaboration between schools through the creation of school district digital intranets, and (ii) e-learning in federated structures through the integration of school district digital intranets into a centralized organization.

introduction

Almost all countries face the educational policy issue of providing learning opportunities for students who attend small schools in rural communities that are comparable to those expected by their urban peers. For governments, it is often difficult to justify the expense of providing specialized teaching and other resources for small numbers of students in senior rural classrooms. Until the advent of the Internet and the facilitation of virtual classes, senior students in rural communities have been encouraged to enrol in boarding schools, most of which are located in

urban areas. Another rural education policy in developed societies has been to transport senior students from small and isolated communities on a daily basis to larger centres to enable them to take advantage of more extensive curriculum options. The advent of the Internet, and its expanding role in the provision of education, has enabled a new policy response that allows senior students in small rural schools to remain in their home communities while joining classes in schools in other places in both real (synchronous) and delayed (asynchronous) time. For parents and senior students in many rural communities in Canada and other developed societies there are now expectations that a full range of secondary school curriculum options will be provided in local schools (Mathiasen, 2004).

In the Canadian province of Newfoundland and Labrador, most schools are located in small, geographically-isolated, coastal communities. Many rural Newfoundland and Labrador communities are declining in size as people leave traditional occupations based on fishing to seek work in other parts of the country. Small schools are therefore becoming smaller, and over the last two decades, many have closed permanently. During this period of rural community and school decline, the Internet became available for educational use, and in this part of Canada, it has been the basis for the creation of new structures (digital intranets) and processes (e-learning). Internet-based structures and processes have provided ways of enhancing the provision of education in small rural communities by extending learning opportunities within and between them through the development of collaborative virtual classes.

nEwfoundland and labrador

Newfoundland and Labrador is Atlantic Canada's most eastern province. It has a population of approximately 500,000 people, of whom less than 28,000 live in Labrador. The province has a distinct culture, lifestyle, and history, and became part of Canada as recently as 1949. Beyond the capital city, St. John's, the provincial population is located mostly in coastal settlements known as "outports" across a large geographic area (156,185 square miles), thereby presenting challenges for the delivery of education, particularly at senior high school level. Approximately two out of three schools in the province are located in rural communities which require special consideration in the development of collaborative, Internet-based structures and processes.

The search for appropriate new educational structures for the delivery of education to students in rural Newfoundland and Labrador led to the development of School District Digital Intranets, within which virtual classes, based on e-learning, have been organized.

In the last decade, there has been considerable re-organization of the school system in Newfoundland and Labrador, largely because of rural to urban migration together with a net outflow of people from the province. In 1996, ten Anglophone school district boards were created in the province together with one province-wide Francophone board, a reduction from 26 school boards. In this re-organization of school boards, the Vista School District was created. When it was established, the Vista School District contained 18 schools ranging in student enrolment from 650 to 40 and covered a large area of about 7,000 square kilometres. The region had a population of about 35,000 people, and an economy supported by a diverse infrastructure including fishing, forestry, farming, mining, aquaculture, and tourism. There were 5,165 students enrolled in 18 schools in the district, taught by 366 teachers. The Vista School District was approximately two hours by road from the capital city, St. John's. With continued reduction in school size in many rural Newfoundland and Labrador communities, the provincial administration of schools was further reorganized in 2003 to create four Anglophone and one Francophone school boards.

advanced placement (ap) courses for e-learners in rural canadian schools

Advanced Placement (AP) courses are common throughout the United States and Canada. They enable senior students to begin undergraduate degrees with part of their program completed from high school if their AP courses are passed at grade levels specified by the university of their choice. Accordingly, AP courses are demanding and only undertaken by academically-superior students. At the time the first digital intranet was established in Newfoundland and Labrador, there were no AP subjects online and, as far as could be ascertained, it was unlikely instruction was provided in other than large urban schools throughout the United States and Canada. The challenge was therefore two-fold: to put four science courses online and to deliver them to dispersed rural students in the new electronic structure, the school district digital intranet. The development of AP Web-based courses in biology, chemistry, mathematics, and physics took place within a team in each subject area. A lead science teacher in each discipline was paired with a recent graduate in each of the disciplines of biology, chemistry, mathematics, and physics who possessed advanced computer skills, including Web page design, Java, and HTML. The lead teacher and the graduate assistant were advised from time to time by Faculty of Education specialists at Memorial University of Newfoundland in each curriculum area and, where possible, scientists from the Faculty of Science. The extent to which each Web-based course was developed by a team of four people varied. Most course development took place through interaction between lead teachers and the recent graduates. Although at times professors had different opinions as to the most appropriate approach to the design of the courses, this model enabled the four courses to be developed over a sixteen-week summer recess period in time for the 1998–1999 school year. Minimum specifications were adopted for computer hardware and network connectivity. All schools involved in the project had DirecPC satellite dishes installed to provide a high-speed down-link. In most rural communities in this part of Canada, digital telecommunications infrastructures do not enable schools to have a high-speed up-link to the Internet. Appropriate software had to be identified and evaluated for both the development of the resources and the delivery of instruction within the Intranet. Front Page 98 was selected as the software package. Additional software was used for the development of images, animated gifs, and other dimensions of course development. These included Snagit32, Gif Construction Set, Real Video, and similar packages. Many software packages were evaluated, and finally, WebCT was selected. This package enabled the instructor to track student progress. It contained online testing and evaluation, private e-mail, a calendar feature, a public bulletin board for use by both instructor and student, a link to lessons, and chat rooms for communication between teacher and student. For real-time instruction, Meeting Point and Microsoft NetMeeting were selected. This combination of software enabled a teacher to present real-time interactive instruction to multiple sites. An orientation session was provided for students in June 1998, prior to the implementation of this project in September. Students had to learn how to communicate with each other and with their instructor using these new technologies before classes could begin.

Electronic Collaboration in School District Digital Intranets

Electronic collaboration between schools began almost two decades ago, and the Canadian development outlined above was influenced by changes that were implemented in Iceland, Finland, and New Zealand. The Icelandic Education Network was created in 1989 (Stefansdottir, 1993; Stevens, 2002) that linked all schools around this island nation, which, like Newfoundland, has an almost

exclusively coastal population and one larger centre of population that is the capital city. Electronic collaboration between schools in Finnish Lapland and the capital, Helsinki, provided information on synchronous video instruction between diverse and distant sites (Kynaslahti, Salminen, & Stevens, 1996), while audiographic collaboration between small schools in rural New Zealand, prior to the adoption of the Internet, provided a model for implementation in Atlantic Canada (Stevens, 2003a).

The initial electronic linking of eight sites (or small rural schools) within a school district digital intranet in the Canadian province of Newfoundland and Labrador to support the teaching of selected AP subjects created a series of classes that were administratively and academically open to each other. This was part of a broader pan-Canadian initiative over the last decade to prepare people in Canada for the information age (Information Highway Advisory Council, 1997). By participating in open classes in real (synchronous) time, combined with a measure of independent (asynchronous) learning, senior students in some Newfoundland and Labrador schools were, a decade ago, able to interact with one another through audio, video, and electronic whiteboards. More recently, the Internet has provided a vehicle for increased interaction in real-time.

In eight schools within a rural school district of Newfoundland and Labrador, 55 students were enrolled in AP biology, chemistry, mathematics, and physics courses. While AP courses are a well-established feature of senior secondary education in the United States and Canada, it was unusual for students to be able to enroll for instruction at this level in small schools in remote communities. The major change for the students in the first Digital Intranet in Newfoundland and Labrador, however, was the opportunity they were given to study advanced science subjects and mathematics as members of open classes from their small, remote communities. Without the electronic collaboration and organizational synergy of the initial digital intranet, this educational opportunity would not have been available to them.

The Digital Intranet provided students with access to multiple sites simultaneously, as well as the opportunity to work independently of a teacher for part of the school day. The advent of the Digital Intranet had implications for students who began to interact with teachers and their peers in a variety of new ways. Many students experienced difficulty expressing themselves and, in particular, asking questions in open electronic classes when they did not know their peers from other small communities. As students became more comfortable with one another, inhibitions such as asking questions online were overcome. Today, interaction in Digital Intranets can be both synchronous and asynchronous.

The educational significance of the linking of schools in Iceland, Finland, New Zealand, and the Canadian province of Newfoundland and Labrador was in the collaborative structures and processes that emerged. Schools that had previously been academically and administratively closed to one another were encouraged to become open and collaborative learning environments. As classes in schools linked to teachers and learners in other classes, initially within schools districts, schools began to integrate academically and administratively (Stevens, 2003b). Timetabling between sites became important, as did technological integration. More significantly, however, was the advent of open virtual classes taking place in structures that were designed to provide face-to-face instruction in real-time as closed, traditional classrooms. The advent of open, virtual classes led to collaborative teaching and collaborative learning. Students could have a teacher who was physically-present, as well as an online teacher who provided instruction from a distant site. Students were encouraged to share learning experiences and to collaborate in solving mathematical and scientific problems, and later, to work together in other areas of the curriculum.

Electronic Collaboration in a Federated Structure

In the process of developing e-teaching and e-learning within digital intranets in rural Newfoundland and Labrador, teachers, learners and administrators had to adapt to a new, electronic educational structure. In the open teaching and learning environment of a digital intranet, participating institutions academically and administratively interface for that part of the school day during which classes are being taught. This is a different educational structure from the traditional and, by comparison, closed educational environment of the autonomous school with its own teachers and its own students. There is a potential conflict between a school as an autonomous educational institution serving a designated district, and schools which become, in effect, sites within electronic teaching and learning networks. Principals and teachers appointed to the closed, autonomous learning environments of traditional schools frequently discovered that the administration of knowledge requires the development of open structures within which they were increasingly expected to collaborate with their peers located on a range of distant sites. Many now find that the positions to which they were appointed in traditional (closed) schools have become, in effect, locations within new (open) electronic schools in which a high degree of organizational synergy is necessary. After the inception of the first School District Digital Intranet, a ministerial inquiry (Government of Newfoundland and Labrador, 2000) into "distance learning in classrooms" was held involving extensive interviewing of students, teachers, administrators, technology providers, and parents. The outcome of the ministerial inquiry was positive in that the Department of Education of Newfoundland and Labrador proceeded to develop a new entity known as the Centre for Distance Learning and Innovation (CDLI) that provides centralization in the provision of e-learning to all school districts in the province. The centre has the task of expanding the initial school district digital intranet model for rural schools in the province and also the range of subjects taught online (Barbour, 2001). The Centre for Distance Learning and Innovation (http://www.cdli.ca/) has extended the provision of education in Newfoundland and Labrador. Most of the work of CDLI involves new program development to extend the curriculum in schools throughout the province. The centre also explores and assesses new technologies and evaluates their potential for teaching and learning in schools throughout Newfoundland and Labrador. The Centre for Distance Learning and Innovation is a federated structure that oversees and extends interschool collaboration, particularly in rural Newfoundland and Labrador. Instruction can be provided directly from CDLI's e-teachers both synchronously and asynchronously. In small schools located in rural communities throughout the province, CDLI provides students with learning opportunities that would otherwise not be available to them. CDLI manages e-learning in communities throughout Newfoundland and Labrador, thereby enhancing traditional on-site face-to-face teaching with virtual instruction. Perhaps the most significant contribution of the Centre for Distance Learning and Innovation has been the integration of traditional and virtual teaching and learning environments (Stevens & Stewart, 2005).

support for virtual Educa tional structur Es

New teaching positions have been created by CDLI, including e-teachers and, to assist them within the expanding range of sites (or rural schools that were becoming part of the digital network), mediating teachers, known as "m-teachers." Coffin (2002) argued that in the expanding e-learning environment of Newfoundland and Labrador it was more appropriate to appoint

m-teams than m-teachers. M-teams, he argued, could be established to replace m-teachers in rural schools in the province:

"The report Supporting Learning (Government of Newfoundland and Labrador, 2000) envisioned a teaching role to provide school-based support for students who were instructed by an off-site e-teacher…. A team concept is perhaps better suited to fulfilling CDLI's vision of small schools as 'beacons of technological innovation' with respect to distance learning. Conceptually, then, e-learning needs the support of a team of people providing four sets of skills: technical, coaching, administrative and resource advisor. ... The idea of a team doesn't have to imply people getting together periodically to plan strategy or solve problems. The team represents more of a bank of resources easily accessible to on-line students which can be used to facilitate their learning."

An m-teaching scenario, outlined by Coffin (2002): a moderate-sized rural high school with 100–250 students may have at least six teachers, a resource centre with at least a part-time resource teacher, some secretarial assistance, technical expertise (which may be located beyond the school in the local community), and a toll-free helpline for technical advice. Coffin argued that in a school "the technology teacher and coach would have some time in their schedules for discharging their responsibilities to on-line students."

In small schools located in geographically-remote communities, e-students—as well as their off-site e-teachers—have to be supported to ensure the provision of education on a daily basis. The concept of an m-team includes many people within a small school, as well as in the local community. Each person on the m-team, according to the Coffin model, would be responsible for specific support services. The technology teacher, the technician, the help-line desk and students would handle technical problems according to an agreed set of protocols. The coach would provide the nurturing, encouragement and advice that students need to persist in their studies. The technology teacher could also be the coach. The coach would also be the school-based contact for the e-teacher when that became necessary. These two professionals together would handle most of the pedagogical functions associated with online learning. Coaches would be assigned to students, rather than courses because the services they provide were client-oriented rather than content-oriented. The school secretary would take responsibility for conveying hard-copy correspondence between the e-teacher and students and other clerical functions.

The resource teacher would provide services similar to those made available to students who were instructed face-to-face in traditional classes. The resource teacher would also catalogue, store, and control the distribution of the learning resources for online courses. The administrator would provide the administrative support services that ensure the smooth and efficient operation of online learning (including supervision of instruction).

In the Coffin model, the m-team may, in reality, be the whole staff of a small school, consisting of teachers, support staff, and administration. This approach to supporting e-learning in rural schools was subsequently adopted in Newfoundland and Labrador by the Centre for Distance Learning and Innovation, and m-teams replaced m-teachers.

tHE dEvElopm Ent of c ollabora tiv E E-lE arning s tructur Es

Today, schools in each of the educational districts of Newfoundland and Labrador are digitally-linked to a growing range of other schools. There has been considerable expansion of the number of subjects taught by e-teachers, supported by m-teams, to complement traditional on-site instruction. Networks of schools in each of the districts in

the province are now part of a federated structure administered by the Centre for Distance Learning and Innovation within the Department of Education. E-learning in Newfoundland and Labrador emerged through the development of reciprocal relationships between rural schools, information technologies, and an acute awareness of a need for change if small schools in this part of Canada were to survive. The educational adoption of the Internet—and through it, e-learning—coincided with a period of declining enrolments in small schools and, indeed, the possibility of the end of local, on-site provision of education in rural communities. The adoption of the Internet and e-learning enabled schools that were physically small in terms of the number of students who attend, in person, on a daily basis, to become large educational institutions in terms of the subjects that could be accessed and made available to students. New structures such as school district digital intranets and later, CDLI, initiated the possibilities of inter-institutional collaboration and the possibilities of schools being academically and administratively open rather than closed to one another. Cooperation, sharing and collaboration have become possible through the adoption of computers, the Internet, and membership of electronic learning organizations at both district and province-wide levels. Schools in rural Newfoundland and Labrador have changed because of demographic necessity, assisted by emerging educational technologies. The creation of new virtual structures to support traditional small schools in rural communities has been accompanied by new teaching and learning processes. As schools have become increasingly open to one another within integrative frameworks, teaching and learning have become increasingly collaborative. E-teachers within CDLI supported by m-teams within schools are forging pedagogy within which actual (face-to-face) and virtual (online) teaching and learning are integrated.

tHE f utur E

Teaching face-to-face and online are different skills. Teachers who were prepared to teach in traditional classes now have to learn new methods to teach from one site to another. Acquisition of the skill of teaching within collaborative structures (digital intranets) is fundamental to the success of rural e-learning. Teachers have to learn to teach collaboratively with colleagues from multiple sites and have to judge when it is appropriate to teach online, and when it is appropriate to teach students in traditional face-to-face ways. These judgements have to be defended on the basis of sound pedagogy (Pendergast & Kapitzje, 2004).

A new pedagogical consideration has recently emerged in the integration of virtual and actual classes called cybercells (Stevens & Stewart, 2005) in which face-to-face groups extend their discussions to include virtual visitors. Cybercells have been made possible by the development of collaborative structures such as those outlined above. By linking groups in physical spaces such as small rural schools with emerging information technologies, cybercells enable virtual visitors to take part in discussions.

By extending existing physical (or actual) educational structures though the integration of virtual visitors, cybercells facilitate collaboration (Stevens, 2006) and, thereby, the development of shared meaning. Cybercells can be added to the range of activities and settings in regular classrooms to enable teachers and students to link with other individuals and groups at distant locations, to extend both teaching and learning. By joining a cybercell from a distance, physically-isolated people, such as those in rural communities, can become part of actual groups in real-time, able to be seen and heard and, thereby, contribute to discussions. There are spatial, cultural, social, technological, and pedagogical dimensions in the emergence of cybercells.

Spatially, cybercells make physical spaces larger by including virtual visitors on demand. For example, a classroom in a rural school in a geographically-isolated community consisting of a teacher and a small number of students (relative to large, urban institutions) supported by an m-team can become a cybercell by linking with students or teachers who live beyond the community who become virtual visitors. Cybercells challenge institutions by extending their physical space to include non-physically-present members (such as other students, specialist teachers, and visiting experts). The significance of the location of teachers and the learners in relation to one another is reduced as virtual and actual teaching and learning spaces interact and merge in pursuit of common interests such as learning. It becomes difficult to define a school as "small" when, in teaching and learning terms, they engage with people well beyond their actual (or physical) locations.

Culturally, cybercells can change classrooms and other physical spaces by facilitating new understandings between groups that are both actually and virtually present. Contact through the introduction of virtual visitors to physical or actual spaces, in synchronous or asynchronous time, has the potential to alter perceptions groups have of one another and to make cultural differences and similarities real through interaction. The culture of a classroom has the potential to be changed through reality-sharing in a cybercell between those who have an actual presence and those who enter a physical space virtually. For example, the interaction of different ethnic or class cultures in a cybercell can challenge existing perceptions and facilitate new cultural awareness of both one's own and other cultures through interaction.

Socially, collaborative teaching and collaborative learning are facilitated by the linking of learning spaces. One of the possible outcomes of the advent of cybercells in teaching and learning is the breakdown of the concept of education as something that happens only in schools and in school time. The introduction of virtual visitors to small, geographically-isolated classrooms who can talk about non-rural life in personal terms has potential to extend understanding of life in other places (Stevens, 2005).

Cybercells make use of new learning technologies including the interactive nature of Web 2.0 in environments that extend well beyond the physical confines of classrooms. New technologies that support the integration of actual and virtual spaces enabling networking between teachers and students to occur include blogs (Internet-based journals), podcasts (home made or organization made sound recordings available through the Internet), forums (written asynchronous discussions), and Wikis (Web pages developed collaboratively). In the Web 2.0 environment, edubloggers (an international group of self-selected educationalists who use Web 2.0 tools) can engage with one another. Students and teachers can read what others have written, listen to podcasts of discussions, make their own blogs or wikis, and join in live chats or Web casts.

An important pedagogical dimension of cybercells is their facilitation of collaboration between both teachers and students, as well as between schools. Cybercells enable teachers, students, and schools to engage virtual visitors in actual learning spaces using contemporary digital technologies. As students network, connect, and interact through the use of Web 2.0, their experiences may mediate their transition into the future world of learning beyond school.

Horizont al and vErtical int Egra tion

In rural Newfoundland and Labrador the open, collaborative model of teaching and learning within digital intranets challenges the closed model of schooling. School district digital intranets provide horizontal integration between

participating sites and new academic pathways for rural students as they access an expanding range of subjects of online, taught by e-teachers. A question now faces rural teachers and principals: can the successful horizontal integration of schools across rural Canada be complemented by vertical integration whereby community schools bring increased learning opportunities to local homes and businesses? When the horizontal integration of learning is accompanied by vertical integration, local and non-local learning will complement one another and provide a new synergy. Rural homes will be invited to become part of enriched learning environments, joining local schools that are already academically and administratively part of federated, electronic educational structures.

c onclusion

Cybercells have the potential to expand traditional classrooms in terms of time, space and, above all, in terms of teaching and learning capacities. The integration of actual and virtual spaces in classrooms challenges traditional teaching and learning practices and provides opportunities for lessons to be both extended and enriched. Interclass and interschool integration of teaching and learning through cybercells has the potential to create new synergies (Thompson, Bakken, & Clark, 2001) based on teamwork (Campbell & Guisinger, 2003). Cybercells, by integrating actual and virtual spaces, provide teachers with opportunities to fuse spatial, social and cultural dimensions of classrooms to promote collaboration and mutual construction of knowledge and understanding between learners on dispersed sites.

The educational, technological, pedagogical, and policy problems that have had to be overcome in the development of e-learning in small communities in rural Newfoundland and Labrador led to the development of collaborative structures within which virtual classes could be supported. It is possible that initiatives undertaken in this part of Canada in which traditional schools have accepted virtual classes could have application for rural schools in other parts of the world, as well as for the provision of education in urban areas. New possibilities for regional development based on local organizational synergies may, subsequently, emerge.

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kEy tErms

Advanced Placement (AP): High school courses administered from Baltimore, Maryland that are of post-high school curriculum standard. Many North American universities provide credit towards first year courses, depending on the standard of pass obtained.

Asynchronous: In delayed time (e.g., learning from a Web site at a time that is personally convenient).

Collaboration: A structured process within which two or more people work together towards a common goal.

Cybercell: A face-to-face group whose members extend their discussion to include virtual visitors.

Open Classes: Classes in schools that are academically and administratively integrated so that teachers and learners can collaborate.

Rural: Places that are settled in the countryside beyond towns and cities.

School District Digital Intranet: Schools, usually located in rural communities, that are linked through the Internet for collaborative teaching and learning.

Synchronous: In real-time (e.g., face-to-face instruction).

Chapter V
Experiences in Collaboration in Distance Education from the Caribbean, Looking Beyond Electronic

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abstract

Information communication technologies (ICTs) have facilitated institutional collaboration in distance education. Based on the study, Institutional collaboration in distance education at the tertiary level in the small, developing countries of the Commonwealth Caribbean: To what extent does it enhance human resource development? (Marrett, 2006), the author examines the experiences in the Caribbean between 1982 and 2002. She explores not only the role played by ICTs, but also some of the issues that arise beyond those presented by the technology, highlighting aspects that need attention in order to ensure successful institutional collaboration in tertiary education, and makes recommendations to overcome the challenges.

introduction

There is no doubt that the advent and growth of information communication technology (ICT) has facilitated and increased various types of institutional collaboration. ICT is: *an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems, and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning. ICTs are often spoken of in a particular context, such as ICTs in education, healthcare, or*

libraries (http://searchcio-midmarket.techtarget.com/sDefinition/0,,sid183_gci928405,00.html).

Regarding ICTs in education, the convergence of telecommunications, computing, and microelectronics in particular has "created a whole new industry in service of education and training" (COL, 1998, p. 1). Additionally, ICTs are contributing to the increase of institutional collaboration in distance education, as evidenced in a study of institutional collaboration in distance education at the tertiary level occurring between 1982 and 2002 in the small, developing countries of the Commonwealth Caribbean. It was found that between 2000–2002, there were almost as many instances of collaboration (15) as obtained for the entire decade of the 1990s (20) (Marrett, 2006, p. 248). This was attributed to:

(1) the growth of ICTs in the region, coupled with (2) the concomitant rise in awareness of distance education as an option for programme delivery on the part of the Caribbean institutions and (3) a concurrent push by the overseas institutions to make their programmes available internationally facilitated by the technology, funding and policies of internationalization (Marrett, 2006, p. 248).

Based on the study, this chapter explores not only the role played by ICTs in the experiences in institutional collaboration in distance education at the tertiary level in the Caribbean between 1982 and 2002, but also some of the issues that arise beyond those presented by the technology, highlighting aspects that need attention in order to ensure successful institutional collaboration in tertiary education.

background

t he Commonwealth Caribbean

Stretching in an arc from Belize in Central America, incorporating the Turks and Caicos Islands and the Bahamas Islands, and down the chain of islands that separate the Caribbean Sea from the Atlantic Ocean, culminating in Guyana on the South American continent, the countries of the Commonwealth Caribbean are small in both population and geographical size. Apart from Jamaica (population about 2.7 million), Trinidad, and Tobago (population approximately 1.3 million), each country has a population of less than one million, including Belize and Guyana, with land masses of approximately 8,867 and 83,000 square miles, respectively, many times larger than their island counterparts. The total population of the region is some 6.5 million.

Tertiary Education

According to Peters (2001, p. 47), the term "tertiary education" as used in the region may include university- and nonuniversity-level programmes, technical and vocational education and training, professional and paraprofessional training, and continuing education programmes, geared for persons over the age of 16 years. The determination of an educational institution as tertiary is the purview of either national accrediting bodies, where they exist, or the Ministry of Education of the country. This contrasts with jurisdictions such as Australia which make a distinction between higher education and tertiary education, with the former referring to degree level education and above offered almost exclusively by universities.

The establishment of universities in the Commonwealth Caribbean is a relatively new phenomenon when compared to the Americas. While Spain established universities in its colonies in the Americas as early as the 16th century and Britain founded universities in North America in the 17th and 18th centuries, it was not until 1948 that the University College of the West Indies was established as a regional university in the Commonwealth Caribbean, forerunner to The University of the West Indies (UWI), now serving 16 countries[1]. Since the mid to late 20th century,

the establishment of universities in the region has picked up pace, largely through the amalgamation of existing institutions and the growth of off-shore universities. The most prevalent tertiary institutions are publicly funded community colleges. There is also a variety of public and private institutions including teachers colleges, theological colleges, and business schools of one type or another, especially in Trinidad and Tobago, Jamaica, and Guyana.

Distance Education

Spurred by the Caribbean Community (CARICOM)[2], governments of the region have sought to increase access to tertiary education, with distance education being one strategy. Moore and Kearsley describe distance education as:

Planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements (as cited in Visser, 1997, p, 2).

Marrett (2006, pp. 40–44) identified a limited number (seven) of Caribbean institutions that were offering their own programmes by distance (any modality), and eight others that had expressed an interest in offering their own programmes by distance.

The pervasive nature of ICTs has led some to equate distance education with online education, overlooking the more prevalent medium of print. Koul (2002, p. 47) points out that only "about 5% of the world's population was online" in 2001, the majority being located in the developed countries. According to Bates (2001), the first Web-based, post secondary course appeared in the USA in 1995. He could not at that time identify "many examples of successful practice outside the most economically developed countries" (Bates, 2001, p. 19). He identified institutions in North America, Australia and New Zealand, and in several European countries including the United Kingdom, Norway, Denmark, and the Netherlands as investing heavily in e-learning in 2001. Since then, the number of programmes and institutions offering programmes online has increased exponentially, but remains largely the purview of institutions in the developed countries, although there are a few examples of institutions in developing countries offering online programmes.

The preponderance of online programmes emanating from developed countries is, in part, a function of the Internet penetration rate[3]. Up to September 30, 2007, according to the Internet World Stats (IWS): Usage and Population Statistics (http://www.internetworldstats.com), 18.9% of the world's population had Internet access. Although this represents a 244.7% growth between 2000 and 2007, the majority of this usage remains in the developed countries, with North America leading the population penetration rate at 70.2%, followed by Oceania/Australia (South Pacific Islands, New Zealand, and Australia) at 55.2%[4], and Europe at 41.7%.

Table 1 gives the Internet usage and population statistics for the Commonwealth Caribbean as at June 30, 2007. Although the penetration rate has increased dramatically between 2000 and 2007 (14,993.70%), overall it is still comparatively low, with a median rate of 18.81%. Only Barbados registers a high penetration rate (above 50%). This may in part account for the limited although growing number of Caribbean tertiary level institutions offering their own programmes (or even parts of programmes) online.

Among the institutions that do have online offerings are: UWI, the largest tertiary institution in the region, which began offering its Master's in Education programme online in 1999. The UWI Distance Education Centre began systematically incorporating online education into its distance education offerings in 2002. Two other institutions located in Jamaica which were identified as

Table 1. Internet usage and population statistics for the Commonwealth Caribbean (Adapted from Internet World Stats: Usage and Population Statistics (www.internetworldstats.com))

COMMON-WEALTH CARIBBEAN	**Population** (2007 Est.)	**Internet Usage,** June 30, 2007	**% Population** (Penetration)	**Use Growth** (2000-2007)
Anguilla	13,487	**3,000**	22.24%	226.40%
Antigua & Barbuda	72,377	**29,000**	40.07%	480.00%
Bahamas	335,142	**103,000**	30.73%	686.30%
Barbados	267,353	**160,000**	59.85%	2566.70%
Belize	312,233	**38,000**	12.17%	153.30%
British Virgin Islands	22,434	**4,000**	17.83%	n/a %
Cayman Islands	50,348	**9,909**	19.68%	27.00%
Dominica	71,388	**26,000**	36.42%	1200.00%
Grenada	101,008	**19,000**	18.81%	363.40%
Guyana	886,113	**160,000**	18.06%	5233.30%
Jamaica	2,710,063	**1,067,000**	39.37%	1678.30%
Monserrat	4,796	**n/a**	0.00%	n/a %
St. Kitts & Nevis	39,382	**10,000**	25.39%	400.00%
Saint Lucia	169,576	**55,000**	32.43%	1733.30%
St. Vincent & Grenadines	125,882	**10,000**	7.94%	185.70%
Trinidad & Tobago	1,330,164	**160,000**	12.03%	60.00%
Turks & Caicos	34,851	**n/a**	0.00%	n/a %
TOTAL	**6,546,597**	**1,853,909**	**28.32%**	**14993.70%**

incorporating at least some form of online teaching in 2004 were the Vocational Training and Development Institute (VTDI) and the Management Institute for National Development (MIND).

Two collaborative initiatives are contributing to the increase in the number of institutions incorporating online education. These are the Caribbean Universities Project for Integrated Distance Education (CUPIDE) and the Caribbean Knowledge and Learning Network (CKLN). CUPIDE began in January 2003, and was scheduled for completion in December 2007. It is a:

UNESCO-UWI project […] funded through the Japanese Funds in Trust for Capacity Building [of Human Resources]. The overall goal of this collaborative project is to develop the human resources within the region through enabling each of the five participating universities (The University of the West Indies, the University of Technology, Jamaica, the University of Guyana, the Anton de Kom University of Suriname, and the University Quisqueya [Haiti]) to better develop and deliver quality distance education programmes using ICTs (www.cupide.org).

In October 2007, the University of Guyana reported its first two online courses.

CKLN involves community colleges in the region and the UWI, the University of Technology, Jamaica (UTech), and the University of Guyana.

Launched by the Caribbean Community (CARICOM) and the Organization of Eastern Caribbean States (OECS) in 2004 […] (CKLN) is a multilateral project, supported by the OAS, the World Bank, the European Union and the Canadian International Development Agency (CIDA). [It] is designed to enhance the competitiveness of Caribbean countries, using information and communication technologies to connect the Caribbean to the global pool of knowledge, developing human resources and facilitating greater regional integration (www.ckln.org).

Aware of the similarities in intent and some of the beneficiaries, the management of both projects has sought to ensure synergies between the two.

Institutional Collaboration in Distance Education

Marrett (2006) defined institutional collaboration in distance education as incorporating "initiatives or arrangements of various kinds between two or more organisations working to accomplish specific goals in distance education that have institutional commitment" (p. 62). Five forms of institutional collaboration in distance education were identified. These were: (i) distance education associations, both local and international; (ii) organizations such as the Commonwealth of Learning (COL)[5], which promote collaboration among groups of institutions; (iii) one institution providing programmes and certification to students in various locations, supported by services (e.g., registration) and facilities (e.g., library) provided by other collaborating institutions; (iv) institutional twinning, in which programmes from one institution are offered to students in another; and (v) consortia (pp. 57–58).

Rumble and Latchem (2004) attribute the "plethora of mating calls" for collaboration in distance education as a response to volatile markets and new economic requirements brought about partly by the new technologies. These technologies place the emphasis on:

organisational systems rather than physical entitites … that … cut across traditional managements, departments and functions and operate through a variety of networks, partnerships and alliances which are interactive, interorganisational and international. These systems are 'messily open' rather than 'neatly closed,' comprising temporary configurations of organisations that share common interests and which members join and leave as opportunities arise and wane (Rumble & Latchem, 2004, p. 127).

Dhanarajan (1998, paragraph 30) gives some of the reasons for "partnerships, mergers, consortiums, of one kind or another" in distance education as including:

- *Economy: developing learning resources, establishing support centres for learners and creating the infrastructure for the delivery of courses are all up-front high capital costs that can be saved by shared use;*
- *Changing enrolment patterns is a common feature of flexible and modular learning; no institution committed to user centred curriculum can fulfil all learner demands; cross sharing of courses to meet programme aims and objectives better achieves student demands without causing enormous costs and presenting risks to individual institutions;*
- *Funding patterns that are uncertain and nonsustainable require alliances and strategies which reduce risks; and*

- *Curriculum demands that a variety of academic talents for short periods of time are better accomplished by sharing staff resources.*

Even while there are driving forces for collaboration in distance education, the collaborative process can be challenging, especially the establishment of successful consortia. Bates (2001) finds that not only do the institutions in a consortium have to be of similar status with equitable funding arrangements made, but "they need a change of culture within organizations, from one of fierce competitiveness between institutions to one of trust and goodwill between the partner organizations" (p. 62). This culture change is perhaps the hardest of all to achieve.

In addition to the need for trust and goodwill, other elements needed for successful partnerships identified by Dhanarajan (1998, paragraph 34) are: the need for clearly defined and articulated mission; unequivocal institutional commitment, backed by leadership dedicated to ensuring the success of the partnership; government and community support at the policy and practical levels in the case of international partnerships; and an organizational structure to support the partnership.

He concludes that:

Partnerships of the 21st century cannot be about territorial preservation (cyberspace does not recognize this), it will be about student volume and economics, learner choice and autonomies, mobility of jobs and people, explosion of knowledge and technology and interdependency and universalisation (Dhanarajan, 1998, paragraph 35).

By means of semistructured interviews, self-administered questionnaires and document analysis, Marrett (2006) carried out a cross-case analysis of 38 instances of institutional collaboration in distance education at the tertiary level in the Commonwealth Caribbean and one failed attempt. It included 28 Caribbean institutions located in nine Commonwealth and three non-English-speaking Caribbean countries, and 26 non-Caribbean institutions involved in the cases. The role played by ICTs and some of the issues that arise beyond those presented by the technology are presented below.

icts and other issues in institutional collaboration in distance education

Of the 38 instances of collaboration in distance education investigated, Marrett (2006, pp. 293–294) reports that technology was the second most frequently cited factor (18/29) as facilitating collaboration, with personal contact being the most frequent (24/29). Email facilitated communication and in a few instances, collaborators were located on the Internet through Web search.

In some cases, the technology was said to have facilitated programme delivery. Interestingly though, in 4 of the 29 cases for which information was provided, technology was also cited as limiting the collaboration. In one case between a Caribbean and an overseas university, the unreliability of Internet connections in the region at the time necessitated a change in the original plan for delivery via the Internet to the use of compact disks or video tapes. This resulted in the programme taking longer than originally intended. Although there have been significant improvements in the provision of bandwidth in the region, there is still room for improvement. Costs were the most frequently cited hindrance to collaboration.

issues

In analysing the 38 cases of institutional collaboration in distance education that obtained between 1982 and 2002, Marrett (2006) identified a number of issues which are reviewed below.

Limited Institutional Learning

Institutional collaboration in distance education was shown to have contributed to the human resource development in the region, particularly at the graduate level. Thirty out of 53 (56.6%) programmes incorporating distance education that were offered as a result of the collaborative arrangements were post graduate, with the areas of education and management being most prevalent. The other programmes were either at the undergraduate (15) or preuniversity (8) level. However, the collaboration was largely between overseas and Caribbean institutions, with the programmes and the policies governing them being in the main that of the overseas institution. The collaboration did not significantly increase the Caribbean institutions' capabilities of developing and offering their own programmes at a distance, especially involving the new technologies. With the growing increase internationally in the use of ICTs in education, which, according to Bates (2001, p. 7) has "resulted in some significant changes in teaching and learning in post-secondary education and training," there is cause for concern about the limited institutional learning.

Policy and Resource Implications of Distance Education

The South African Institute for Distance Education (SAIDE) points out that "distance education has a weighting towards sometimes quite high fixed costs in start-up but which allow for economies of scale as student numbers increase" (SAIDE, 2004, p. 2) and average per student costs decline at thresholds of 500, 1,000 and 10,000 students (p. 8). With the notable exception of UWI, the tertiary level institutions in the region largely have a national focus. The small population base of the individual countries would seem to militate against these institutions developing distance education for local audiences only. To develop programming for audiences beyond the national boundaries requires a shift in policy and practices. Given the prevalence of community colleges and teacher education institutions, should the move to distance education offerings be contemplated, there would be a clear case for institutional collaboration among these institutions to maximize resources. As Bates (2001, pp. 62–63) points out, particularly as pertains to institutions in small or economically less developed countries:

competition between local institutions in the field of e-learning is likely to be counter-productive. The real competition for local universities and colleges will come from outside the system, from foreign universities and from the private sector. The resources and skills in economically less well developed countries are likely to be too scarce to enable lots of programmes from different institutions to be developed to a quality that can compete with those coming from outside. Thus, for instance, ***small states in a region*** *such as the South Pacific or Caribbean* ***would probably bene. t a great deal from building a strong e-learning consortium or a single regional e-learning institution*** (Emphasis in original).

Limited Intraregional Collaboration

Although the limited resources and small size of the population of the individual countries present a compelling argument for collaboration in the development of programmes offered at a distance to ensure viability, there remains limited intraregional collaboration. Oftentimes, such collaboration was instigated by agents (such as COL, funding agencies, or governments) external to the collaborating institutions rather than by the institutions themselves. Most of the cases of intraregional collaboration centred mainly on training. This runs counter to recommendations made in various quarters for collaboration in distance education among Caribbean institutions as a strategy for increasing access to tertiary education in the region (Bates, 2001; Koul, 2002; Marrett

& Harvey, 1998; Thurab-Nkhosi, 2000). One explanation for there being more collaboration with external institutions than intraregionally is that the impetus for both the development of distance education and collaboration originate outside of the region (Marrett, 2006, p. 315). Further, Marrett summarises that:

Challenges which are surmounted in collaboration with overseas institutions are not dealt with locally and the institutions persist with parallel play within the region while actively seeking to play with the 'big children' overseas. With the implementation of projects such as CKLN and CUPIDE, failure on the part of the institutions to engage in greater collaboration may result in technical infrastructure being in place with little local programming and much more programming from overseas (Marrett, 2006, p. 311).

Environmental Support for Collaboration

In addition to policies of internationalization and resources provided by some of the overseas institutions themselves, there were examples of enabling environments to encourage tertiary level institutions to seek out collaborative arrangements. For example, in the USA, there is the Association Liaison Office (ALO)[6] for University Cooperation in Development, established in 1992, which:

assists the nation's six major higher education associations build their partnership with the U.S. Agency for International Development (USAID) and help their member institutions foster cooperative development partnerships with colleges and universities abroad". Uniquely positioned to promote the involvement of U.S. higher education in global development, ALO seeks to encourage international partnerships to address strategic goals (ALO: http://www.aascu.org/alo/About/about.htm (URL no longer available)).

The Consortium for Belize Educational Cooperation (COBEC):

was established in the late 1980s to link post-secondary educational institutions in Belize and other countries for the purpose of strengthening and expanding their capabilities in higher education. In 1992 the consortium was incorporated as a 501 (3) © nonprofit corporation (www.cobec.org/cobec_site/home.html).

On October 31, 2007, there were only U.S. and Belize institutions listed as members on the COBEC Web site.

Agreements Involving Facilitating Agent

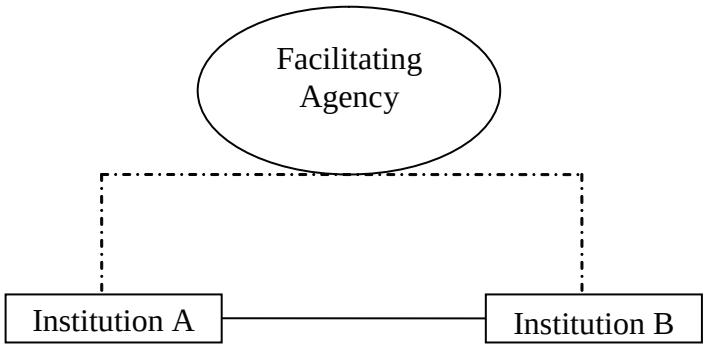
Marrett (2006, p. 285) identified eight types of multilevel agreements where a third party acted as a facilitating body between educational institutions. These are represented in the Figures below and exemplified in the brief cases given in the related boxes.

In some cases, the facilitating agency simply acts as the catalyst for bringing the institutions together without being involved in institutional agreements. This is shown graphically in Figure 1. The facilitating agency's role is represented as a dotted line, and the written agreement between the institutions by the solid line.

A second scenario is one where there are two levels of agreements, one between governments as facilitating agencies, and another agreement between the educational institutions, as shown in Figure 2. Variation of this is where the government as facilitating agency enters into an agreement with a provider institution and then mandates a public tertiary institution to participate in the collaboration without there being a written agreement between the two educational institutions, described as an "unsecured" agreement and represented by a dotted line in Figure 3 below.

In some instances, the facilitating body is an organization such as a council of community

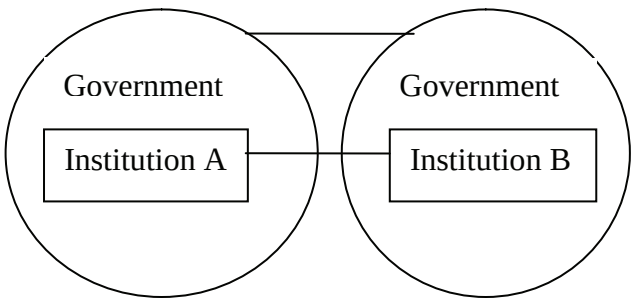
Figure 1. Facilitated institutional agreement (Source: Marrett 2006, p. 287)



Box 1. Facilitated institutional agreement

UWI Faculty of Agriculture and Wye College
In 1992, cognisant of the plans of the UWI Faculty of Agriculture to develop distance education, the then COL Advisor to the Caribbean suggested the possibility of collaboration between the Faculty and the then Wye College of the University of London. He was aware of an arrangement between Wye and an open university in Pakistan in which the materials for Wye's post graduate programme in Agriculture and Rural Development had been adapted for Pakistan and he had thought that this would be good for transfer to the Caribbean. COL funded two meetings (one in the UK and the other in Trinidad and Tobago) between Wye and UWI to enable initial discussions. Further funding for meetings to develop the idea was provided by the British Development Division for the Caribbean which, under the Higher Education Links programme, also funded the four year (1994-1998) collaboration that resulted. It involved (1) the adaptation ("Caribbeanization"), delivery and certification by UWI of the Wye programme, Advanced (MSc, diploma and certificate) Training in Agricultural and Rural Development, (2) training for relevant academic, technical, and other support staff in the development of learning materials and tutorial systems, administration and management of such programmes, and (3) provision of desktop publishing equipment. There was a letter of agreement between the two educational institutions. (Marrett 2006, pp. 139–142)

Figure 2. Agreement at governmental (facilitating) level encompassing the institutional agreement (Source: Marrett 2006, p. 288)



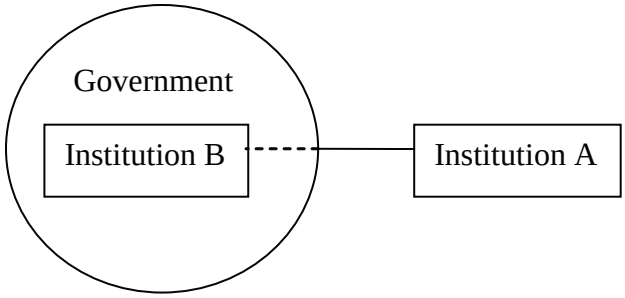
Box 2. Agreement at governmental (facilitating) level encompassing the institutional agreement

RBTT ROYTEC and the University of New Brunswick

In 1998, the University of New Brunswick (UNB) in Canada began offering by distance its Bachelor in Education for Primary School Teachers to students in Trinidad and Tobago, in collaboration with the Royal Bank Institute of Business and Technology (RBTT ROYTEC), and with the support of the ministries of education of Trinidad and Tobago and the province of New Brunswick. Prior to this, UNB had been involved with ROYTEC in the delivery of a site-based Bachelor of Business Administration programme in Trinidad and Tobago. UNB approached RBTT ROYTEC with the idea for further collaboration.

Academic responsibility was vested in UNB. Local mentors provided guidance and support for the students especially for school-based projects. There was also a local programme coordinator, a former Chief Education Officer in the Trinidad and Tobago Ministry of Education, who helped to develop the operating framework for the programme in addition to acting as the liaison between programme administration, the students and the Ministry of Education. In his view, an important element in the success of the programme was the preparation work that occurred over a period of one year, facilitated by policy arrangements. A development of the collaboration was that from 2004 the content for two courses was written and delivered by persons from Trinidad and Tobago under contract with UNB, with UNB retaining the copyright. The coordinator described this as an indication of an emerging partnership between the two institutions. (Marrett, 2006, pp. 135–137).

Figure 3. Agreement between government (facilitator) and overseas institution, involving local institution in "unsecured" agreement (Source: Marrett, 2006, p. 289)



colleges, with several member organizations. The facilitating agency enters into an agreement with an external institution, and designates one of its members as the focal point, but with no formal agreement either between the focal point and the external institution or between the focal point and other members of the council, as represented in Figure 4.

Another type of multilevel agreement involves the facilitating body contracting with one educational institution, which then contracts with another, in addition to contracting with individuals (for course delivery, for example), represented in Figure 5.

A sixth scenario is one in which the facilitating organization contracts with two institutions in the region for the delivery of the same programme, with collaboration between the two regional institutions being only incidental, shown in Figure 6.

There was one peculiar case of collaboration in which the facilitating body contracted with one educational institution to assist in the adaptation and delivery of a programme of a second institution, but there was only a verbal agreement between the two educational institutions, represented in Figure 7. As the case study in Box 7

Box 3. Agreement between government (facilitator) and overseas institution, involving local institution in "unsecured" agreement

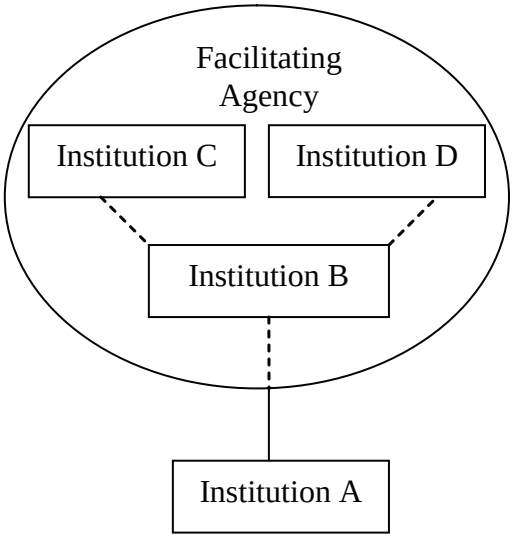
IGNOU and the Ministry of Education, Jamaica

Established in 1985, the Indira Gandhi National Open University (IGNOU) provides distance education to large sections of the population of India. In 1995, IGNOU began enrolling students throughout the Commonwealth in two of its graduate programmes (Post Graduate Diploma in Distance Education, and Master of Arts in Distance Education) through the Rajiv Gandhi Fellowship Scheme (RGFS), implemented in association with COL. The courses were delivered by distance using a mix of media (largely print) supported by locally recruited counsellors.

For the initial offering, there were100 students from 15 Commonwealth countries, including Antigua, Guyana, St. Kitts-Nevis, St. Vincent and the Grenadines, and Trinidad and Tobago. Prior to the second offering in 2002, with support from the COL, the two programmes were revised and further internationalized. The second offering to 45 students from seven Commonwealth countries included 10 from Jamaica, which was a result of the efforts of the then Chief Education Officer in the Ministry of Education and Culture, Jamaica. While on professional assignment to COL in 2001, he learned of the RGFS and given his interest in developing the human resource capacity in open and distance learning, sought to have Jamaica included.

As part of the agreement between the Ministry of Education and COL, the Ministry had to undertake to provide tutorial support. Funds were allocated in the Ministry's budget for the coordination of the tutorials and the principal of a teachers'college, Mico College, was asked. There was no formal agreement with Mico. (Marrett, 2006, pp. 150–151).

Figure 4. Agreement between facilitating agency and overseas institution, involving local institutions in "unsecured" agreements (Source: Marrett 2006, p. 289)

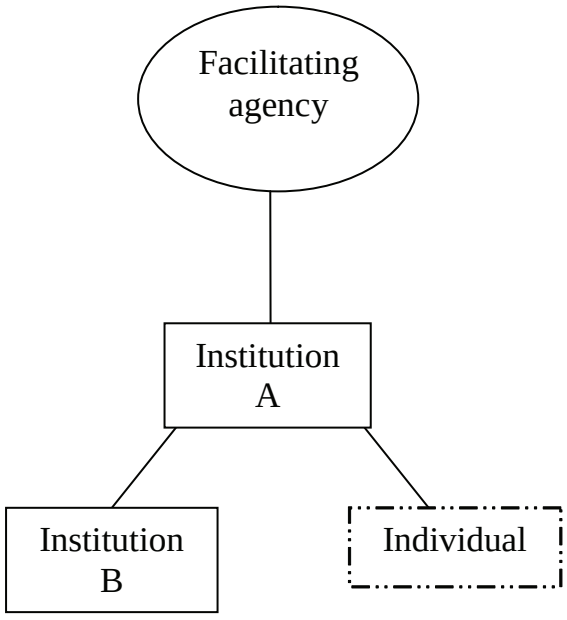


Box 4. Agreement between facilitating agency and overseas institution, involving local institutions in "unsecured" agreements

CCCJ, BCFTCS and BTCC

There are eight community colleges located throughout Jamaica offering a wide variety of post secondary programmes. The colleges are members of the Council of Community Colleges of Jamaica, (CCCJ) which, in addition to the University Council of Jamaica, accredits their programmes, plays a supervisory and coordinating role in relation to the work of the colleges, and fosters the professional development of their staff. As part of a thrust to upgrade the faculty of the colleges, in 2002 CCCJ entered into an agreement with the Birmingham College of Food, Tourism and Creative Studies (BCFTCS) in the United Kingdom to make the latter's Master's in Hospitality Management available by distance primarily to faculty of the colleges. When the collaboration was originally negotiated, the principal of Brown's Town Community College (BTCC) was the chairman of CCCJ and volunteered his institution as the one to undertake the local coordination. There was no formal agreement with BTCC. (Marrett, 2006, pp. 175–176).

Figure 5. Multi level agreements (Source: Marrett 2006, p. 290)



Box 5. Multilevel agreements

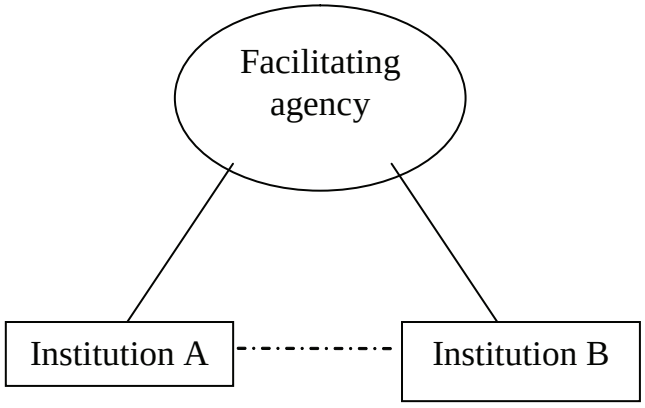
Special Diploma in Technical and Vocational Teaching

The University of Technology, Jamaica (UTech) is a national university with a growing regional reach, using distance education as one means of increasing enrolment. In 1999, COL approached UTech to provide an institutional base for what was eventually called a Special Diploma in Technical and Vocational Teaching (to differentiate it from regular UTech diplomas that carried more credits). The programme had its genesis nine years earlier at a COL-sponsored conference on Technical and Vocational Education (TVE) by Distance Education held in 1990 in Hong Kong. The need was identified for training in pedagogical skills for teachers in the TVE system who were skilled in their specialization but did not have teacher training, a matter that was particularly relevant to the Caribbean. In 1992, representatives of technical and vocational education and training from 14 Caribbean countries met in Nassau, Bahamas, to develop an action plan to meet the identified need. COL then contracted a number of writers throughout the Commonwealth to write the materials. Between 1993 and 1999 the materials were written and tested with the students of TVE institutions in the Caribbean.

In 1999, a regional steering committee of representatives of ministers of education met to review the curriculum and the materials, and identified the need for standardization of the curriculum and the materials and, given the passage of time, updating or complete rewriting of some of the materials. UTech entered into an agreement with COL to undertake the standardization and revision exercise as part of a project scheduled to run from 2000-2006. For the duration of the agreement, UTech would hold the copyright, after which COL would be able to make it available to others.

In 2000, the steering committee met again and determined the countries to be involved in piloting the programme which was scheduled to begin in early 2001 (however teaching did not begin until late 2002). UTech would certify the programme and franchise it to the relevant institution in each country to offer the programme according to established standards and guidelines. (Marrett, 2006, pp 177–189).

Figure 6. Agreement between facilitating agency and participating institutions with incidental collaboration between institutions (Source: Marrett 2006, p. 291)



Box 6. Agreement between facilitating agency and participating institutions with incidental collaboration between institutions

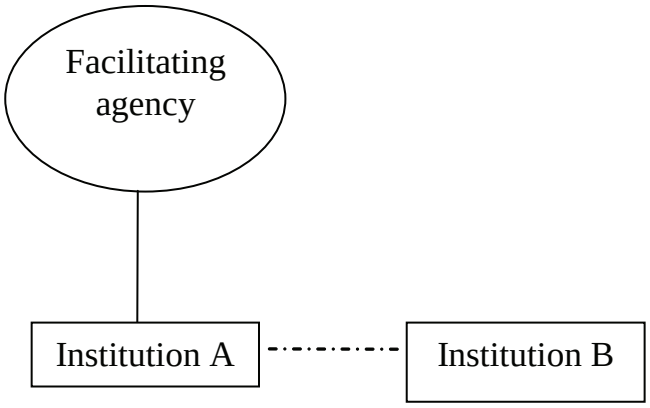
Diploma in Youth in Development Work

The Commonwealth Youth Programme (CYP) is an arm of the Commonwealth Secretariat, which, through four regional centres (Africa, Asia, Caribbean and South Pacific), works with governments to implement policies for youth, provides training, and works with young people to empower themselves to advance individually and as a group. The CYP Caribbean Centre (CYP:CC) is based in Georgetown, Guyana and collaborates with ministries and departments responsible for youth development to provide certificate and diploma level training, initially through residential programmes. In 1993-95, CYP:CC converted its traditionally taught Diploma Course in Youth Work to print based distance learning format for delivery throughout the Commonwealth Caribbean. In 1995, CYP began the development of a 13-module diploma programme, Youth in Development Work, to be taught at a distance in its four regional centres. The development of the programme entailed extensive consultations involving the Pan Commonwealth Office, the four regional centres, COL, the University of Huddersfield in the United Kingdom (contracted by CYP as the external quality assurance agency), and 15 institutions in the four regions. In the Caribbean, the institutions were the University of Guyana (UG) and UWI. Course writers throughout the Commonwealth were contracted to develop the modules. Three of the modules were developed by writers in the Caribbean, two from Jamaica and one from Guyana. The modules were printed in Malaysia in 1998 and the pilot began in the Caribbean in 1999 and ran until 2001.

While the development phase involved a lot of consultation, the delivery was primarily the responsibility of each of the educational institutions with limited interaction among them. The institutions gave their own certification, although CYP gave a certificate for recognition across the Commonwealth. Apart from the copyright for materials being held by CYP, all aspects of registration and delivery of the programme were the purview of the offering institution. Staff from government ministries with responsibility for youth development had been expected to give administrative (e.g., assistance with recruiting students) and other support, such as supervision of field work, although there were no formal agreements to that effect. In practice, there were differing levels of involvement of the respective ministries or departments.

Within the Caribbean, the interaction was primarily with CYP:CC as the coordinating body. There were memoranda of understanding and financial agreement between CYP:CC and each of the two universities but no agreement between the two educational institutions. Collaboration in academic matters, such as sharing of examination questions, did not develop in the region, although it was reported to have taken place in the Asian block. In preparation for the offer of the programme to a second cohort at UWI in June 2004, UG (which had started a second cohort in March 2003) was invited to participate in a planning meeting held in Grenada in March 2004 to share experiences. (Marrett, 2006, pp. 190–198).

Figure 7. Agreement between facilitating agency and one institution with "unsecured" collaborative agreement between institutions (Source: Marrett 2006, p. 292)



Box 7. Agreement between facilitating agency and one institution with "unsecured" collaborative agreement between institutions

The Certificate in Broiler Production Technology by distance

The Regional Educational Programme for Animal Health Assistants (REPAHA) was established in Guyana by CARICOM in 1975 to meet the need for increased middle management capacity in animal health delivery as part of the drive to increase regional meat and milk production. Taught as a face-face programme, it targeted veterinary assistants and veterinarians as well as farm managers from across the region. It began as externally-funded, then moved to a stage of mixed funding with CARICOM member states contributing to fixed costs, and then in 1988 largely to self-financing with contributions from the government of Guyana. With a fall in scholarships available for students nationally and regionally REPAHA experienced a fall in the number of students entering the programme at a time when there was an increasing reliance on student fees for financing the programme.

In 1997, the then principal of REPAHA embarked on developing distance education capabilities with the assistance of the Institute of Distance and Continuing Education (IDCE) of the University of Guyana and COL. Two workshops were held in 1998 which gave rise to the development of the Certificate in Broiler Production Technology by distance. Two further workshops were held in 2001 and involved presenters drawn from IDCE, UWI Distance Education Centre, and two other distance education initiatives in Guyana: the Guyana Basic Education Teacher Training (GBET) and the Guyana In-Service Distance Education Programme (GUIDE). A few of the participants at these workshops had attended the ones held in 1998.

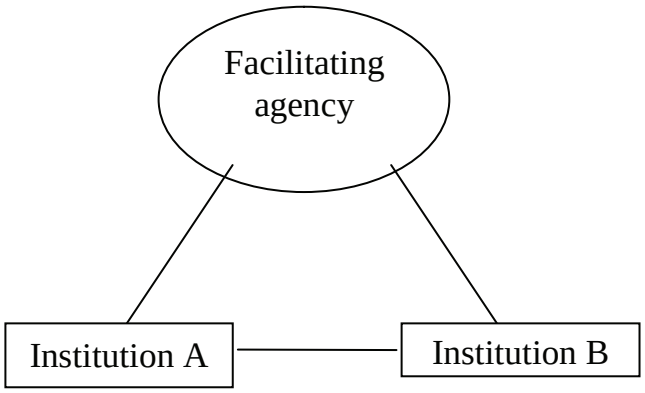
However, even while REPAHA planned for the revitalization of its programme through the development of distance education, in light of the fall in the number of new students and with the view that the programme had significantly met the need for which it was established, in February 2002 the Government of Guyana and the CARICOM Conference of Heads of Government decided to merge REPAHA with the Guyana School of Agriculture (GSA). REPAHA ceased operating at the end of August 2002.

The then principal of GSA had agreed (although not in writing) to allow IDCE to continue the development of the Certificate in Broiler Production Technology by distance. In March 2003, an agreement was signed between COL and IDCE focusing on the delivery and monitoring of the programme, including reproduction of the materials, development of handbooks for learners and tutors, and orientation and training for tutors and management staff. However, there was no written agreement with GSA.

Before the programme was launched, the GSA principal changed and the successor did not share the IDCE's enthusiasm for what was supposed to be a collaborative programme, although the new principal had been a participant at three of the four workshops while she was deputy principal of GSA. Remarking in a 2004 interview that she had noticed the advertisement for the programme, she explained that while REPAHA was in existence, the two institutions (REPAHA and GSA) shared staff and as such "a lot of [GSA] staff were pulled in" when REPAHA had begun to "think distance". The distance education initiative had not gotten far before the closure of REPAHA.

Although she had a feeling that IDCE was "running the module", the ownership of it was not clear to her. There was no formal relationship between GSA and IDCE and communication was almost nonexistent. "They were trying to push us but we were not ready." Explaining that it took one year to fully take over the programmes from REPAHA after its closure with a lot of issues to be sorted out, GSA was only treating with the face-face former REPAHA courses. "Perhaps they feel we are no longer interested. We are interested in the long term but our face-face has us occupied". (Marrett, 2006, pp. 200–210).

Figure 8. Agreements between facilitating agency and participating institutions (Source: Marrett 2006, p. 292)



Box 8. Agreements between facilitating agency and participating institutions

Caribbean Distance Education Scholarship Programme

The Canada Caribbean Distance Education Scholarship Programme (CCDESP) was a five-year initiative that began in 1998, administered by COL on behalf of the Canadian Department of Foreign Affairs and International Trade. It was an attempt to improve the cost-effectiveness of Canadian scholarship funding by providing the opportunity for students in the Caribbean to register with one of three Canadian universities to pursue by distance mode programmes identified by four Caribbean governments. UWI was also involved in CCDESP, primarily to give support, as it turned out. Students in Jamaica pursued the B.Sc. in Information Technology with Athabasca University (AU), students in Dominica and St. Vincent and the Grenadines did the degree in Teacher Education with Memorial University of Newfoundland (MUN), while students in St. Lucia and St. Vincent and the Grenadines studied the degree in Tourism and Hospitality Management with Mount St. Vincent University (MSVU).

There was a memorandum of agreement (MOA) between COL and UWI and three memoranda of understanding (MOU) (each with the same wording) between COL, UWI and each of the Canadian provider institutions. There were also agreements between COL and the Canadian institutions and COL and the Ministries of Education.

While the initiative can be judged as successful in that a number (some 66) of Caribbean nationals completed the programmes and obtained degrees from the Canadian universities at substantially lower costs compared to traditional on-campus study, it failed to engender any significant amount of collaboration between UWI and the Canadian institutions.

Apart from the short time span between the effective date of the agreements (July 1998) and the expected implementation of teaching (September 1998) which would not have allowed sufficient time for revision of the courses to accommodate input from UWI, an examination of the agreements signed by UWI reveals a number of areas that from the outset may have contributed to the problems experienced in the collaborative aspects of the project.

The MOA between UWI and COL did state that COL (not the collaborating institutions) was seeking:

UWI's participation and collaboration as a local partner institution in the CCDESP, particularly with regard to the development, exchange and provision of materials, personnel and learning facilities through its network of Distance Education Centres (UWIDEC).

Although some use was initially made of UWI's personnel (largely administrative) and learning facilities, there was no "development, exchange and provision of materials", except in a limited way in one case, which is examined below.

The MOA further spoke of COL anticipating:

facilitating cooperative working relationships among Canadian and Caribbean educational institutions and study centres that will serve as hosts for the students and seeks to ensure that local institutions are full partners in arrangements, providing both Canadian and local institutions with opportunities for growth, scholarly exchange, technology transfer and capacity building.

However, of 13 items in the MOA's operational plan, seven spoke to the primary role of the Canadian provider institutions, while only the last two items addressed UWI's role and this in language of conditionality: "Pending collaboration arrangements with provider institutions, UWI may make appropriate distance education materials available to the CCDESP…at no direct cost to COL" and "Pending collaboration arrangements with COL or provider institutions, UWI may make available tutors and UWIDEC equipment and facilities for the delivery of the CCDESP programme" and that "provider institutions and/or COL will provide any necessary relevant training", the latter ignoring the fact that one of the roles of UWIDEC is to provide training in distance education.

The agreement as written did not really anticipate a truly collaborative role for UWI as an equal partner, but assigned it more to the role of an institution of a lower level, such as that of a college working in collaboration with a university to deliver the latter's degree. What is of interest is that UWI signed the agreement although itself offering degrees (although at that time not at a distance) in the very areas addressed by the CCDESP. It was suggested that UWI may have signed such an agreement in consideration of the fact that the governments had been in discussion with COL and UWI's principal negotiator did not want to be seen to be delaying implementation.

If COL's intent was to "develop and share human, curriculum and material resources in various aspects of the subject areas", stated as one of the objectives of the MOA, a better approach would have been for the Canadian institutions and UWI to work together to incorporate aspects of both the Canadian and UWI programmes with the operational plan specifying the details of how this would be accomplished.

The MOUs between UWI and each of the three Canadian institutions were fairly general in nature, emphasising the intent of engendering cooperation both for the specific project and in the future:

to explore such other areas of mutual interest leading to joint programmes, research in distance education, and others as might be of interest to any of the partners in this agreement, and which may lead to separate or subsidiary agreements.

However, it is the first paragraph of these MOUs that contain the seed of possible discord. While they speak generally of UWI's interest in "increasing the number of distance education opportunities available to prospective Caribbean students"—not necessarily UWI's own students—the MOUs are very specific about each of the Canadian institution's interest "in building on its

continued on following page

Box 8. continued

reputation both in [the subject area] and in distance education *to contribute toward the internationalisation of its campus and its programmes*" (Emphasis is author's).

One of the provider institutions (MSVU) asked UWI (apparently from February 1999) to make courses available to students registered in its programme. Partially as a result of different persons attending meetings and handling communication within UWI, in addition to matters such as differences in course structures and nonavailability in UWI of some of the courses requested for delivery by distance education, the matter was not resolved before August 1999, with the result that two UWI courses in accounting were offered. Accommodating the students in the UWI registration process was undertaken through the UWI specially admitted student mechanism, and UWI was to bill the Canadian institution for the tuition fees per student. There was some dissatisfaction with delivery of the course expressed by students in one of the Caribbean countries and there was concern about the high failure rate, resulting in complications and added costs as the courses had to be repeated as the students were required to pass before they could proceed with their studies.

From this author's perspective, likening the intended collaboration to an arranged marriage, COL may have introduced the parties with the intention of fostering wedded bliss or at least a happy engagement, however the opportunity for sufficient courtship without the presence of the match-maker as chaperone was not presented or at least not grasped. (Marrett, 2006, pp. 211–222).

exemplifies, the absence of a written agreement between institutions can lead to problems of continuity where there is a change in the leadership of any of the organizations.

The ideal scenario is one in which there are agreements in place among all the parties involved, shown in Figure 8. However, careful attention needs to be paid to the wording of the agreements, as exemplified in the case described in Box 8.

rE comm Enda tions

To address the issues identified, the following recommendations are made.

Institutional Learning

In seeking to establish collaboration in distance education, the Caribbean tertiary level institutions should seek to enter into arrangements that not only provide programmes in the short term, but should ensure the development of their own human resources in addition to any other infrastructural development that might be forthcoming. This does imply that they need to assess their policies on development of distance education.

Intraregional Collaboration

In recognition of the need to foster greater intraregional collaboration in distance education, CARICOM, CKLN, and CUPIDE had agreed to jointly sponsor a consultation on collaboration involving tertiary level institutions and related organizations in the region, scheduled for the end of November 2007. At the time of writing, the consultation had not taken place, but it is anticipated that this meeting would help to pave the way for greater collaboration.

Environmental Support for Collaboration

In addition to the institutions examining their own policies, as pertains to the development of distance education and also in terms of collaboration, a regional enabling organization would assist in areas such as policy formulation, identification of funding, training, marketing of regional programmes, and encouraging synergies among various distance education initiatives in the region. This organization could also assist in the implementation of the recommendations emanating from the consultation on collaboration. This entity would work at the regional level, linking with international organizations such as COL,

which has a Commonwealth-wide focus and is a source of related information and other resources. Rather than create a new entity, it may be possible to utilize an existing organization such as CKLN, which already has established a foundation.

Agreements

While personal contact may initiate the collaborative process, there is need for formal agreement between the collaborating institutions, which should clearly state the purpose of the collaboration and set out the roles and responsibilities for each institution. By so doing, a foundation is laid that will withstand changes in key personnel in any of the institutions. Input into the formulation of the agreements should be sought from the relevant stakeholders in each of the institutions to facilitate implementation.

f utur E t r Ends

The exponential growth in Internet usage experienced in the Caribbean will most likely continue and the use of online learning will increase. Whether the Caribbean institutions will become greater contributors to the global offering of distance education programmes online (rather than being only recipients) will depend on their foresight in the development and implementation of policies that embrace distance education and foster collaboration.

Areas for further investigation include: an assessment of the quality of programmes that resulted from institutional collaboration in distance education; economic studies of potential earnings from the export of educational programmes from the Caribbean to the wider world, as well as the quantification of expenditure on the importation of tertiary education into the region; and intrainstitutional collaboration in distance education.

c onclusion

There is no doubt that the availability of Internet access has facilitated institutional collaboration in distance education at the tertiary level in the Commonwealth Caribbean. However, that is the easy part. For the collaboration to be truly beneficial to each party, attention needs to be paid to issues beyond the technology. This chapter has highlighted a few of those areas.

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kEy tErms

Commonwealth Caribbean: Countries in the Caribbean region that share a history of colonization by the British, and which now belong to the Commonwealth of Nations or British Commonwealth.

Distance Education: Planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements (Moore & Kearsley, as cited in Visser 1997, p. 2).

E-Learning: The application of electronic technologies to learning.

Information Communication Technology: An umbrella term that includes any communication device, or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems, and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning. ICTs are often spoken of in a particular context, such as ICTs in education, healthcare, or libraries (http://searchcio-midmarket.techtarget.com/sDefinition/0,,sid183_gci928405,00.html).

Institutional Collaboration: Initiatives or arrangements of various kinds between two or more organisations working to accomplish specific goals in distance education that have institutional commitment (Marrett, 2006, p. 62).

Internet Penetration Rate: The Internet Penetration Rate corresponds to the percentage of the total population of a given country or region that uses the Internet. The IWS defines an Internet user as anyone currently in capacity to

use the Internet: (1) The person must have available access to an Internet connection point, and (2) The person must have the basic knowledge required to use web technology (Internet World Stats: Usage and Population Statistics , http://www.internetworldstats.com/surfing.htm).

Tertiary Level Education: In the Commonwealth Caribbean, inclusive of university and nonuniversity level programmes, technical and vocational education and training, professional and paraprofessional training, and continuing education programmes, geared for persons over the age of 16 years. The determination of an educational institution as tertiary is the purview of either national accrediting bodies, where they exist, or the Ministry of Education of the country.

Endnot Es

1 Antigua and Barbuda, Anguilla, The Bahamas Islands, Barbados, Belize, British Virgin Islands, Cayman Islands, Dominica, Grenada, Jamaica, Montserrat, St. Kitts/Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, Turks and Caicos Islands. There are four campuses located one each in Barbados, Jamaica and Trinidad and Tobago, and a virtual campus with a physical presence in the supporting countries. The other noncampus countries are served by University Centres. (See: http://www.uwi.edu)

2 Established in 1973 by the Treaty of Chaguaramas, which was revised in 2001, CARICOM currently has 15 member countries (Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Monteserrat, St. Luica, St. Kitts and Nevis, St. Vincent and the Grenadines, Suriname, and Trinidad and Tobago) and 5 associate members (Anguilla, Bermuda, British Virgin Islands, Cayman Islands, and Turks and Caicos Islands). In addition to the establishment of the CARICOM Single Market and Economy, its objectives include: improved standards of living and work; accelerated, coordinated and sustained economic development and convergence; achievement of a greater measure of economic leverage and effectiveness in dealing with third States or other third parties; and enhanced coordination of foreign and foreign economic policies and enhanced functional cooperation (source: http://www.caricom.org).

3 "The Internet Penetration Rate corresponds to the percentage of the total population of a given country or region that uses the Internet… The IWS… defines an Internet User as anyone currently in capacity to use the Internet… (1) The person must have available access to an Internet connection point, and (2) The person must have the basic knowledge required to use web technology" (http://www.internetworldstats.com/surfing.htm).

4 This figure is skewed by the population penetration rate for New Zealand at 74.9% and Australia at 71.9%

5 "The Commonwealth of Learning is an intergovernmental organisation created [in 1989] by Commonwealth Heads of Government to encourage the development and sharing of open learning/distance education knowledge, resources and technologies. COL is helping developing nations improve access to quality education and training." (www.col.org/about/). Further, as a "catalyst for collaboration" COL engages in programmes that it hopes will result in "significant dividends [that] accrue when parties work together in a complementary and synergistic manner" (www.col.org/programmes/catalyst/).

6 In 2006, ALO's name was changed to Higher Education for Development to better communicate the role of the organization (http://www.hedprogram.org/WhoWeAre/OurHistory/tabid/83/Default.aspx)

Chapter VI
Collaboration and Networks: Basis for the Management Based on Knowledge in Education

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abstract

This chapter presents the course School Management and Technologies, and what emerged from the discourses of subjects that make it possible to deduce that the educational managers successfully learned to use of technology in school management and the formation of networks and of partnerships during the course. Through the curriculum developed in the course of School Management and Technologies, as well as the interfaces offered in the learning environment, participating managers have the opportunity to rethink everyday practice, the educational contexts, and ways to work on communication with people, both in the same school or other. It was possible to perceive the potentials for the suggestion of network formation and community building, primarily Communities of Practice (CoP), as the basis for knowledge-based management in education.

introduction

This chapter describes what was revealed in the process of developing the curriculum in a School Management and Technologies course. The goal is to create work teams in the schools and among schools so that the managers should be capable of thinking about the context, the function, and technologies that are part of the daily life in schools—that is, to promote an environment in which the school manager could articulate the educational policy at the school for utilization of technological and media resources.

The case presents an examination of the partnership for the execution of the course, the professors, the modules, the interfaces, the purpose, and the methodology, as well as what emerges from discourses of school managers. The interaction that enables the formation of collaborative networks and partnerships among educational managers is emphasized. Attention is focused on practices that allow accessibility to develop educational and administrative activities. Social and cultural practices considered for analysis concern the inclusion of subjects who strive to become part of the culture of technology, even without previous technological ability, and succeed in changing their realities to permit the inclusion of media and technological resources.

Through the learning environment, the managers understand the possibilities of interaction, organizational and document exchange that allows for theoretical and practical discussions with local peers and with peers of other institutions. The course offered an opportunity for synchronous and asynchronous communication with managers and university professors. The knowledge produced through the course interactions is reflected in actions and in the activities at the schools. The course belongs to all who participated in the teaching and learning process, and in their actions contributed to the building of each course. Application of the course material consists of a written project in the last module of the course based on the reality in the participating schools. It is possible to verify the potential for the continuation of exchange initiated in the School Management and Technologies course. Be reviewing ongoing participation in the Communities of Practice (CoP) in online discussions and constant participation of representatives from education department.

In daily activities, the possibility of acquiring knowledge socially, across bureaucratic barriers, helps in the sharing of ideas.

tHE proj Ect

School Management and Technologies Project

The formation of the course of School Management and Technologies aims for the incorporation of technologies into the school management, recognizing the specifics of managing performance. Educators of the university work with (Imbernon, 2005) the managers' performance, with the articulation of theory and practice (Freire, 2003), with the social interaction (Vygotskii, 1986), and with the collaborative production of knowledge (Almeida, 2005; Almeida & Prado, 2005; Shön, 1987).

The project allows public school managers to be connected to the Secretary of Education office of the State of São Paulo, so they can use the technological resources of the school in school management and promote the best conditions for teachers to incorporate technologies into pedagogical practices, into quality learning experiences for students.

The course started in the second semester of 2004 and ended in the second semester of 2006.

Approximately 12,000 school managers were certified by the university in three distinct stages in project. In the first stage, the teaching team consists of professors of the Pontifical Catholic University of the State of São Paulo (PUC-SP), and officials from the Secretary of Education office of the State of São Paulo who are educational supervisors and technicians of technology centers. In the second and third stages, the course is given by officers of the Secretary of Education office who are educational supervisors, and are assisted by technicians of technological centers. All receive guidance, assistance, and didactic and educational support by professors of the Pontifical Catholic University of the State of São Paulo (PUC-SP).

Role rotations are necessary so the education supervisors experience the course (Dewey, 1997) and grasp the formation methodology. This experience is necessary if they are to incorporate the methodology into the public school system. University educators play various roles made viable by the technology. There is a need to think, analyze, study, and to systematize the sequence of course activities. The course coordinator works on all the changes with the professors and group guides. The educational design, the quantitative and qualitative reports are worked out in weekly meetings.

The course is made up by four modules. Activities provide for the use of technological resources in the schools. The course has strategic actions for the use of technologies in the goals and activities in each module, indicating the need for interaction between the individual and the collective in the school.

During the course, there is an incentive to create working teams in and out of school, to work collaboratively and develop action plans in collaboration. Teams rethink the contexts, the functions, and technologies with respect to the articulation between the Pedagogic Political Project of the school and the technological resources.

The managers facilitate reflection in regard to the use of technologies in accordance with the reality and the community of the school. The goal of the action plans is to improve the quality of the school. The expected result is a new meaning of the role of the manager, regarding leadership, formation of communication networks, and articulation of changes in the school by way of interaction among professors, employees, school community, and directors of teaching.

Course modules enable participants to use information systems for facilitate recordkeeping, systematization, articulation, storage, and the dissemination of information.

In the first module, the activities encourage participants to use basic software and navigation by way of the Internet, and explore the digital platform for distance education. These activities are worked on individually and in groups, aiming the usage of technologies by the school managers.

The second module, divided in two parts, works the individual and the collective. It analyses and discusses the experience and existence of school management. Case scenarios refer to situations that use the technologies or technological resources to carry out management tasks. By analyzing these cases, participants develop practical strategies to use in their schools.

Case and scenarios presented in the course show the reality school circumstances. They are complemented by readings that stimulate discussions in the forum and exchange of experiences.

In the third module, experiences worked on in the first modules are brought together with the team. Participants report that this exchange is considered one of the highest points of the course. In many cases, technological solutions are implemented that help the work in school management. There is a commentary and posters presentation about the advances and innovation that occur based on the possibilities of use of technologies in the everyday work of the managers.

In the fourth module, the manager has the responsibility of building a collaborative project for his own school management with technologies. Managers describe how they intend to use the technological resources to form networks and to strengthen the bonds with the school community. Having experienced the digital interface that enabled interactions in the course, he searches for means to produce and manage emerging ideas coming from the schools. Activities are cross-referenced to the manager's practice so they reflect their own realities. They should identify the technologies of their respective schools, check out how they are being used in the local context and identify possible ways to record, store, and disseminate the knowledge produced in the school. By identifying the school's strengths, and through

the individual contribution of each member of the team, they can propose actions to change the perceived contexts of the curriculum.

This process changes how the managers write, and it encourages the investigation of the real context by way of scientific knowledge. These elements are the foundation the use of technology in the management developed in the schools.

When the managers join forces with colleagues by way of interactive interfaces, they have a space where they can explain how they carry out actions to exchange information about the school's problems, to find solutions together for these problems, and to discover a little more about the theory of the democratic school. The management project is encouraged to be implemented later on in the schools in view of the service to the school community. The manager's studies start with the course site, all actions initiate at the access to the virtual environment.

The Site of the School Management and Technologies Project

The site of the School Management and Technologies[1] is customized for the project and for the courses. The site's presentation starts with an explanation of the partnership. At the first level of access it is possible to navigate in the open space. Open Space received this name because it has free access, as it can be accessed by all who are interested in the project.

At this locale, we can find the initial information on the project, the participants and professors of the course, references to the institutions of education and to the partners, and the access items. The registered courses and access to the activities, forums, chat rooms, and others interfaces—with entry of the password—can be seen. The "talk to the support team" is used for technological problems, and no password is needed, only identification and e-mail for answering questions. The Blue part—open space—is not restricted. The restriction starts in the orange part of the course.

My space—orange part—is a restricted local to registered users of the course. In it, there are recorded data of the environment, and through it, one can exchange information and publish statements and news.

In the red space, the course's participants and professors can access contents of the course. In this space, one can review the quantitative data of the course, such as reports of access and participation. This information may determine the need to communicate or intervene with the groups.

The site provides tools to optimize the integration of information. It can be seen as a virtual space that integrates the in progress of data, information, and communication used by the course project participants and a way to manage the data. The site offers a way for participants to present and share knowledge which enables the collaboration between the participants in the course and coordinating team. After accessing the site, the user has access to the virtual environment of the course that is on the customized platform for distance education.

The Virtual Environment of the School Management and Technologies Course

It is important to understand the potential of available virtual tools in the context of the course, to situate them in each proposed activity and interactions between professor and participants. The toolbar allows that the school managers to easily access in the course, chats, forum, mail, e-professor, library, notes, markers, e-portfolio, and agenda.

The "*Chat*" is seen in a button and creates a space for synchronous communication, which is used in Module 2, and in other situations as needed. The group professor is responsible for setting the sessions. In this space, a problem that requires collective work with the managers is discussed with the various people participating in the course. A "log"[2] of the chat is stored in the environment for future consultation.

The *chat*, in the course, has intrinsic characteristics, being synchronous, and extrinsic characteristics for being an available tool in most environments of online learning. Facilitation can happen in real-time, in a multidirectional form—from one to all, from all to one, and from all to all—in a spontaneous manner, since there is no way to foresee the course of a chat. It allows fast exchanges, and can be useful to clear up doubts faster than in e-mail exchanges. It can be used to work on concepts that are needed for learning and synchronous collaboration in service activities, in solving problems or to make fast decisions.

The *Forum* is used for exchanging and sharing experiences, as well as for the formation of networks and partnerships between managers. The Forum has the potential to give a voice to everybody, and to promote collaborative learning experiences with the whole group of participants. It participants discuss ideas, offer joint solutions to problems, build and manage actions. Since it is asynchronous, simultaneous presence for meditation or participation is not required. The forum allows each participant to read their peer's contributions and the professors' comments, analyze them, to take them up again and rework them.

The *Mail* is the reserved space for the interaction among the managers without the formal involvement of the professor, who only has access to the content of exchanged messages, but does not apply control over them. Although it is a public space for the course's participants, the interactions are one-to-one, which represents a difference in relation to the *E-Professor.* The *E-Professor* tool can be accessed by the course's participants to send and receive messages to/from the group educator. Notices and interactions that involve the professor are done by way of this tool.

The *E-Professor* used for communication by the professor to all course participants in case of notices. It can be used for information exchange or for solving problems between the professor and course participants; it can be a communication one-to-one, a or one-to-many communication, depending on the situation.

In the *Library*, texts written specially for the course are accessed. Authors are specialists in the content and specific subjects relevant to the class. These texts are referenced in the course's content and can be used for proposed activities to aid practices in development, and creating conditions for the integration of theory and practice in school management and technologies. The participants have access to the link of the text and receive a CD-ROM for access off-line. Beyond storage of the texts, in the library, there are the tutorials, so that the course participants can have access to all the tools of the course and, in case of doubt, fast help.

Notes are tools reserved only for manager-participants, so they can record their doubts and observations with regard to content and texts, just as the *Marker* that serves only the students of the group.

The *Portfolio* is a personal folder offering the participant space for storage and organization of files, and personal and group records. It allows for interaction through commentaries, that is, one document can be shared with the participants and commented on below. A search for posted documents can also be done.

The *Agenda* is the last to appear in the toolbar. It can be also seen in each beginning of content in the module.

The tools of the virtual environment support for writing, collection, analysis, and interpretation of data. The main purpose is the continuous reflection about the management and, specially, about the contribution of technologies to the work of manager and for the school's activities. The goal for establishing interaction in the forum is to encourage the participants to give new meaning to the contexts and the mechanism of interaction among managers in the schools and the directorates of education. The use of technologies offers the potential for interaction activities, joint production of knowledge, or for daily communication of the school.

The School Management and Technologies Project is focused on the interaction using tech-

nological resources to solve problems, reflect on actions, and think in a network of peers.

Courses in the online modality offer contributions to educational changes, and the communication generates a need to check and confirm thoughts all the way through the interaction between peers and with the professors.

anc Horing conc Epts for tHE forma tion of nEtworks

To handle the subject of networks and the Communities of Practice (CoP) in education, it is necessary to conceptualize the Management Based on Knowledge and the Communities of Practice (CoP) in educational context, although they are concepts borne from organizational environments different from educational institutions.

Management based on knowledge in education is cross-referenced to directives, policies of choice, and to practices of the institutions that intend to work with the creation and transfer of documents and with data of knowledge, intangible processes, and with models and methods of work. It supports for activities of the managers, professors, employees, students, parents, and community—involved in the collective work of the school, in a secure context where they have to produce, record, store, preserve, distribute, disseminate, and re-use the information and knowledge in the new situations.

As the knowledge is required for the development of individual and collective learning, there is the analysis and reflection of events, facts, feats, and gestures. The use of technological resources helps in so far as records, storage, possibility of recovery, interaction, and dissemination of knowledge exist. Interactions flow and evolve from the individual to the collective, and vice-versa.

In education, knowledge-based approaches must support the ability to learn how to do something by doing it, reflecting on it, and spreading the news of accomplishments. It should develop a culture of exchanging activities in virtual environment to share the experiences, technological, and remedial resources that should produce compendiums, collective texts, and practice strategies regarding their own practices. Knowledge is built, shared, organized, revised, and spread in the institution, which contributes to the injection of it into the daily practice. The aid is in professionalizing the participants, in the "transfer" of knowledge, and in the institutionalization of the developed practices, making possible the culture of sharing in the workplace.

In a culture of exchange, analysis and reflection is implicit, and the work with pedagogical and administrative practices contributing to co-learning, making the collective construction of knowledge easier. Learning is a social phenomenon and it is related to experience, history, and everyday practice.

Learning relates to cognitive, emotional, historic, social, and political purposes. In certain groups, people can be members of the centre, and in others, they can participate in a peripheral way (Lave & Wenger, 2006). In the Communities of Practice (CoP), learning has defined central characteristics, a process that was named as legitimate peripheral participation.

Learners take part in the community of practitioners in equality with specialists and people with more knowledge of the subject. The production of knowledge has cognitive, emotional, political, social, and cultural characteristics that leave an indelible mark in the participants. Knowledge is in a dialectic relation involving internalization and externalization, generating changes in people who work on the context within itself. Legitimate peripheral participation is a way to include the newest and the most experienced in the activities. Human beings need mobilization to build knowledge, and in the movements of ideas, the everyday practice establishes itself in social experiences.

The everyday practice is understood as the structure, the discussions, the decisions, the way

the technological tools are managed, the information, the styles, the language, the history, the values, the beliefs, the records, the storage, and the disseminations. Besides the way the people's groupings are formed, the Community of Practice (CoP) is defined in three dimensions.

The first dimension refers to how the institution is understood by the professionals and how they continually renegotiate the everyday practices, so as to solve the problems, make decisions, and produce information goods for dissemination to the institution. The second refers to how the sharing of pedagogical and administrative practices work, to connect members to the institution in a social, affective way with shared values. The third dimension describes the shared repertory of the routines, the responsibilities, vocabulary, styles, and technological resources.

The curriculum in the network does not constitute a body of knowledge to be transmitted, or an attempt to manage to extract products. It consists of the learning process, and of work with pedagogical and administrative practices, providing development of the thinking of social practice as a way to build knowledge in practice.

It is not the aim of this work to highlight the curricula of each school of the public school system. It is intended to reveal, in discourses of educational managers, indications of management based on knowledge present in the participating schools in the course.

int Eraction for t HE f orma tion of nEtworks and partn Ers Hips

The subjects of the research are social beings, and recognize themselves as people who do not live and work alone. Based on the educational manager's discourse, it is possible to realize that they have now grasped the potential for communicating with other peers by electronic mail outside the learning environment. To some managers, this communication modality was unknown, for they did not believe that they could work with technologies.

Although it seems to be a small step toward forming networks, there are educational professionals who have not yet tried to use technology for sociable communication, specially the educational manager who has an administrative assistant in his work. The interactive interfaces and the necessity to work with the content to realize the course's objectives are motivators for the use of technological resources that can be applied to the school's everyday activities.

As they become acquainted with the technological resources and share learning spaces with their peers, they can socialize about experiences, and exchange information as unique moments for searching, with their peers, for answers to the problems they face in the schools.

Among peers, the managers are encouraged to write actions and to lead projects in the school. Through technology or for the use of technology, the community can be brought into the school with interacting among professors, students, and parents.

The manager, when contemplating the priorities of the community, serves the teaching and learning necessities of the student and reflects on the pedagogical proposal with the teacher, and can rate models that can be systemized so that they can be a reference to other schools and adequate to other realities. The search for interaction generates the partnership.

The transformations in the educational spaces are still slow and, in some cases, brusque, since it implies in inertial ruptures and organization of concepts.

The construction of shared repertory routines, of responsibilities, of vocabulary, of styles, and of technological resources facilitate the continuation of the networks.

The managers realize the condition of interfaces that make the interaction possible and recognize, in the formation of networks, the potential

for solving problems and making decisions. The formation of Communities of Practice (CoP) with the managers is a proposal that is well-accepted by educational managers, given the desire to learn more and to reach professional dimensions they would not reach alone. To the educational institutions, Communities of Practice (CoP) promote the possibility for dialogue and the management based on knowledge produced by the managers.

c onclusion

Outcomes presume the interaction in the school networks and partnerships can lead to actions that they developed together. Participants' identities and the group's identity need to be known to legitimize the networks that are formed in schools are able to make virtual spaces possible for shared repertories of the routines, the responsibilities, the vocabulary, the styles, and the technological resources, for this being enough incentive and legitimacy given by the central institutions.

The characteristics that emerge from the manager's discourses point to the viability for online communities. The creation of Communities of Practice (CoP) is possible, given that the managers interested in taking part in initiatives do voluntarily recognize, even if in a superficial way, the participative, professional, and institutional dimensions.

This now-emerging social phenomenon foresees cultural building in a more participative way and with the emergence of restructuring the professional networks. The Communities of Practice (CoP) strengthen the creation of new "we" and "knots" in the network.

The process of educational change may be slow, but the managers cannot be discouraged when facing what still needs to be done, and should not assume impotence in the relation to power.

The collaboration in assignments is essential for the construction of a joint knowledge by the educational professionals. In learning spaces, it is necessary to focus on the results without forgetting the processes, the expressed negotiations, the adjustments in comments and returns, and the mediation in human interactions.

In the curricular change, the professional's learning is implicit. The links are made between the individual and social history, between intentions and representations. The understanding that incentives are necessary to overcome and advance to new learning, as well as the contributions for interaction in learning environments must be situated in the curriculum of courses and post-courses, so as to make possible the formation of networks for solving problems and making decisions.

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2 It is a system that records a certain conversation in the virtual environment for future reference

Chapter VII
Hybrid Synergy for Virtual Knowledge Working

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abstract

Recent rapid technological advancement has influenced communication and information management. In addition, it has facilitated collaboration, an interactive process that engages participants who work together to achieve outcomes they could not accomplish independently. Using new technologies for remote collaboration from U.K., Finland, and Greece, we created our own collaboration and creativity technique as best practices for our team by utilizing an adaptation of Collaborative E-Learning and Six Thinking Hats. We call this model for knowledge working to enhance collaborative creativity Hybrid

Synergy. The question under investigation was "What tools, methodologies, techniques, and practices can support collaborative creativity of multidisciplinary teams for virtual knowledge working?" The results from the study conducted in an online course verified the importance of the individual contribution for the development and evolution of a virtual team as a whole. Furthermore, the propositions suggested the use of specific techniques and methodologies can enhance technology enabled organisational change.

introduction

The new information knowledge society is now a critical resource for social capital and economics development. The concept of *intrapreneurship*, that is people who focus on innovation and creativity within one organization, suggests an economy that is increasingly dominated by knowledge using new technologies (Frazer, 2007). Therefore, organizations, educational institutions, as well as businesses have been investing in the integration of Information and Communication Technologies. One of the focus areas has been online education. In Greece, part of this integration is delivered by the Greek Ministry of Education. The planning, growth, and operation of the *Greek School Network* (GSN, http://www.sch.gr/en) has been advanced for this purpose. Acknowledging the Greek teachers' need for professional development through networking and exchange of experiences as an online community of practice for life-long learning, GSN provided the e-learning platform Moodle@GSN. Gradually, our e-learning team was formed, aiming at delivering online courses for the Greek teachers. Based on sound existing frameworks (e.g., Nemiro, 2002, we have developed methodologies and techniques facilitating our virtual networking to achieve cost- and time-effective results, encourage team collaboration (Nemeth & Goncalo, 2005) and expand our talents by combining educational traditions from the U.K., Finland, and Greece.

This chapter seeks to answer the question "What tools, methodologies, techniques, and practices can support collaborative creativity of multidisciplinary teams for virtual knowledge working?" Answers to this question aim at supporting entrepreneurs within one organization (intrapreneurs) since, as Sawyer (2006) suggests, there might be a great number of creative employees within an organization, but if they work in a stifling organizational structure, they will not innovate (Frazer, 2007, p. 16). In this chapter, we will present concepts and methodologies behind our e-learning team, such as knowledge working, collaborative creativity, best practices, and tools for online collaborative knowledge working, as well as ways to measure and assess performance.

knowl Edg E work Ers as ag Ents of cH ang E

Knowledge workers are the employees who know more than anyone else about their organization (Drucker, 1966, 1973). They are the ones who, by virtue of their position or knowledge, are responsible for a contribution that materially affects the capacity of the organization to contribute, perform, obtain results, and share knowledge with other co-workers. These individuals are involved in occupations heavily reliant in knowledge, such as research and development, education and consultancy, and are mostly likely to be driven by the satisfaction of their work (Reilly, 2005). According to Reilly (2005), knowledge workers can be seen as an "awkward squad" by managers, as they

seem intolerant of unnecessary rules. He says that establishing relatively autonomous groups within organisations to generate knowledge has been common for research and development purposes. These kinds of groups create knowledge communities built up from informal networks among peers. These knowledge communities explore new ideas and generate knowledge for the organization, which prevents knowledge hoarding, allowing valuable knowledge to be passed on within the organization.

There is a growing demand for knowledge brought by the Internet. Following Romer (2004), we adopted the idea of *virtual knowledge workers* as the individuals who produce information delivered to its consumers in a soft manner, through online courses, and online work or publications. Romer uses the computing metaphor, which replaces the traditional categories of input (capital, raw material, production and nonproduction workers) with three broad classes of input: *hardware*, *wetware,* and *software*. Hardware includes all physical objects used in production (computers, peripherals, and so on), wetware captures the employees that produce tacit knowledge (social capital), and software includes all knowledge codified and transmitted to others within and outside the organization with any possible means (e.g., manuals, recordings, films, blogs, Wikis, publications, scientific principles and processes, and so on). After producing the first copy of the software, the process and the material can be reproduced, communicated, and used simultaneously by an arbitrary large number of people. However, according to Romer (2004), not many knowledge workers have this ability for software dissemination.

Until now, most organizations have, to a great extent, neglected the important role knowledge workers and software play on a massive scale. However, Davenport and Prusak (1998) claim that knowledge workers are going to be the primary force determining which economies are successful since they are the key source of growth in most organizations. For more information on the seven levels of knowledge work (i.e., work, functions, processes, programmes, transfer outputs, services, and social networks) see Wikipedia (http://en.Wikipedia.org/Wiki/Knowledge_worker). The hierarchy ranges from the effort of individual specialists through technical activity, professional projects, and management programs to organizational strategy, knowledge markets, and global-scale networking. This framework is useful for positioning the myriad types of knowledge work in relation to each other and within the context of organizations, markets, and global economies. It also provides a useful context for planning, developing, and implementing knowledge management projects, such as designing online courses.

This study focuses on *online social networks*, which enable knowledge organizations to co-produce knowledge outputs by leveraging their internal capacity (Tapscott & Williams, 2007). However, this process entails some prerequisites, which, according to Reilly (2005), are:

- Idea-sharing is a high priority for tacit knowledge transfer
- Bringing the right people together and establishing a supportive infrastructure such as space to meet and collaborative technologies
- Devising systems for evaluation and feedback to measure objectives
- Knowledge workers need to be pulled instead of pushed and suppressed
- Knowledge from knowledge workers should be openly exchanged and recognized
- Career progression is vital to knowledge workers
- Organizations should be clear about their visions in order to breed knowledge workers
- Employee management, support, appraisal, reward and risk-taking are essential
- Corporate objectives need to be balanced between personal and professional goals

- Managers need to act as coaches and facilitators of knowledge workers and involve them in decision making
- Find ways to encourage knowledge workers to stay with the employer
- Facilitate commitment to the organization through the belief that the leader is worth supporting, so as to feel encouraged to participate and learn
- Offer opportunities for greater development and contribution to the profession

Nevertheless, these prerequisites rarely preexist in most organizations, including the Greek educational authorities. For this reason, we tried to investigate the best practices for our profession in real and situated settings for virtual knowledge working.

It is worth noting that our team was not predefined. Rather, it emerged through a social networking process; we came together based on our special interest in educational project management and collaborative e-learning. For example, the last group member, Sofia Papadimitriou, was an e-learner who exhibited exceptional activity in the course and actively helped other members. Sofia herself proposed a contribution to the group. In the next section, we will present the way we worked collaboratively.

From Collaborative Creativity to Collaborative Knowledge Working

Collaborative knowledge working aims at problem-solving for best practices within an organization. Furthermore, it targets new ideas and innovation development within human social networks. The Internet itself is a network of individual creative contributions; according to Berners-Lee (2007), the Internet is not only a technological means, but also a social phenomenon.

We Live in a Creative Era

Several researchers assert that we live in the *era of creativity* (Cropley, 2006; Florida, 2002, 2005; Murakami, 2000) and utilize the term *creative industries* (Florida, 2002; Matheson, 2006) to specify economic sectors such as advertising, architecture, arts and antiques, crafts, design, designer fashion, film, leisure software, music, performing arts, publishing, software and computer services, television, radio, and education. Creativity has been recognized as a key factor not only for economic growth, but also for the physical survival of the society.

Creativity: Yes, but Which One?

The definition of creativity applied in everyday life is still a matter of ongoing debate (e.g., Sternberg & Lubart, 1996) and researchers confront a number of myths (Sawyer, 2006), and mysteries (Perkins, 1981) that are associated with the concept of creativity. As a result, there are many and contradictory definitions (e.g., Torrance, 1988), scientific theories (e.g., Sternberg & Lubart, 1999), implicit theories (e.g., Sternberg, 1985) and research approaches (e.g., Ryhammar & Brolin, 1999) for this very complex phenomenon, one of the "highest-level accomplishments to which humankind can aspire" (Taylor, 1988). Therefore, Sternberg and Lubart (1999) argue that employing multidisciplinary approaches would promote research on creativity, and Mayer (1999) calls researchers of creativity to develop an unambiguous definition and to utilize a combination of creative research methodologies.

However, when we study creativity in a scientific way, we must have at least a working definition. The words *novel* (new, original, unique) and *valuable* (appropriate, useful) are used in most definitions of creativity (e.g., Torrance, 1988). As a working definition, we adopt the conceptualization of creativity as "imaginative activity fashioned so as to produce outcomes that are both

original and of value" (NACCCE, 1999). The merit of this definition is that it explicitly specifies five fundamental characteristics of creativity: purpose, imagination, process, originality, and value.

Because of the different interpretations of the term creativity in the literature review, there is a need to create a signpost and build a common terminology for contemporary creativity. A number of researchers have made a clear distinction between two *types of creativity*:

- Traditional—New: Elliot, 1971
- Eminent—Everyday: Nicholls, 1972
- Historical—Psychological: Boden, 1990
- Capital C Creativity—Small c creativity: Gardner, 1993
- Elite—Democratic: NACCCE, 1999
- Sublime—Everyday: Cropley, 2001

The first type of creativity (traditional, historical, and so on) is ascribed to few, charismatic people who contribute to a field and whose contributions are recognized by the society. This type of creativity stresses the value of the creative product and creative person and it has almost no significance in the education milieu. In contrast, the second type of creativity (new, psychological, and so on) is regarded as an innate potential in all people and many researchers assert that it can be taught and enhanced.

According to the *creative cognition approach* (Finke, Ward, & Smith, 1992), the difference between the two types of creativity is one of degree rather than type, and human creativity utilizes ordinary cognitive processes, even in its most remarkable expressions. Our research (e.g., Kampylis, Berki, & Saariluoma, 2006; Kampylis, Fokides, & Theodorakopoulou, 2007) is primarily concerned with the latter type of creativity implemented in real life settings following the creative activity stages (Shneiderman, 2002, p. 113), in this case activities management for online courses:

- **Collect:** Gather Information and acquired resources
- **Relate:** Work in collaborative teams
- **Create:** Develop ambitious projects
- **Donate:** Produce results that are meaningful to others

Shneiderman's cycle follows the creative process cycle: information gathering, identifying the relationship between the information provided and synthesizing it for further development. In addition, Shneiderman suggests the return of investment to the community in the form of fulfilling others' real needs, implying a fair trade between the creators and the context of creation: resources provide the initial knowledge and produced knowledge must return back to the community. Therefore, Shneiderman's collect/relate/create/donate scheme is an essential part of collaborative creativity for real life settings. Such schemata are referred to as collaborative creativity techniques.

Creativity and Collaborative Creativity Techniques

There are many projects, consulting companies, workshops, advice books, and techniques worldwide that target personal and organizational creativity enhancement, and constitute the *pragmatic approach* to the study of creativity (Sternberg & Lubart, 1996). Nickerson (1999) calls into question the value of the one-time, one-week, one-size-fits-all commercial training programs that aspire to enhance personal and organizational creativity. According to Sawyer (2006), the pragmatic approach is damaging for the scientific study of creativity because its proponents have been very little concerned with testing the validity of their ideas. Moreover, the specific approach lacks any basis in serious psychological theory and leaves average people correlating creativity with commercialization. In addition, many creativity training programs and techniques assume

that creativity is an individual, domain-general ability and do not emphasize the importance of hard work, commitment and intrinsic motivation (Sawyer, 2006). The result is that these training programs and techniques reinforce cultural myths about creativity.

On the other hand, the scientific understanding of creativity should lead to even more practical applications (Simonton, 2000) in terms of curriculum design and lesson plans for students in a wide variety of disciplines at all educational levels in order to cover the demand for a more creative education (e.g., Kampylis et al., 2007; NACCCE, 1999; Starko, 2005). However, there is a gap between research-based and business-related training programs and techniques. According to Cropley (1997), we should use a long-term, multiple intervention strategy that includes (a) building requisite knowledge and expertise, including a firm grasp of principles; (b) creating exercises that build skills needed for working with this knowledge; (c) encouraging the search for novel solutions and effective strategies for testing these solutions; (d) openly evaluating progress and errors; and (e) extending these efforts into independent, collaborative projects.

Creativity applied in virtual working is still to find a place in university modules as the theory and practice have not yet found a common ground as best practices. One attempt to fill in this gap in virtual working is combining two distinct collaborative creativity frameworks: *Collaborative E-Learning* and *Six Thinking Hats*. They represent the division into research-based and business-related training programs and techniques.

Collaborative Learning

UNESCO has provided the most coherent definition for collaborative learning. Collaborative learning occurs:

when learners work in groups on the same task simultaneously, thinking together over demands and tackling complexities. Collaboration is here seen as the act of shared creation and/or discovery. Within the context of electronic communication, collaborative learning can take place without members being physically in the same location (Technology and Learning definitions, UNESCO, 2004).

However, researchers think there is a distinction between collaboration and cooperation. According to Teasley and Roschelle (1993):

Collaboration is a coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem. Cooperative work is accomplished by the division of labour among participants, as an activity where each person is responsible for a portion of the problem solving (Teasley & Roschelle, 1993, p. 235).

Based on Teasley and Roschelle's definition, several researchers have provided a distinction between collaborative learning as learning occurring within group members and cooperation as filling different parts of the same puzzle (e.g., Dillenbourg, Baker, Blaye, & O'Malley, 1996). Anchored in this definition, collaborative learning is the most suitable approach to study, analyze, and actually use for group exploratory and creative thinking. Winograd (1987) suggested that rules and protocols need to pre-exist to suit a team's composition; techniques based on progressive dialogue can facilitate team-members' communication.

Argumentation is a shared learning experience that has been considered an effective means for adult learning (e.g., Brown & Duguid, 2000). Collaborative learning activities are nowadays central to successful groupwork for group knowledge building (Wegerif, in press). There have been several attempts to model collaborative learning for practice used in real classroom discussions (e.g., Mercer & Wegerif, 1999) or design tools to

facilitate it (Jeong, 2005; Lambropoulos, 2007). The Initiate-Respond-Evaluate (IRE) scheme presented by Hoadley and Enyedy (1999) aimed at facilitating group learning. IRE triggered efforts to support collaborative learning dialogical sequences by predicting the forms of desirable dialogue. In other words, being aware of the collaborative learning techniques and stages, the interlocutors can coordinate their own idea generation. This means that collaborative learning can be taught and learned.

Wegerif (2007) proposed that collaborative learning targets the exploration of new ideas among group members as an exploratory dialogical process similar to the Socratic dialogue. Since this is not an automated procedure, collaborative effort must originate from the team members (Clarke & Wilkes-Gibbs, 1986, p. 26). Thus, the virtual knowledge workers as team members need to come with a willingness and attitude to collaborate. Trust, knowledge awareness, team members' presence and co-presence awareness, and awareness of interactional collaborative learning strategies are essential for achieving this (Berki, Isomäki, & Salminen, 2007; Jäkälä & Berki, 2004). Grice (1975) and Wegerif (2007) agreed that dialogic argumentation for idea generation requires:

- Trust between the team members
- Clear visions and goals to enable participation
- Clear and coherent argumentation
- Openness to criticism
- Consensus on decision making and actions

The aforementioned social prerequisites constitute the first level of collaborative learning and the progressive dialogue the second. Wegerif, Mercer, and Dawes (1998) have developed a model based on exploratory talk that builds on team members' interactions for new knowledge building, new for at least one of the members or for the team. Lambropoulos (2007) has proposed the following scheme as a process for *Collaborative E-Learning* based on collaborative learning studies and ongoing empirical work:

- Information
- Question
- Explanation
- Exploration
- Agreement and disagreement
- Evaluation
- Summary and conclusions

Lambropoulos' model was mainly structured for the development of tools to aid *Collaborative E-Learning*. However, even though the tools required specific structures to function, this is not a linear, but a spiral and dynamic process that is not preplanned, integrating and sometimes omitting stages, which leaves space for insights and immediate conclusions. As with collaborative learning, de Bono's (1985) *Six Thinking Hats* technique targets creative thinking.

The Six Thinking Hats Technique

In the mid-1980s, de Bono (1985) proposed the *Six Thinking Hats* as a technique of *lateral* (creative) *thinking*. Several companies and organizations have used this technique in enhancing creativity and productivity, problem-solving, and decision-making. The technique is also used in education at all levels, as it aims to:

- Encourage creative (lateral) thinking
- Focus on and improve the thinking process
- Improve communication between the participants
- Accelerate decision-making
- Focus on the holistic view
- Avoid unnecessary debates
- Give opportunities for contribution to all
- Separate ego from performance

The six coloured hats represent six distinct but complementary dimensions of human thinking. The thinker can put on or take off any of these metaphorical hats to indicate the type of thinking that he or she is using at any particular time. This putting on and taking off procedure is essential because it characterizes change in thinking. However, the hats do not characterize the persons who "wear" them. Any hat can be used not only to describe the thinking process required in a given situation but also to define the way someone is thinking in a neutral way. In other words, hats can be used to "separate ego from performance" (de Bono, 1985). They should be used proactively rather than reactively.

c ollabora tiv E c r Eativity

Learning and creativity both involve central processes of cognitive change, and they are both inherently social (Candy & Edmonds, 1999). Furthermore, many creative products are overly outsized and complex to be generated even by the most creative and genius individual human beings. Instead, these products are created by teams, organizations, even entire societies, and require *collaborative creativity*. Movies, video clips, e-learning courses, operating systems, and complicated scientific experiments, to name just a few, require teams of creative workers and complex networks of experts (Sawyer, 2006). Even when we observe such complex products, we often assume they have been invented or developed by an individual because we conceptualize creativity at an individual level.

However, there are significant differences between individual and collaborative creativity (e.g., Mamykina, Candy, & Edmonds, 2002) that should be investigated, such as the role of individuals, the contexts, the processes, the products, and the team dynamics. The scientific study of collaborative creativity calls for a new perspective that allows us to shed light on how groups of people work and learn together, and how the collective actions of many people result in a final product.

We conceptualize collaborative creativity as the highest level of the creative process, involving more than one person interacting with one another, sharing ideas and experiences, and affecting the insights of the other members of the team. If we want to explain the creative outcomes of our team work, we should analyze not only the creativity of each member but also the group dynamics and the levels of collaboration between our team members. In other words, we need to combine *individualist* and *contextualist approaches* to explain collaborative creativity (Sawyer, 2006).

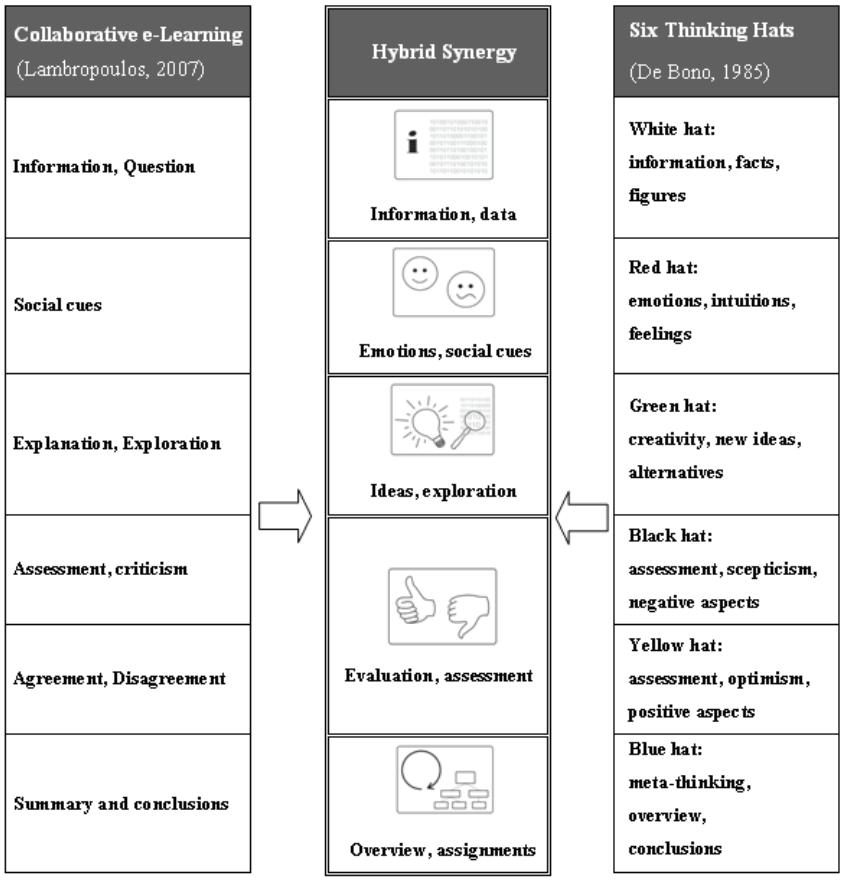
It is worth noting that collaborative creativity cannot be fully planned; each member of the creative team contributes with ideas and criticism and these individual contributions are integrated in order to structure the collective product. This collective product is not predetermined, and even small creative contributions may cause significant changes to it (Sundholm, Artman, & Ramberg, 2004). This spiral mobility has an internal structure that can be enhanced by specific collaborative creativity techniques such as *Hybrid Synergy*.

Hybrid Synergy

Anchored in *Collaborative e-Learning* and the *Six Thinking Hats*, we propose an analytical framework to facilitate collaborative creativity for written communication under the term *Hybrid Synergy* (Figure 1).

Both *Collaborative E-Learning* and the *Six Thinking Hats* follow a spiral argumentation development based on initial information input and build upon argumentation and rhetoric techniques. The major difference between the two approaches and *Hybrid Synergy* is the integration of positive and negative aspects of creative argumentation in collaborative creativity as part of a continuous evaluation process. In this way, both positive and negative aspects are viewed as steps for further development in knowledge building rather than as distinct states.

Figure 1. Hybrid synergy



A team of knowledge workers can use *Hybrid Synergy Steps* in many different sequences depending on the issue. In most cases, our team has used one of the following sequences (Figure 2).

Since the Greek team only worked online, the following section will present the tools used as the medium to enable remote communication and collaboration.

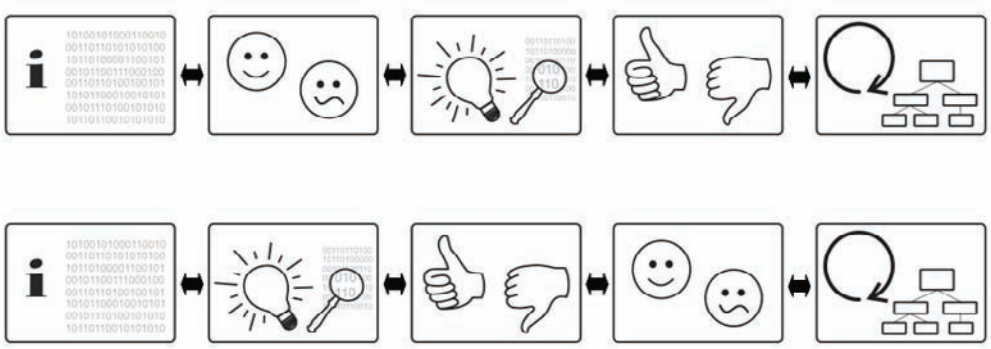
tE c Hnology for c ommunica tion and c ollabora tion

We use tools to expand our capabilities (Shackel, 1991). In return, these tools interact with our own personalities (Preece, 2000). To some extent, tools can restrict or allow activity coordination as well as measurement and evaluation of virtual working. It is also important to note the paperless green aspect of online written communication. The following section refers to the tools used to facilitate remote activities and tasks from afar.

Groupware (social software) can provide a balance to more formal processes by encouraging informal interactions through participation in information sharing, knowledge management and decision-making. Thus, we used the following *Web 1.0* and *Web 2.0* communication technologies:

- E-mail for *asynchronous communication* using text
- *Synchronous Communication Tools* utilizing text, voice, and video (e.g., chat and Skype)

Figure 2. Non-linear structures for hybrid synergy



- Video-Conference for synchronous collaboration via video and text as well as sharing applications (e.g., whiteboard)
- Wiki and blogs for collaborative authoring

All tools are used depending on the task and the kind of e-team interactions needed for each particular situation:

- *Reaching consensus:* Asynchronous and synchronous communication tools for:
  - initial targets and focus
  - strategies and methodologies
  - detailed planning
- *Immediate decision-making:* Synchronous communication tools for:
  - confirming understanding of statements
  - reaching consensus
- *Activity management:* collect/relate/create/donate using Wikis and blogs for:
  - work memos, such as diaries, archives, and collaborative writing
  - own coding for keeping document archives to cut duplication and needless revision
  - daily reports on "what work was completed?" and "what work are you going to do next?"

The tools also provide data for performance benchmarking and assessment based on *human-human* and *human-computer interactions.* Choosing suitable methodology is the key for evaluation, assessment and feedback.

rE s Earc H dE sign and mEt Hodology

Research methodology was designed to support the multidisciplinary and situated nature of the online course.

Ethnotechnology

Ethnotechnology was found to be the most suitable approach to support our aims and objectives. The ethnotechnological perspective suggests that the properties of a context cannot necessarily be accurately understood independently of each other. The ethnotechnologist is interested in how people make their actions intelligible to themselves and others (Guribye & Wasson, 2002); this is actually what the knowledge workers do. For this reason, we used descriptive data on the team's activities and examples of *Hybrid Synergy Analysis* presented in the following section.

The Study: The Project Method E-c ourse

The *Project Method E-Course* was implemented on the e-learning platform of the *Greek School Network* which utilizes *Moodle Open Source Software* (http://www.moodle.org) and addresses the needs of Greek State School Teachers in Primary and Secondary Education. The initial phase of the course involved three e-tutors and took place in November–December 2006. The content was re-designed based on the participants' needs as revealed during the progression of Phase 1, as well as the course evaluation process (Vivitsou, Lambropoulos, Konetas, Paraskevas, & Grigoropoulos, 2008). The renewed syllabus focused on the utilization of online collaborative tools (i.e., blogs, Wikis, and videoconferencing) for teaching purposes. This objective was coupled with the pedagogical principles underlying project implementation within an educational context, which was the focal point of the previous period. The second stage was launched in February 2007 with 162 participants, extended over five consecutive weeks and involved eight e-tutors.

In ethnotechnology, *human-human* and *human-computer interaction analysis* involves quantitative and qualitative methodologies. Because the aim of this chapter is to present the *Hybrid Synergy* technique for written communication in virtual knowledge working, and also due to space restriction, only some examples of the activities the e-tutors participated in will be presented next.

E-Tutors' Activities in Logs

Logging is a *Human-Computer Interaction* approach to view and evaluate users' visits in the system. Logs provide accurate and easy-to-use quantitative analysis. However, logging must be combined with other quantitative and qualitative approaches in order to provide an overview of the environment under investigation. The e-tutors' logs during the online course (February 26–March 28, 2007) and activities until August 1, 2007 were 11,555 and 29,193 respectively:

- E-T1: 761–2,174
- E-T2: 1,530–2,436
- E-T3: 467–467
- E-T4: 1,171–3,695
- E-T5: 4,342–9,767
- E-T6: 33–2,590
- E-T7: 644–2,537
- E-T8: 2,607–5,527

It appears that the e-tutors' activities may naturally occur during the course. However, depending on individual priorities, spare time and special interests, the e-tutors continuously visit the environment for further assessment and redesign. E-tutoring is an ongoing activity. The next sections refer to e-tutors' activities in written communication.

E-Tutors' Activities in Chats (November 11, 2006–January 1, 2007)

From November 11, 2006 to January 1, 2007 we conducted 10 chats; the total duration was 810 minutes with 17,741 words written. Not all e-tutors have participated in all chats; the number varied, there being two e-tutors involved in one chat, three and four in two chats, five in three chats, and six e-tutors in two chats. The chats had an average duration of 82 minutes and 1,774 words written.

Chat text richness appears to be related to chat duration and the number of e-tutors involved. Based on *Hybrid Synergy Analysis*, the following graph depicts the relationship between the number of e-tutors, chat duration, and idea generation (Figure 3).

This graph shows that a small number of e-tutors (≤3) is related to:

- A small number of issues discussed
- A short duration of discussion
- An even smaller idea generation

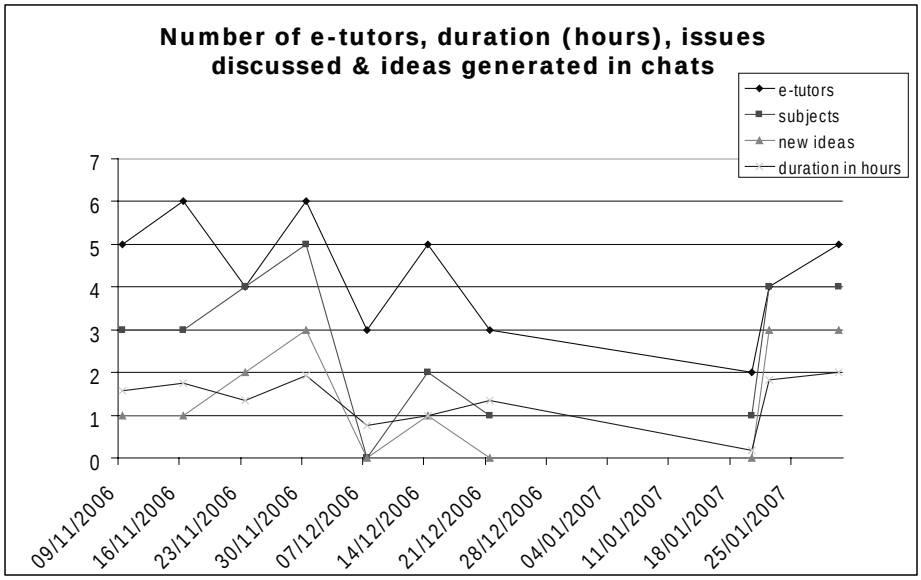
Idea generation (N=14) is interconnected to all parameters (e.g., number of e-tutors, duration, number of issues discussed). This means that if all related parameters reach a peak, idea generation reaches a peak as well. Next, we present an example of how *Hybrid Synergy Analysis* exhibits the idea generation in one chat.

Chat 23/11/2006: Hybrid Synergy Analysis

An example of *Hybrid Synergy Analysis* is presented from the chat on November 23, 2006. Four e-tutors participated in the chat for 80 minutes, producing a total number of 1,720 words. The chat analysis and argument development were as following:

- *Information*
  ET-8: themes for blogs
  ET-4: previous experience on blogs
- *Emotions*
  ET-8: emoticon
  ET-6: emoticon
- *Evaluation*
  ET-1: focus on Byzantine iconography
  ET-1: justification
  ET-4: justification on ET-8 presentation from one team to the other
  ET-6: agreement
- *Ideas*
  Propositions:
  ET-1: Wiki
  ET-8: team working
  ET-1: implementation of a cultural project in the Greek schools
  ET-8: creation of a blog and Wiki as part of the online course
  ET-8: decision-making by reaching consensus
  ET-4: teamwork rules and protocols: facilitate communication, avoid email overload, solve technical problems, message contribution, and exchange of opinions.
- *Overview, assignments*
  E-tutors: Agreement on online course subject

Figure 3. Chat analysis 23/11/2006



ET-8: Summary and agreement on regular newsletters
E-tutors: Overall summary and agreement as well as thanks for the collaboration

This discussion was one of the most crucial ones because the team had to decide on the online course provided to the Greek teachers from March 1, 2007 to March 31, 2007. In the information phase, ET-8 and ET-1 proposed blogs and Wikis, whereas ET-4 assisted the brainstorming in order to find specific contexts of implementation. ET-8 and ET-6 reacted with emoticons suggesting their satisfaction with blogs and Wikis. It is evident that progressive dialogue is essential for idea generation; for example, ET8 pointed out the need for specific collaborative approaches and this helped ET-4 to format ideas on team-working protocols. In the overview, two summaries and agreements indicated the end of the chat.

E-Tutors' Activities on Skype (February 27, 2007–March 27, 2007)

There were 14 discussions on Skype between February 27–March 27, 2007. The following graph depicts the correlation between the duration of discussions and the number of e-tutors participating (Figure 4).

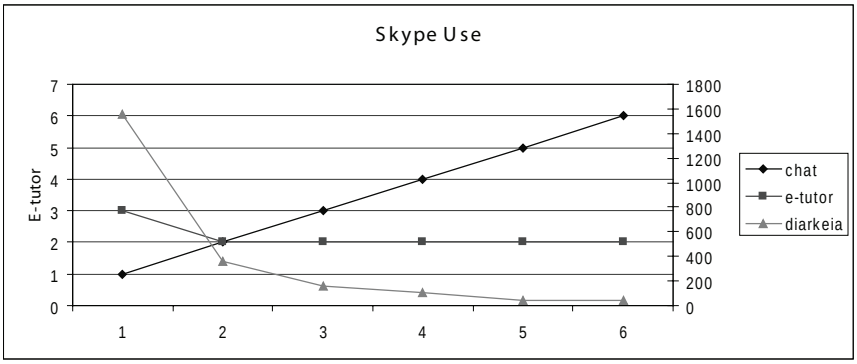
Initially two e-tutors participated in the chat on Skype. It is apparent that when a third e-tutor joined, the duration increased and the issues reached consensus in a total of 26 min or 1,560 sec. The above graph suggests that the greater the number of e-tutors participating in a Skype meeting, the greater the duration. This result is reasonable. In addition, the duration of the meeting was related to the subject. For example, during the first videoconference (VC) recording the e-tutors were discussing and solving the problems in VC when the participants were having their VC sessions, that is, in a synchronous mode. The unsolved problems were reported to the educational authorities responsible for Click2Meet, and were solved to a great extent.

Synchronous Communication via Skype on March 2, 2007: Hybrid Synergy Analysis

An example of *Hybrid Synergy Analysis* is presented below from Skype on March 2, 2007. Three e-tutors participated in the discussion and the duration was 37.8 min:

- *Information*
  ET-5 to ET-1: Discussion about chat
  ET-1 to ET-5: Information and guidance about blog
  ET-1 to ET-5: Extension for the on-line course about blogs
  ET-1 to ET-5: Lengthy reference of creation of Wiki from the e-tutor ET2

Figure 4. Skype activities analysis 27/02/2007 - 27/03/2007



- *Emotions*
  ET-5: emoticon (y)
  ET-5: emoticon (ninja)
- *Evaluation*
  E-tutors' satisfaction
  Decisions on chat
  Evaluation of the course: negative aspects
  Expressions:
  ET-1: I suggested some links
  ET-6: AAA! Wonderful!
  ET-1: All of the participants were very pleased from the answers and the aid that we gave to them!
  ET-5: Bravo!
  ET-5: Therefore they liked it?
  ET-1: I'm certain!
  ET-5: 99.9% certain!
- *Ideas*
  All e-tutors:
  Creation of Wiki
  Course extension
  Blog creation
- *Overview, assignments*
  All e-tutors:
  Annotation about chat
  Satisfaction in participation in the course
  Create Wikis
  Technical problems using chat
  Blog for follow up
  Evaluation and final questionnaire

The above Hybrid Synergy Analysis presents an overview of the messages sent using Skype. The analysis depicts the need for initial information on the issues to be discussed, the use of emoticons for feedback, and evaluation expressions. The idea generation reached a rate of three in 26 minutes, equal to almost one idea every nine minutes.

The issues discussed concerned a chat with the e-learners and the launch of the online course: the number of participants in the chat, the quantity and quality of questions asked from the e-learners, questions on the blogs, the technical problems and in particular the reasons for difficulty connecting to Moodle@GSN. Immediate decisions were made and actions were taken. Reporting the problems to the GSN technical support was one action. The prediction of the persistence of technical problems indicated the need for the extension of the online course for one more week. Therefore, the course timetable on the pedagogical scenario, as well as the dates for evaluating the course had to be changed. Lastly, there was an overview and evaluation of actions taken until that point in time.

what about Discussion Forums?

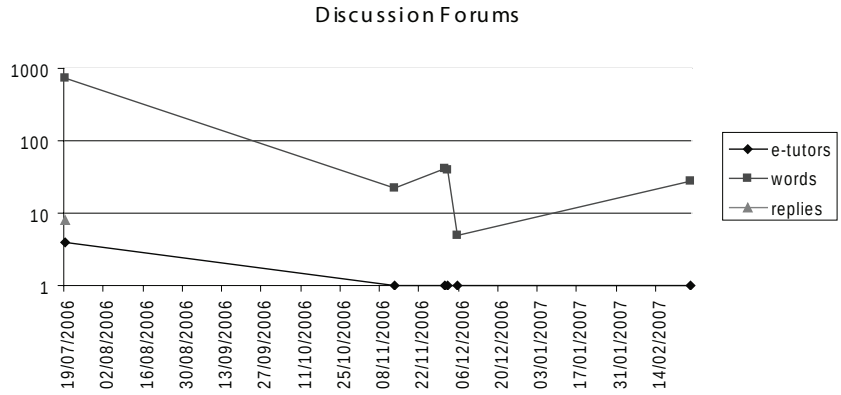
Even though there were 13 discussion forums, there were six discussion threads with only minor participation in one of them. One discussion prompted eight replies, while all others lacked any replies (Figure 5).

It is evident that the e-tutors preferred synchronous communication. The discussion forums were found difficult to use, as we needed an immediate space of action. In other words, we preferred discussions while we were working on the online course in order to save time.

discussion

Hybrid Synergy provides a transparent and coherent analytical framework for *virtual knowledge working* that can resolve the coordination problems as well as problems with social loafing or free riding (Karau & Williams, 1993). In this chapter, we attempted to present the concept and methodologies as well as the tools behind our effort as a Greek e-learning team: knowledge working, collaborative creativity, best practices and tools to achieve cost- and time-effective collaborative and virtual knowledge working, as well as ways to measure and assess it. Methodologies, planning, and coordination of activities can bring results for collaborative creativity when applied in situated contexts. As Shneiderman (1997)

Figure 5. Limited activities in discussion forums



suggested in his collaborative creativity model "collect/relate/create/donate," such processes can enliven the educational process. It is apparent that the e-tutors deliberately reinforce the *Hybrid Synergy* cycle, asking specific questions in order to elaborate on certain issues and, ultimately, to achieve consensus. In addition, they can assess their own behaviour and performance and review their own actions in a self-directed learning mode (e.g., Argyris, & Schön, 1996; Brockett & Hiemstra, 1991).

Based on the total number of idea generation following the *Hybrid Synergy* analytical framework (N=14), it appears that idea generation is interconnected to all parameters (e.g., number of e-tutors, duration, number of issues discussed). This means that idea generation depends on all related factors, and if the e-tutors reinforce the Hybrid Synergy cycle idea generation can be enhanced. Furthermore, the technique is predefined. However, the actual knowledge building process and possible products are not. It is interesting to see that this interplay and interchange of the dialogic process among group members is exactly what creates the argumentation and discussion towards new knowledge building on a team basis. In other words, individual contribution results in creative teamwork enhancement.

The results from this study cannot be generalized. We have presented our own work and experience in a case study. In addition, there are no similar studies for comparison. Therefore, further research is needed to explore the different Hybrid Synergy aspects and achieve replicability and generalizability.

c onclusion and f utur E t r Ends

This chapter aimed at answering the question "What tools, methodologies, techniques, and practices can support collaborative creativity of multidisciplinary teams for virtual knowledge working?" We used *Hybrid Synergy* to collectively share information for knowledge building and make decisions mediated by synchronous and asynchronous social software technology. This approach utilizes knowledge workers' different perspectives and can be used to allocate change and innovation. This holistic perspective has the advantage of examining the causes rather than the effects, and it supports greater clarity and distinct vision of different aspects in a given situation. Evidently, the *Hybrid Synergy* process can not only facilitate collaboration and cooperation between the e-learning team members but also support collaborative creativity. *Collaborative creativity* is a higher level of the creative process. As it involves more than one person interacting

with another, it facilitates the sharing of ideas and experiences, and affects the insights of the other members of the team.

Furthermore, *Hybrid Synergy* requires a degree of skill and practice, because it involves mutual respect and attunement with the ideas and intentions of other people in the team in order to achieve consensus. Regarding collaboration and communication using various media and *groupware*, it is evident that access to such apparatus, especially on a synchronous mode, and utilization of suggested techniques can unlock participants' creative potential, and provide opportunities for interaction, collaboration, and the active expression of the key components of creativity. These include purpose, imagination, originality, production, and value.

Virtual knowledge working can facilitate social and economical change in the new and creative era by adapting to new conditions of working that are independent of time and space in contrast to the previous industrial era. ICT is now deeply embedded in the industry and new technologies have suggested significant structural changes in the way business and organizations operate, similarly to the Ford revolution in the 20th century. Specific virtual working frameworks are needed. Therefore, such modules in universities would help employees' collaborative creative activities across the globe either for "off-shoring" or within organizations and business networks. The European governments are now considering changing their legislation and providing flexible working hours. Another example comes from the British Prime Minister Gordon Brown's speech on Work-Life Balance in the Trade Union Congress (April 30, 2007, http://www.tuc.org.uk/work_life/tuc-13245-f0.cfm) and the executive summary Interim Report of the Equal Opportunities Commission's investigation into the Transformation of Work under the title *Working outside the box: Changing work to meet the future* (http://www.eoc.org.uk/PDF/working_outside_box_summary.pdf).

Moreover, part of the methodology in this chapter indicates that virtual working can be an option for all *virtual workers*: as with face-to-face communication and collaboration, it can be tracked, measured, and thus provide assessment of employees' overall performance. However, current tools have not automated this process of benchmarking and assessment, and therefore, standards must be developed.

Technology-enabled organizational change is about looking after people, not looking after technology. In other words, defining clear goals, strategies and work allocation via joint planning, shared resources and joint management, as well as tackling low morale and poor job satisfaction, can improve collaboration, which in turn will improve productivity. Tools provide the media for achieving this. Thus, fostering a culture of innovation even within organizations with limited financial resources, such as educational organizations, can start from a research and development team with a bottom up and top down interactional perspective. To profit from innovation, people must be able to make their ideas come to life (Frazer, 2007). Therefore, an organization does not exist to implement change. Rather, it implements change to help itself to continue to exist and thrive (Newton, 2007) as well as create creativity for everyone (Shneiderman, 1999). *Hybrid Synergy* provides the means towards achieving this organizational goal.

a cknowl Edgm Ent

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kEy tErms

Collaborative Creativity: The analytical framework that investigates the role of individuals, the contexts, the processes, the products, and the team dynamics in a situated context in order to provide specific co-creativity techniques and methodologies.

Collaborative Learning: Takes place when learners work in groups on the same task simultaneously, thinking together over demands and tackling complexities. Collaboration is here seen as the act of shared creation and/or discovery. Within the context of electronic communication, collaborative learning can take place without members being physically in the same location (UNESCO).

Hybrid Synergy: A method of written communication analysis for collaborative creativity.

Six Thinking Hats: This technique is a "thinking tool" that was created by Edward de Bono. The six colored hats represent six different, but complementary, dimensions of human thinking that can be used in complex decision-making processes.

Social Capital: Refers to the institutions, relationships, and norms that shape the quality and quantity of a society's social interactions. Social capital is not just the sum of the institutions which underpin a society—it is the glue that holds them together (The World Bank).

Technology-Enabled Organisation Change: Change implemented in an organization based on collaborative creativity and transformational leadership.

Virtual Knowledge Workers: The employees who, preferring working online, know more than anyone else about their organization, and by virtue of their position or knowledge, are responsible for a contribution that materially affects the capacity of the organization to contribute, perform, obtain results, and share knowledge with other co-workers.

Chapter VIII
Collaborative Partnerships and the Application of ICTs in Secondary Education in South Africa

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abstract

The purpose of this study is to examine the dynamics of collaborative partnership involving the private sector, government, and community groups in the application of information and communication technologies (ICTs) for expanding access to and improving the quality of secondary education in South Africa. Based on the operations and projects of Mindset Learn channel in secondary schools in South Africa, the study explores the enabling factors for the innovative improvement of secondary schooling with ICTs. On the other hand, the study also focused on the challenges facing Mindset Learn innovative approach to secondary education as well as the prospects of the sustaining this model of educational development in South Africa and other countries in Africa. Qualitative data collection methods were used to gather data from key informants.

introduction

This chapter is a report of an instrumental case study of the processes of collaborative partnerships in Information and Communication Technologies (ICTs) in secondary education in South Africa. The organization studied is the Mindset Learn, which is part of the Mindset Network Organization. South Africa has more collaborative partnerships involved in the use of ICTs for the improvement of education more than any other country in Africa.

This study is informed by the need to understand how Mindset Network (MSN) Organization

applies various forms of ICTs to expand access to and enhance quality secondary education in South Africa; and how their activities in educational technology are sustained. Collaborative partnerships are the backbone of ICT in education policy implementation in South Africa. The democratic government of South Africa made ICT in education policies for two main reasons: first, to use the potential of ICTs to ensure a rapid expansion of quality education; and second, to use modern ICTs to attain a level of national economic competitiveness in the emerging knowledge economy through the training of highly-skilled workers. Despite the development of ICT in education policies, implementation remains a challenge.

One of the logical solutions to the shortage of financial resources for technological intervention in schools is the involvement of the private sector through collaborative partnership models. ICT in education projects require pooling of resources by private companies, civil society, and the government. Against this backdrop, the study investigates the implementation processes of ICT in education policy by collaborative partnerships in South Africa through the following key questions:

1. What factors enable the implementation of ICT in secondary schools by collaborative partnerships in South Africa?
2. What challenges face collaborative partnerships in the implementation of ICT in secondary schools in South Africa, and how are solutions to these challenges negotiated among partners?

Each of the above research questions are answered through the analysis of interview data and the archival and policy documents from the field. These questions are approached from the perspectives of policy network and actor-network theoretical frameworks. The methodological framework of the study consisted primarily of field research carried out in South Africa. The fieldwork consisted of semistructured interviews with key informants such as government officials, officials of Mindset Network Organization, and representatives of businesses and organizations that are members of Mindset Network. Other qualitative instruments employed in the research include direct observation in secondary schools where MSN projects are located, and the review of government and project documents.

problEm statEmEnt

There is growing evidence that ICTs may be the only feasible and economically sound means of expanding access to and improving the quality of secondary education, both in South Africa and the rest of Sub-Saharan Africa (SSA) (Isaacs, 2002). ICTs are used in education for three purposes: to widen access to education, to raise its quality, and to reform it. Perraton (2004) argues that the last two applications shade into each other as qualitative change can be seen as a way of reforming and transforming education. For these reasons, the interest to use ICTs to support secondary educational initiatives in South Africa and Africa in general, has increased dramatically in the last decade. As Hawkins (2002) rightly observed, successful integration of ICTs in education cannot be handled alone by the ministry or department of education in the developing world. Hence, there is the need for strategic collaboration between the government, private companies, and the civil society.

However, a major gap exists within present research and understanding of the role of collaborative partnerships in ICT in education policy implementation in South Africa and other countries in SSA. A survey carried out by the Association for the Development of Education in Africa (ADEA) confirmed that while financial issues are critical, a major obstacle to successfully adopting ICTs in African education is the establishment of the political and institutional frameworks necessary to sustain such initiatives

(ADEA, 2006). At the moment, there is a gap in knowledge on how ICT in education policies can successfully be implemented to achieve the goals of secondary education in SSA, and how the deployment of ICTs impact positively on secondary education attainment.

Collaborative partnerships have become important aspects of education reform in Africa, especially as it relates to ICTs. However, there is little guidance available for public and private sector organizations presently collaborating or contemplating collaboration for the use of ICTs to help meet secondary education goals in Africa. Multisector collaborative ventures are not new; rather, what is relatively new in South Africa and SSA is the collaboration in ICT in education. As a result, there is no consolidated documentation of the process, structure, and strategies of such collaborative partnerships in ICT in education and how they are sustained, especially within the context of Africa. The fragmented information in ICT in education is often based on the experiences of advanced countries.

tHE or Etical f ram Eworks: policy nEtwork and a ct or- nEtwork tHE ori Es

This study triangulates two theoretical frameworks, namely: policy network and actor-network theories. The focus of this study is on the implementation processes of ICT in education policy in South Africa hence the research is partly informed by the policy network theory (Dowding, 1995; Kennis & Schneider, 1991). The policy network theory addresses the inclusive nature of implementing ICT in education policy in South Africa. Within this framework, the focus is on the policy implementation version of policy network analysis (Schroeder, 2001) or what Carlsson (2000, p. 514) called the "policy network theory of collective action." Policy network is considered to be a valuable structural tool for analyzing the basic processes of networks (here presented as collaborative partnerships) in policy processes, particularly ICT in education policy implementation in South Africa. As expected, there are many definitions of policy network theory. However, all definitions of policy network involve many similar components, which serve as points of theoretical and conceptual consensus, upon which the implementation of ICT in education policy by collaborative partnerships in South Africa is based. These components are: multiple actors or agencies independent of one another; multiple sectors, multiple levels and, a recognition that everybody is participating for their own reasons.

Furthermore, policy network is described as: "a multiactor, multisector, semiclosed system operating on interwoven calculi of maximizing influence and resources" (Schroeder, 2001. p.18). A policy network is generally defined as a set of relatively stable relationships, which are of nonhierarchical and interdependent nature linking a variety of actors. Such actors share common interests concerning a policy and also exchange resources to pursue these shared interests with the acknowledgment that co-operation is the best way to achieve common goals (Kenis & Jorg, 2003; Kennis & Schneider, 1991). This pattern of resource-pulling by different elements of social coalition is perhaps more visible in the implementation stage of policy process, as demonstrated in the cases of the Mindset Network Organization and ICT in education (or e-education) policy in South Africa.

The policy network theory is complement with the actor-network (ANT) model. The theory and methodology of ANT consists of and combines both technical and nontechnical elements in the analysis of information technology and its effects and usage in society. ANT is a conceptual approach for exploring collective *sociotechnical* processes in research (Callon, 1986; Latour, 1987). The model argues that humans and nonhumans such as machines and other artifacts interact in different but interrelated ways, which collec-

tively constitute collaborative networks that act as independent and autonomous actors, thereby forming actor-networks (Pouloudi et al., 2004). The fundamental message here is that no single technical objective is unilaterally accomplished by human agency. As Macadar and Reinhard (2004, p. 3) argue, "The fundamental idea is that human and nonhuman actors interact to form the networks of heterogeneous entities of the world we live in." Thus, the term "actor" in ANT is not applied as in conventional sociology where actors are usually defined as "discrete individual, corporate, or collective social units" (Wasserman, 1997, p. 17; cited in Stalder, 1997). The central theoretical and methodological premise in ANT is that of symmetry or equality of human and nonhuman actors.

The actor-network theory is focused on the heterogeneous elements that make up what Walsham (1997) called "coextensive networks of humans and nonhuman elements" (p.469). As social networks involve group of people, organizations and institutions that are connected and interact based on a set of norms and belief, a socio-technical network involve technical artifacts, which include technologies constructed by humans to improve the conditions of human existence. This study takes the perspective that integration of educational technology in South African secondary schools involving humans and non-human actors. Theses nonhuman actor ICT in education policy frameworks (texts), television broadcasting via satellite, data-casting systems, teacher training and development, compact disks (CDs) for curriculum distribution, Internet connectivity in schools, digital libraries (technology or technical relationship), and trans-border data flows. Identifiable human actors in the actor-network of implementing ICT in education policy in South Africa are: the national and provincial departments of education and communication, Mindset Network Organization, the secondary schools that benefit from the projects and Local communities. Both technical and human actors above make up nodes of information networks, or elements of specific partnership that support secondary education through ICTs in South Africa. Within this context, public and private sector groups (i.e., the Mindset Network Organization) who employ ICTs to expand secondary education curriculum in South Africa may be viewed as actor-networks. Therefore, ANT approach offers unique perspectives that are essential for understanding the interactive nuances of education technology policy implementation, ICT partnership and secondary education improvement. The integration of the policy network and actor network approaches could lead to a better and precise mapping, and understanding of the process of ICT in education policy implementation by collaborative partnerships for the transformation of secondary education in South Africa. Despite their separate origins, policy network theory and ANT are mutually supportive in this study, especially when it comes to tracing the stages of implementing ICT in education policy in South Africa. It is important to remember that the interests and practices of collaborative partnerships in educational technology in South Africa are both the aggregation of individual choices (Keeley, 2001) and the impacts made by technological artifacts at their disposal.

state and structure of secondary education in south africa

Primary education in South Africa is divided into junior primary (Grades 1–3) and senior primary (Grades 4–6). Junior secondary school is composed of Grades 7–9. The senior secondary education (i.e., Grades 10–12), which ends with the Senior Certificate of Education (SCE) or matriculation examination is not compulsory for learners, hence it is not considered as part of the basic education system in South Africa. By mid-2006, South Africa had 6,000 secondary

schools (i.e., Grades 7–12) (South African Yearbook, 2007). Under the National Qualification Framework (NQF) policy, education structure in South Africa was overhauled and grouped into three bands. These levels are: (1) the general education and training level, which is equivalent of primary and junior secondary school; (2) the further education and training (FET) level, which is equivalent to senior secondary school; and (3) higher education level (Howie, 2002).

As Bhola (1994) explains, what is generally called "Further Education" in South African education policy documents is "Secondary Education" in ordinary parlance. He further explains that the term "Further Education," which must have been chosen for its neutrality, is meant to accommodate all forms of secondary education, including those with academic, technical, and vocational contents, which are earning credits for graduation (ibid). Like in many countries, the completion of the first nine years of required education is the "first exit" point in formal system of education and training in South Africa. Many students do exit at this point. These days, however, most of the students prefer to continue to the second stage of three years of secondary schooling known as further education.

The aim of the NQF is to integrate education and training provision in South Africa through a common set of qualifications (Akoojee & McGrath, 2005). The FET band (i.e., senior secondary or high school) is sub-divided into units or levels 2, 3, and 4. The 4th level marks the end of secondary education and it comes with the national Senior Certificate examination widely known as the "Matric." Thus, FET is the band, "which provides learning programs between the levels 2–4 on the National Qualification Framework (NQF)" (Kraak & Hall, 1999, p. 19). The restructuring of senior secondary education system in South Africa under FET, makes it exceptionally broad and all-inclusive (Kraak & Hall, 1999). Until recently, senior secondary education in the country was organized into separate institutions for general and vocational education (ibid). As argued by many scholars, (Allais, 2006; Bhola, 1994), the "Matric Examination" is the best known measure of education standard in South Africa. Understandably, the FET is the most complex phase of education in the country; hence both public and private entities are involved. Officially, FET responsibilities fall on national and provincial departments of education of education; however, other stakeholders such as private companies are equally involved in FET provisions (Kraak & Hall, 1999). In all, South Africa has 6,000 secondary schools (Grades 7 to Grade 12) (South African Yearbook, 2006/2007).

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Many challenges are facing secondary education in South Africa and Africa in general. The most common barriers to secondary education delivery include inadequate finance and the sustainability of the present sources of finance, training and retaining teachers and training and retaining education managers and supervisors, lack of relevant and updated books (Peltzer et al., 2005). Others challenges include access to school and educational facilities for rural communities. Consequently, the present level of access, quality, and relevance of secondary schooling cannot support social and economic development needs in South Africa (Aduwa-Ogiegbaen & Iyamu, 2005; Ndala, 2006). The above challenges of secondary education in the region are commonly associated with educational failures and setbacks. These shortcomings and many more make the realization of the EFA (Education for ALL) goals in South African and SSA a daunting challenge. In view of the high private and social returns to investment in secondary education (Psacharopoulos & Patrinos, 2002), innovative policy interventions are urgently needed to improve the quality of secondary education and meet the increasing

demand for secondary education in many African communities.

Despite meaningful policy reforms in South Africa such as the decentralization of school management decisions and the creation of School governing boards, Outcome-based Education (OBE), Tirisano (working together) initiative and curriculum reform initiatives, supply of quality secondary education in South Africa has fallen short of the increasing demand by learners in today's knowledge economy. To a large extent, the challenges facing secondary education in South Africa stem from two interrelated issues: poor quality and to some extent limited access. The poor quality of secondary education in Africa has made it difficult for graduates to secure gainful employment after graduation.

In addition to the historical experience of apartheid and its impacts, the HIV/AIDS pandemic in South Africa has compounded the challenges of secondary education in the country by adding to the existing high rate of teacher shortage and attrition (Crouch, 2001; Peltzer et al., 2005). A report on Educator *supply and demand in South African Public educations system* by Peltzer et al. (2005) shows that overall, 12.7% of all educators in South Africa are HIV positive.

r ational E for ict in sEcondar y Educa tion in s out H a frica

This section explains why it is necessary to integrate ICT in secondary education in South Africa. In light of the above challenges facing secondary education, it become imperative to ensure that secondary education in South Africa is not only improved quantitatively, but also qualitatively. Despite the recognized potential of technologies in educational transformation, education systems in Africa currently rely on labor-intensive pedagogical processes typically involving teachers in face-to-face interaction with students. It is unrealistic to expect South Africa and other African countries to meet their increasing demand for secondary education through conventional face-to-face, teacher-to-student approach to curriculum delivery alone. First, South Africa, like other African countries, does not have the resource to train the required number of teachers to accomplish this task. Second, student-centered education environment is considered more productive and resulted oriented than teacher-centered education environment, which has dominated education system in most African countries. Thus, ICTs have the potential to contribute to quality and outcomes-based education experience by making readily available educational materials accessible to students via the Internet, CD-ROM and satellite broadcast. ICTs can overcome geographic, social, and infrastructure barriers to reach populations that cannot be normally served by conventional delivery systems (Haddad, 2007). Additionally, they provide feasible, efficient, and quick educational opportunities. Therefore, the falling standard of education coupled with the need to expand educational reach in South Africa call for a fundamental restructuring of the learning environment, away from the traditional didactic, teachers-as-fountain-of-knowledge model of instruction, and toward the social constructivist perspective of learning (Haddad & Draxler, 2002).

ict in Educa tion initia tiv Es in s out H a frica

It is well recognized that ICTs are crucial in the accomplishment of educational and socioeconomic development agendas in post- apartheid South Africa. The government is poised to harness the potential of ICTs to deliver educational curriculum to those beyond the limits of the formal education system, such as out-of-school youth, those with disabilities, and learners in rural communities.

The challenge of using modern technologies to enhance the quality of teaching and learning in secondary schools in a developing country such as South Africa is that it will require significant investment. As a capital intensive venture, integration of technology in education cannot be left solely to the government. This fact is acknowledged by the *Transforming Learning and Teaching Through Information and Communication Technologies (ICTs)* (2003) in South Africa, which states in chapter six sub-section six (6.6) that, "Given the magnitude of the task and additional resource requirements, investment in ICTs cannot bet the sole responsibility of Government. Investment from the private sector and other resources will be required to supplement Government contributions" (Department of Education, 2003. p. 35). Therefore, it is not surprising that the implementation of ICT in education policy in South Africa is primarily driven by public and private sector collaborations and initiatives. There are different forms of ICT in education collaborative initiatives in South Africa. While some initiatives provide public schools with hardware and software computer facilities, others are focused on training and professional development for teachers in the integration of ICTs in curriculum development and pedagogy. Examples of such initiatives are, Intel Teach to the Future, DFID/Imfundo Limpopo Project, Mindset Network learn Channel, and Microsoft Digital Village (SchoolNet—South Africa, 2002). This approach to educational change and innovation through collaborative activities of public and private stakeholders is illustrated in Figure 1 below. It is within the context of these collaborative partnership initiatives in the implementation of ICT in education policy in South Africa that the study is located.

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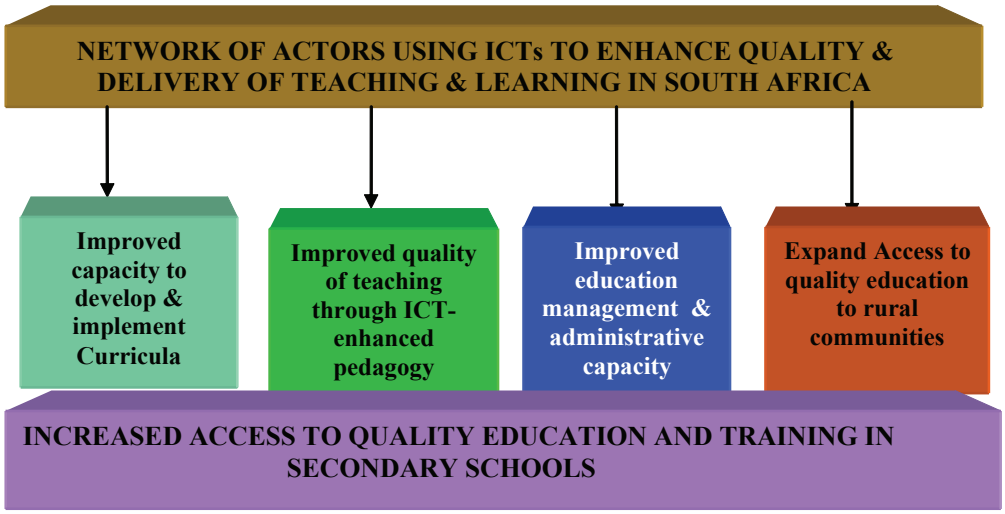
The Mindset Network Organization (MSN) is a nongovernmental organization (NGO), which contributes to the development of secondary education with a combination of old and new ICTs. The Mindset Learn, part of the MSN organization, broadcasts secondary school curriculum to secondary schools (i.e., Grade levels 10, 11, and 12) South Africa at the same time. The subjects covered in the curriculum-based program include English, Physical Sciences, Mathematics, Infor-

Figure 1. Focus areas of ICT in education in South Africa

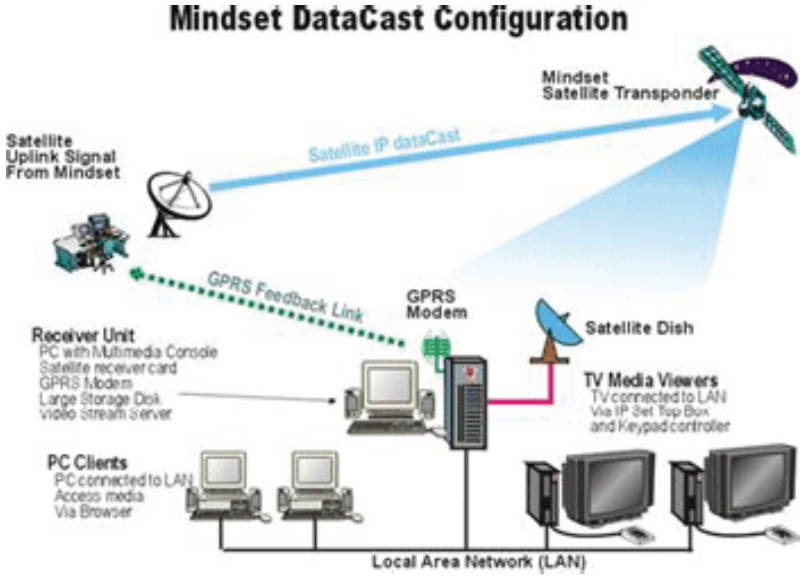


mation Technology, and Financial Literacy (Evoh, 2007). In addition to the broadcast to secondary school classrooms, Mindset Learn materials are also distributed to households through digital satellite television (DSTV Channel 82), print (Sunday Times) and Web format (ibid). Mindset program is available in more than 1,000 schools and over a million homes in Southern Africa via DSTV platform (ibid). The MSN package, which includes technical equipment and staff training, has been installed free of charge in almost 500 township and rural schools in South Africa.

The objective of the Mindset Learn is to use ICTs to meet the educational challenges in South Africa, particularly at the school level. As noted above, among such challenges are; poor standard of educational curriculum, and limited access to secondary education. These challenges underscore the need for an innovative application of technologies to expand access to and improve the quality of secondary education in South Africa. Mindset Learn projects are funded primarily by partners in the organization. MSN partners are grouped into five discernable categories, However, the foundational members of the organization are Liberty Life, Standard Bank, Sunday Times, The Nelson Mandela Foundation, Telkom Foundation, Sentech, IntelSat (formerly PanamSat) and MultiChoice Foundation (Mindset Network Organization, 2004). This category is composed of both private businesses and foundations.

Mindset Learn began in earnest in 2003 by broadcasting national secondary school curriculum contents on televisions for schools and homes. After experimenting with various forms of technologies, the Mindset Learn has reached the stage of educational technology convergence in form of the Datacast solution. The Datacast model is composed of the Digital Video Broadcast (DVB) and Internet Protocol (IP) technology. This educational technology solution has evolved into the new 3 Generation DataCast Solution (3Gen) (Mindset Network, 2005, cited in Evoh, 2007). See Figure 1. The 3Gen technology, which is based on satellite platform stream and store data on local computer storage devices in secondary schools thereby creating an "on demand" viewing services for educators and learners. This system provides

Figure 2. Mindset datacast configuration with LAN workstations (Source: The Mindset Network Organization (2005)



a more user-friendly and flexible educational tool with multimedia contents (ibid). The DataCast technology overcomes the challenge of time constraint associated with traditional broadcast system (Evoh, 2007). The 3Gen is a multitechnology platform, which provides hybrid TV broadcast and Web delivery system simultaneously.

The attention of Mindset Network is focused on schools in underdeveloped and under resourced-communities. Schools in these disadvantaged communities are expected to benefit immensely by accessing educational contents provided by MSN free of charge. The benefit of enriched curriculum to poor and remote communities is particularly important in view of the shortage of educational resources in secondary schools in such communities. As Ann Lamont, the former CEO of MSN puts it, "Core to our success is producing quality content that can be used by as many people as possible" (personal interview, 2005). MSN uses some of the best teachers in the country to prepare and deliver the national secondary school curriculum.

findings and analysis: challenges and sustainability of strategies of partnerships

This section of the study explores the main themes that emerged from data analysis about how collaborative actors like MSN participate in the implementation of ICT in education policy in South Africa, and how they can sustain their participation over time. The first segment presents the supportive elements and enabling factors for ICT in education collaborative partnership in South Africa. Several themes from the data were organized into four major categories. These factors are: the perceived value of ICTs and partnerships in secondary education in South Africa; political will and school support of technology application; partnership structure, management and reward; and choice of technology and technical support. These enabling factors are explained further below.

Enablers of ict in Education collaborative Partnership

Perceived Value of ICTs in Secondary Education in South Africa

The way Information and communication technology (ICT) is perceived in South Africa is a major factor that attracts credibility for groups and organizations that promotes the integration of technology in education. ICT is perceived as the key to the future development of South Africa. Besides, the potential for educational improvement, ICT is seen as a vital component of today's knowledge economy.

The importance of ICTs in the knowledge economy: The national and provincial governments have recognized the strategic importance of ICTs and the ICT sector in enhancing the country's competitiveness and meeting development challenges. There is the hope and expectation that collaborative partnerships will use ICTs, particularly computer technology, to bring information literacy to public education in South Africa. In this context, information literacy is more than the ability to operate the computer. Rather, as Taizo Nishimuro (1999) explains, information literacy means computer literacy plus the ability to solve problems through collaborative processes, taking advantage of information technology and networks. Both national and provincial governments in South Africa are encouraged by the expected impact of ICTs in education and the large amount invested by the private sector through MSN. Some provincial governments such as Western Cape are already involved in funding MSN operations in secondary schools in the province. Many provincial governments are also looking forward to making ICT part of the education process. ICT

application is a big educational project, which will involve big financial cost, which is no doubt beyond the education budgets of governments in South Africa. This underscores the need for governments in the country to encourage the private sector in whatever projects they have in ICT in education in public schools in the country.

ICT Skill for secondary school graduates: As a driving factor in economic growth, ICT skills are vital requirements for employment in South Africa's economy. Given the economic importance and impact of ICT in the country, it is important for the country to develop a workforce with the skills to use ICT to increase productivity. This underscores the imperative for secondary school graduates in South Africa to develop ICT skills in preparation for life after secondary school. Hence, secondary school graduates in South Africa are expected to have ICT skills to integrate effectively in the world of work when they graduate. Unfortunately, due to limited education budget, secondary schools do not have the necessary technological equipment, particularly computers to train students in computer skills. This gap in funding computer education and training for the acquisition of vital skills by secondary schools students is being filled by collaborative partnerships such as MSN.

Realizing the objectives of e-education policy in South Africa: ICT-enhanced education is arguably one of the most powerful means of helping secondary school students in South Africa to achieve the nationally-stated curriculum goals, particularly the outcome based education system. NGOs such as MSN are emerged as partners in educational transformation and are often a source of creativity and innovation (South African Yearbook, 2007). Collaborative partnerships in South Africa are expected to play significant role in the realization of targets set by the *E-Education White Paper.* Among the objectives of the white paper set to be achieved by 2007 are to: "build an education and training system to support ICT integration in teaching and learning and improved management and administration" (Department of Education, 2003).

Technologies can fill in gaps created by lack of teachers: Traditionally secondary schools in South Africa operate with impoverished learning materials, few and overworked teachers and oversize classes. The primary sources of information in these schools are outdated textbooks and the teacher's knowledge of the subject matter. Unfortunately, there is an acute shortage of teachers particularly for mathematic and science subjects. Besides, many of the teachers in different subject areas are unqualified. Under this situation, ICT can be used to complement limited supply of teachers if properly applied. The introduction of new forms of education delivery, through ICTs in forms of audio, video and/or the Internet; as well as the development of different educational models through arrangements such as networks of institutions, have proven to be effective and innovative strategies to meet the challenges of teacher shortage in South Africa. For example, Mindset Learn broadcasts lessons in mathematics and physical sciences directly to thousands of classrooms to improve the quality of secondary education and to expand secondary education curriculum to schools that do not have adequate teaching staff. A computer with Internet connections can provide easy access to different forms of historical documents, breaking news, and hundreds of libraries and museums.

School Support and the Political will for Technology Application

ICTs are new tools for innovative and outcome based education system. However, the success of using ICTs to accomplish specific educational goals lies on the level of support such innovation receives. Data analysis reveals that support for ICT integration in education in South Africa has different dimensions. As illustrated in Figure 3, the different dimensions of "Support System" are vital both for the success of ICTs in educational

improvement and for the success of collaborative partnerships as agents of educational change. Application of ICTs in a classroom is a multidimensional process that depends on a number of interrelated factors. Such factors include training and staff development for teachers, continuous maintenance and technical support, reliable infrastructure and connectivity, ICT leadership/champion, and community support and buy-in. In addition, the support of political leaders as well as the support of national, provincial and district departments of education are crucial for effective technology integration in schools. Analyzed data reveals two broad categories of support systems, namely: School Support, and Political Will/Support. Each of these categories is further divided into subgroups of support.

School Support System for ict Integration

Technical support/maintenance: One enabler of ICT in education collaborative partnership is the provision of on-site technical assistance. If teachers and students have to rely on technology as an integral part of the education system, technical problems need to be resolved quickly. It is very discouraging for teachers and students to wait for hours, days or weeks before technical problems are resolved. Means and Olson (1997) identify five types of technical assistance necessary for successful ICT integration in schools. Such ICT-related assistance includes:

1. Help in planning for technology uses and acquisitions;
2. Training in how to use new hardware and software;
3. Demonstrations and advice on how to incorporate technology into instruction;
4. On-demand help when software problems or hardware failures arise; and
5. Low-level system maintenance (p. 81).

MSN provides three-year maintenance of its technology kit, including a cage in each school after installation. This three-year maintenance period is based on the three-year maintenance warranty negotiated by MSN with the manufactures of the various technologies installed in schools. At the end of the three-year warranty period, equipment maintenance becomes the responsibility of each school, but MSN helps them to plan for it ahead of time. Besides, part of the negotiation process is to encourage the school to fund the insurance for the technology equipment themselves because; this allows the school to take ownership of the project (Elbereth Wentzel, 2005).

MSN Call Center Support: Mindset Learn has a support call center, which is located in the MSN head office in Johannesburg. The center was designed to serve as on-demand teacher and staff support system. Teachers from different MSN schools across South Africa, call the center to obtain answers to all types of questions on the operation of MSN kits. Such questions range from major technical issues to pedagogical and challenges in ICT integration in classrooms. Despite the low usage of this service by teachers and schools, the center serves as a critical support system in education delivery through ICTs by the MSN organization.

Teacher Support and Staff Development: To a large extent, and like in other professions, ICTs do change how teachers do their job. From conducting scientific experiments on computers to taking students on virtual field trips, successful integration of ICTs across curriculum by teachers require continuous teacher training. Continuous training is particularly important for teachers in Africa most of whom were not given technology training as part of their pre-service training, and who do not have their own computers at home. Ongoing staff development will not only enhance teacher's skills in using ICT facilities and other multimedia facilities, it will also increase their confidence. Research findings in the United States shows that "there were increases in pedagogical

use in classrooms if computers were also available to teachers at home, if there is adequate technical support, *and* teachers have access to ongoing professional development" (Blackmore et al., 2003, p. 48).

MSN train teachers twice before such teachers start using technologies in their schools. Teachers from different schools meet at a centrally locate school, for the training. The first section of the training is focused on the school management team. These types of training enable school leaders understand the implications and demands of technology in education. In general, the training enable the school leaders understand the usage of ICTs from the leadership point of view. The second section of the training is focused on teachers. In this regard, teachers are trained on the basic elements of ICTs, for example, the different components of the computer, followed with more significant training on the use of such technology in classrooms. Thus, the training deals with how to integrate ICTs into teaching and learning in general (Fatima Adam, 2005). MSN uses different models of teacher training, which includes training teachers from all subject areas, and then training teachers from specific subject areas (Fatima Adam, 2005).

Supportive Educational Contents: Another important factor of sustainability of MSN ICT in education system is that, rather than using and adapting foreign-made educational contents, the organization produces its own contents. The production of educational contents is undertaken by the *Content Development and Production* Unit of the organization. This department is responsible for writing and development of secondary school curriculum in different learning areas before it is transmitted to learners. MSN educational contents are produced based on the sociocultural dynamics of secondary education learners in South Africa. The department develops and produces curriculum-aligned content in Mathematics, Science, Communication and Information Technology for primary and secondary school learners and teachers on video, print, and computer-based multimedia platforms. The department covers five subject units for secondary school learners. Subjects areas covered include; mathematics, science, English, Information Technology, and financial literacy. Each of these subject areas has one or two subject method experts. The unit works in collaboration with the national and provincial departments of education and subject review experts. These external reviewers are practicing teachers, academics and university professors (Sue Cohen, 2005). Subject contents produced by MSN are guided by the curriculum policy for secondary education from the national department of education (DOE).

political support and cr Edibility

As mentioned above, the second category of support for the sustainability of ICT in education partnerships is political in nature. Political support can be grouped into three subgroups: (1) Policy development by the government; (2) support and cooperation of the departments of Education (DOE) and the department of communication (DOC); and (3) efforts and inputs of high political figures.

ICT in Education Policy Development: Policy development and implementation in ICT in education is a key factor for sustainability in educational technology innovation. ICT in education policy framework provide guidelines for educational technology projects schools. In addition, the policy defines the national educational objectives, which ICT in education projects should target. The initial policy in educational technology in South Africa began with the Technology-Enhanced Learning Investigation (TELI) process in 1994 (personal interview with Vis Niadoo, 2005). The TELI was further expanded in 2003 by the draft white paper on e-education. Although ICT in education, policy framework in South Africa involves broad range

of social, economic and infrastructural needs, the following areas are of particular importance: (1) ensuring educational equity; (2) expanding educational access and opportunity to remote and underserved communities; (3) increasing education quality and relevance; (4) training the needed workforce for the knowledge economy; and (5) creating incentives for collaborative partnerships in general, and the active participation of the private sector in particular, in ICT in education. ICT in education policy provides guidelines and a point of reference to the activities of collaborative partnerships in educational technology.

Alignment with Government Policy: ICT in education projects by collaborative partnerships will be sustained if they are aligned with national ICT in education or e-Education policies and other strategic and operational policies in education and overall economic development. This study reveals three levels of ICT in Education Policy Alignment: the macro level representing the national education department policy; the meso level representing the provincial departments of education; and the micro level alignment representing ICT policy and objectives in individual schools. As illustrated in Figure 4, these three levels of policy alignment converge in the activities of MSN organization, which frames and coordinates these policies in forms of action plans and projects in each school to ensure positive educational outcomes. Robert Kozma (2005) identifies three forms of alignment in ICT in education policy, namely: strategic-operational alignment; horizontal alignment and vertical alignment. MSN and its effort to use ICT to improve quality and expand access to secondary education supports and bolster the National Education Department's e-education policies and other social and economic development initiatives in post-apartheid South Africa.

This brings about alignment between strategic and operational policies of MSN's ICT in education projects, which are directly tied to the nation's goals for economic and social development. Horizontal alignment assures that ICT policies and projects support other policies within the education system. To this end and as mentioned above, the integration of ICT in education in secondary schools enforces and supports changes in the new secondary school curriculum known as outcome based education.

Figure 3. Multidimensional support system of ICT application in schools

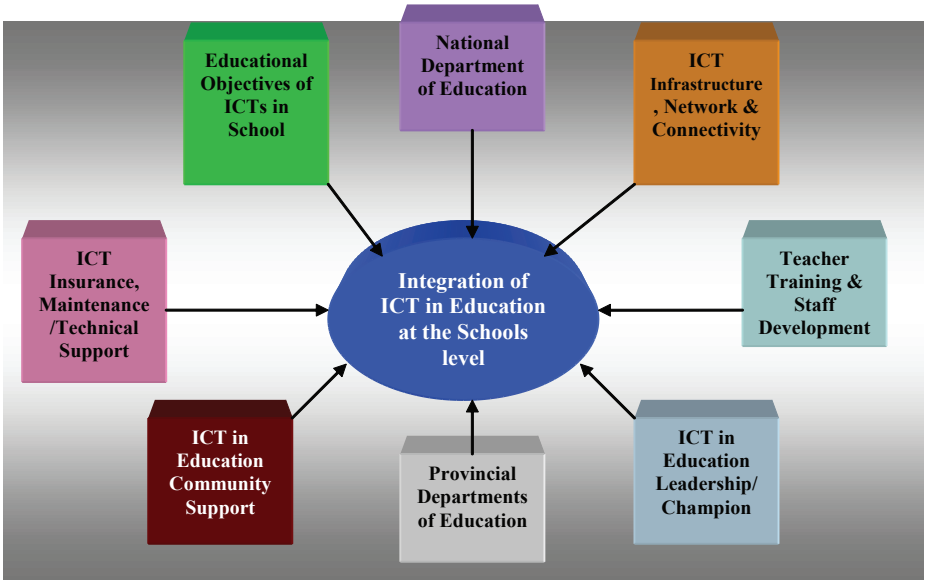
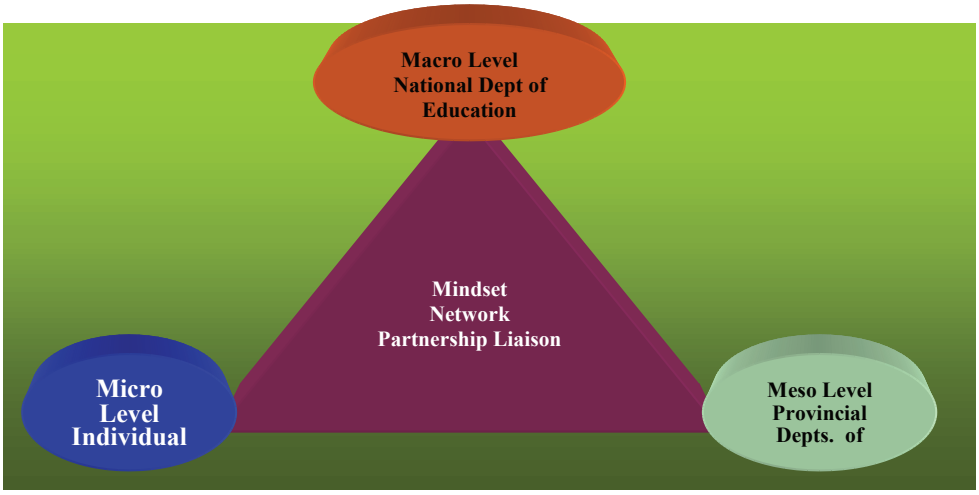


Figure 4. Three levels of ICT in education policy alignment



Vertical alignment, according to Kozma (2005, p. 9) has to do with "the coordination of policies up and down structural layers." This entails the hybridization of national, provincial and school ICT in education policies to produce maximum impact in classroom teaching and learning in secondary schools in South Africa.

High level of political support: Involvement of major political figures such as the former president of South Africa, Mr. Nelson Mandela gives support and credibility to MSN and its activities across the country. The participation of political figures such as Mr. Mandela has helped MSN to either bring in major partners or resolve conflicts among its major founding partners. For example, as noted by a key informant, it took a phone call from Nelson Mandela to enlist the participation of one of the founding partners who was reluctant to be involved in the Mindset Learn. MSN benefits not only from the political influence of President Mandela, rather Mandela is also involved through the participation of the Nelson Mandela Foundation. Another form of political support for MSN operations is that the current president of South Africa Mr. Thabo Mbeki is also committed to the use of ICT for overall development in South Africa and Africa in general.

Cooperation with Departments of Education (DOE): MSN works closely with national and the nine provincial departments of education in South Africa. The selection of schools is largely done in partnership with the department of education. The department of education identifies areas of need and encourages MSN to establish ICT projects in such schools. Working closely with government in defining what needs to be done and receive their approval of schools contributes to the strategic direction of MSN activities. The involvement of national and provincial departments of education has given the government a sense of ownership. It is expected that this commitment will influence the government to continue to support some elements of MSN activities in schools when organization withdraws from such institutions (personal interview with Fatima Adam, 2005).

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Another sustaining factor of MSN collaborative initiative in educational technology is the structure of the partnership coupled with its system of governance and reward for members. The

partnership and governance structure of MSN not only define the organization, but also shapes its operations in the use of ICTs for development goals in South Africa.

Strategic Layers of Partnership

A key factor of sustainability of Mindset Network Organization activities is the strategic layers of partnerships that make up the organization, and how these partners are rewarded. Generally, MNS organization has about 50 partners. These partners can be grouped into five broad categories. These categories of MSN partnership are illustrated in Table 1.

Rewards to Partners: MSN partners are rewarded according to their level of contribution to the organization. Corporations and business entities are not involved in MSN projects for meeting corporate social investment as required by the state. Rather, MSN partners are rewarded for their contributions through media exposure. Given that MSN has a full channel on DSTV broadcast and Santec channel as well, it provides media exposure for its partners in broadcast, print, newsletters, Web, datacast as well as posters and presentations to government and other corporate groups. Millions of Rand worth of media spaces is allotted to MSN partners. Media exposure for MSN partners consists of about a 30-second commercial and or a billboard on air, a logo on print or a mention in the newsletters to all the corporate sponsors (personal interview with Natasha Southey, 2005). As Hylton Applebuam puts it, benefits to MSN partners can be grouped into three categories, namely: national; sectoral and commercial benefits (personal interview with Hylton Applebuam, 2005). The media exposure creates a national awareness of the supportive role of the partners to educational improvement in South Africa. Besides, such exposure brings recognition to the partnering companies in national and provincial departments of education. Again, media exposure enables MSN partners to be recognized and identified within specific sectors of their business activities within the South African economy. Such sectoral recognition ties into the commercial benefits of MSN media exposure. For example, seconds of adverts on air, billboards and the use of corporate logos serve as a marketing strategy for the businesses of MSN partners throughout the South African society. This, no doubt, attracts more business opportunities for the partners and helps them secure future markets.

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Strategic Partnership Selection and Agreement: The strategic selection of participating partners is a key success factor of MSN organization.

Table 1. Layers of mindset network partnership

Category of Partnership	Contributions	Rewards to Partners
Founding Partners	Monetary investment between R15 and 25 million each over 3–5 years	Media exposure, skilled workforce and corporate citizenship mandate
Channel Partners	Television channel; free bandwidth	Media exposure and corporate citizenship mandate
Subject/Content Partners	Monetary contribution for the production and distribution of specific subjects.	Media exposure and corporate citizenship mandate
Access Partners	Monetary contributions for the acquisition of Mindset technology kits in schools	Media exposure and corporate citizenship mandate
Technical Partners	Technical maintenance of Mindset equipment in schools	Media exposure and corporate citizenship mandate

Each MSN partner makes a contribution, which is aligned to the nature of its core business and its corporate citizenship mandate. As Itumeleng Letebele explains, "MSN has successfully mobilized the participation of companies that are critical to the delivery of technology-based education, and thus ensured that the technology deployment costs are shared by the corporate partners" (personal Interview, 2007). This strategy allows MSN to accelerate the use of ICTs for the delivery of educational contents for the benefit of secondary education and the community at large. The strategic selection of partners invokes the concept of contractual exclusivity between MSN and some of its founding partners. Contractual exclusivity with particular partners such as Liberty Life Insurance Company and the Standard Bank, restrains MSN from welcoming any other partner in the financial services area of business. Thus, Liberty Life Insurance Company and the Standard Bank have exclusive rights in the financial services area of business. Given that some founding members of MSN are competitors in the same industry, and to avoid much competition, members are strategically selected. Given that MSN activities are project-based, partner members are not allowed to compete for the same media space. For example, Standard Bank is the only corporate member from the banking industry. Apart from initial seed money the bank contributed, it also created and sponsors the teaching of Financial Literacy through ICTs in secondary schools. For this reason, MSN organization will not allow another bank to create financial literacy materials (personal interview with Natasha Southey, 2005).

Internal and external auditing: MSN operations are audited every six months by some partner members such as the USAID. Auditing of Mindset Network is part of the partnership agreement. In addition, there is an annual audit of the company by an independent company. All of these processes of accountability and scrutiny add more credibility to the work Mindset Network Organization.

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Strong personal relationships: The foundation of Mindset Network Organization is built on existing personal relationships among business partners. MSN organization is the brainchild of Mr. Hylton Applebuam, the Executive Director, of Liberty Foundation and also the director of companies and trustee of various developmental and educational trusts. The selection of the core or founding members of MSN was done based on his personal relationship with those businesses and foundation in South Africa. Mr. Applebuam explains how the connection with each founding member of MSN was made:

The Standard bank connection is based on the fact that Liberty and Standard bank are sister companies. Sunday Times connection is based on the fact that Liberty Foundation had a historical involvement with Jon Company and Sunday Times Newspapers through the Read-Write Program through the Leaning Channel, and the publisher of Sunday Times is a close personal friend. Nelson Mandela Foundation, I've know Madiba[1] very well since 1990 and the foundation is run by John Samuel whom I've known and we were funding John Samuel's work long before 1990, in the 1980s we were funding John's educational work. So again, it was personal relationship (personal interview, 2005).

The above remark by Mr. Applebaum, illustrates the role played by personal relationship in the establishment of MSN. Mr. Applebaum's statement shows that the founding members had known each other through business relationship. This no doubt adds to the solid relationships among the partner members of the organization, and the impact of this positive partnership experience on MSN ICT in education projects in schools. MSN was built on existing relationships by people who have had one form of business relationship or the other. This is particularly true among

the founding partners. For example, IntelSat (formerly PanamSat) had an existing business relationship with MultiChoice DSTV. Besides, MSN is the second partnership put together by Mr. Applebaum to use ICTs to expand access to education. The Learning Channel was the first partnership on ICT in education. The success of the first partnership convinced many MSN founding partners to participate in the current channel. As Mr. Applebuam points out, "PanamSat (now IntelSat) will never give their Transponder (satellite space) to anybody than us. But the fact that we've been broadcasting educational contents for 12 years made them to believe that these guys know what they are doing" (personal interview, 2005). Part of Mr. Applebuam's experience in educational technology partnership encouraged him to register MSN as a nonprofit organization. As mentioned earlier, the idea behind this was to ensure that the organization will not be 'hijacked' by entrepreneurs who are partners in the organization, when it eventually becomes successful. This strategy was based on his experience in a past partnership with the British government, which funded an educational radio program. Mr. explains that, as this program evolved and became successful, it was taken over by corporate partners in the organization who turned it into a commercial venture.

Constant communication with partners: MSN has a good communication management strategy that enables the organization to maintain a healthy relationship with its partners. In view of the various hierarchies of partnership, communication is obviously one of the most important strategies of developing and maintaining a relationship with all the stakeholders. The MSN client relationship manager, Natasha Southey explains that, there are five particular areas of communication that are needed to keep the relationship going. This ensures that there is a two-way strategic communication between Mindset organization and the partner members. The first one is information dissemination among members. The objective behind information sharing among members is to create the feeling of community between all the partners and Mindset Network (Natasha Southey, 2005).

Information about the organization is shared among partner members through five channels. The first channel is through the monthly *Newsletter*, which is sent to MSN partner members. MSN newsletter consist of community-based and grassroots information on MSN activities in the field. The objective here is to "create a community of partners, so that everyone feels that they are part of a big picture and that they are helping South Africa and Africa. So the stories revolve around progress that we have made and we try and include thing like comments and communications from our sites: things like teachers' comments, and children's comments" (personal interview with Natasha Southey, 2005). The second channel of communication between MSN and its partner member is through quarterly visitation of members by the client relationship manager. Such visits are aimed at maintaining personal contact with the members. Besides discussing general issues concerning MSN operations, the visits enable MSN staff to report directly to partners on their projects, project deliverables as well as challenges facing the organization. The use of Mindset *News Flasher* is another way of keeping MSN partners informed about events in the organization. Mindset News Flasher is used when there are sudden developments in the organization. As part of the partner relationship management, MSN reports to the founding partners every four months. This report provides a general feedback on MSN. These lines of communication enable all parties involved in the MSN to have a clear understanding of expectations and deliverables.

High level of Professionalism: The management of MSN and organization's interaction is based on a high standard professional ethics. Although, MSN is registered as a nonprofit organization, but the organization is run and managed as a corporate entity (personal interview with

Mankanya, 2005). MSN is divided into different departments and units. These elements of bureaucratic system do not delay transactions between and within departments and unit. Each department and unit of MSN has a clear understanding of their expectations and responsibilities.

Partnering with other ICT in Education Organizations: Besides corporate partners, MSN is partnering with other ICT in education organizations in South Africa. Such educational technology partner organizations include, the Khanya Educational Technology project, under the Western Cape department of education, and the Guateng Online. The Khanya project, which was established in 2001 is one of the first dedicated provincial government programs in South Africa to address the shortage of educator capacity and the need to deliver curriculum to schools through the innovative use of ICTs. Apart from exchange of ideas concerning the use of ICTs in curriculum delivery, MSN signed a three year agreement with Khanya to extend MSN contents to 613 Khanya schools in the Western Cape Province. In addition, Microsoft South Africa and Mindset Network have formed a strategic partnership to jointly develop information and communication technology teacher training materials to be used by the network.

MSN Projects are not Funder-driven: MSN education projects in schools are funder-supported but not funder-driven. In essence, they are not controlled by partners who provide funds for such projects. Rather, proposals for such projects are designed and developed by MSN management staff before hand. During partnership negotiation, the project proposal modified and presented to the prospective partner for approval. Therefore, MSN projects are funder-supported; they are not funder-driven.

Choice of Technology

To a large extent, the choice of educational technology impacts teaching in schools. It is important to contextualize national educational technology strategies to meet local needs in individual schools.

Multimedia approach: The choice of ICT platform is important in the success of ICT in education project. MSN explores the potential of all technology platforms such as satellite, print, computer, Television, video, and World Wide Web for the improvement and expansion of secondary education opportunities in South Africa.

Technology Convergence: MSN has used multiple technology platforms for educational purpose. It has moved from direct broadcast of secondary school curriculum to use of Datacasting Solutions (DCS), which enables teachers to use MSN lessons on-demand. (See Section 8 and Figure 2). The DCS, which was designed to meet the needs of MSN schools allow flexibility on delivery mechanism. While this is not a replacement for computer laboratory, it is basically an additional methodology to create greater access (personal interview with Ricky Naidoo, 2005). MSN uses DCS as a practical illustration of the convergence of educational technologies by developing a package of educational products that are very cost-effective and very accessible to communities.

sustaining msn innovative approach in secondary Education

This section analyzes the various challenges facing collaborative partnerships in ICT in education in South Africa. These challenges, which emerged from the data, illustrate the complexity of implementing ICT in education policy by collaborative partnerships. MSN projects had been in operation for about one to two years when data for the study was collected. Certainly, none of its practices and innovation could be considered as "mature" as they were being reevaluated and fine-tuned. Nonetheless, other partnership

groups in educational technology can learn from the experience of MSN at the early stage of its development.

Misconceptions of "ICT" in Education

There are two forms of misconception among policymakers with regards to ICT in education in South Africa and other African countries. The first conception stems from the meaning of the acronym "ICT." As Hylton Applebuam remarks, many think that the "C" in ICT stands for computers. Thus, computers have come to be seen as a "vitamin" whose mere presence in schools can result in better educational outcomes. Another conceptual issue is that, ICT is often seen as another subject in the curriculum, which should teach students computer skills essential for employment and world of work. The misconception of ICT as only computers feeds into the second misconception. Many believe that the computer is the only viable information communication technology needed for the improvement of education in the region. Consequently, there is emphasis in providing schools with computer laboratories to teach students computer skills (personal interview with Hylton Applebaum, 2005). Thus, there is a general misunderstanding among policymakers between the use of ICT as tools in educational development and the teaching of computer literacy as skills that are important in today's world or work. The conception of ICT and the focus on computers has made governments to neglect the potential of other ICTs, such as radio and television, in the transformation of secondary education in Africa. The concept of ICT in education should be more holistic in nature. The broadening of the concept should include both new (e.g., computers) and old technologies (e.g., radio and television).

Limited Resources

Limited supply and use of MSN Kits by Teachers: End use of MSN technology in classrooms by teachers is very low. This shows that many of the schools are not making effective use of the educational contents produced and distributed by MSN. The limited use of MSN technologies in schools can partly be explained by the limited supply of MSN kits in school. Every school receives one set of MSN kit. A set of MSN technology kit is composed of one TV set, and one computer/datacasting solution. One set of MSN kit is inadequate for a school that has a student population of about 900 students and 35 teachers. In effect, little positive impact could be made with few technological resources in schools. The lack of effective use of MSN educational technology kit in teaching across curriculum by teachers is not peculiar to South Africa and education systems in developing countries. As Sarah Younie writes concerning secondary school teachers in England,

Across subjects there remain significant weaknesses in teaching using ICT. Only a minority of teachers are capable of managing ICT resources and organizing the classroom to ensure that effective subject learning is taking place. Many teachers still have difficulty in deciding when and when not, to use computers, while others are reluctant to use them at all. Teachers who have had experiences of faulty technology are often skeptical about the capacity of ICT to help raise standards (p. 395).

Inadequate teacher/staff training in ICT integration: MSN train teachers twice on how to integrate technology in teaching. Realities on the ground show that this number of teacher training is inadequate for effective integration of technology in teaching and learning. In view of the fact that most teachers in South African secondary schools do not have background training in ICT use and management, and given the complex nature of integrating ICTs in teaching, continuing teachers' ICT training is fundamental for the development of new pedagogies to ensure the maximum returns to MSN investments in

educational technologies in South Africa. The use of MSN kit in subject teaching in schools is undermined by several factors. This includes the lack of adequate training for teacher in many schools that got MSN kits[2]. Inadequate training of teachers on how to integrate ICT in teaching in the classroom informs the argument made by Jurema et al. (1997, p. 3; cited in Atun, 2007, p. 55) that,

Little or no attention has been given to Pedagogy of Informatics, which takes into consideration learning and teaching processes, organization of curriculum, and reflection on people/machine relationships in learning and in the wider community, as well as developing children's ability to use computers competently.

The broad range of pedagogical skills required for teachers for effective integration of ICTs in teaching calls for constant teacher training and support in school. The integration of technology in classroom teaching involves time management. It is well known to teacher that, one of the biggest obstacles to teaching with technology is time management. As Jan Hawkins (1997) rightly said, using technology can change the dynamics of time. On the other hand, using technology can also frustrate the teacher if she does not have the skills to integrate technology effectively in the classroom. While recognizing the ambition of MSN Learn to transform secondary education in South Africa through ICTs, the success of these innovative projects in schools across the country depends on whether they are translated into everyday practice by the teachers or not.

Lack of ICT leadership/champions in schools: There was apparent lack of school leadership/championship of MSN projects. Of course, the principal of each school and a couple of teachers are aware of the project in their schools, but this awareness is not widespread among teachers and other staff members in the school community. Even in few schools where the principal was the clear champion of the "ICT matters," this was not shared among other staff members. A meaningful integration of ICTs in teaching and learning requires that the school must have teachers who serve as technology or ICT champions or coordinators. These ICT champions, who emerge from the teacher ranks, would be active in designing and implementing the innovation in the school. As Means and Olson (1997, p. 101) argue, given the inevitable changes among administrators, staff transfers, and retirements, "ICT projects in schools, which have not evolved into sharing of technical knowledge and the development of multiple sources of leadership and enthusiasm will have a hard time sustaining themselves." Thus, the key to sustaining MSN projects for positive outcomes in schools is solid participation of teachers.

Lack of Community Involvement

The involvement of school communities in the planning and implementation of MSN projects is very minimal. Due to the top-down technology planning and minimal involvement of the school community in MSN projects, Mindset kits may be seen as handouts by the community, which needs little or no commitment from the community. Communities need to have a sense of belonging and engagement to sustain technology projects in schools over time.

Lack of ICT Development/Master Plans in Schools

As Younie (2006) remarks, the school is one stratum of planning for a successful integration of ICTs in teaching across curriculum. Unfortunately, such plans and arrangements are not available in schools were MSN projects are running. In the schools visited, it was observed that the principal of the schools acted as the ICT leader or coordinator. There was a discernable lack of ICT leadership and cohesive joined-up

arrangements at the schools level. Due to lack of strong and coordinated plans in schools, perennial technical issues of connectivity, reliability, access and technical support were mishandled. The lack of school ICT planning translates to limited use of MSN equipment on pedagogy and classroom practice. The top-down approach of planning in MSN projects discourage the empowerment of the schools to formulate a long-term ICT professional development plans by building on existing training and professional development programs.

IE ssons: ict in Educa tion as a nEtwork of a ctions

The proceeding section examined factors undermining the activities of Mindset Learn Channel in secondary schools in South Africa. This section provides a brief normative discussion of certain issues, which, if adapted to the local context, will promote ICTs integration in secondary education in South Africa and Sub-Saharan Africa (SSA) in general. Today, two discernable features are identifiable in the effort to improve education system in Africa: multisectoral partnership initiatives and the employment of ICTs. These innovative approaches are exemplified in the activities of Mindset Learn in South Africa.

It is significant to share lessons learnt by MSN both positive and negative. This is because the use of technology in education is becoming an integral part of secondary education reform in SSA countries. However, most if not all ICT-enhanced education initiatives in the region are driven by multisectoral collaborative initiatives within and across countries. A good example is the New Partnership for Africa's Development (NEPAD) e-schools initiative (Evoh, 2007)[3]. Hence, organizations in the region stand to gain from the experiences of MSN. Although I consider MSN as a work in progress, nevertheless, it has accumulated many lessons others can learn from in ICT in education. Thus, the following suggestions are cautiously made. One needs to be very careful in making recommendations because of the complex nature of the process, coupled with differences within and between countries.

Data analysis shows that successful implementation of ICT in education is multidimensional and holistic in nature. Awareness of the complex nature of integrating ICT in education and the ability to properly coordinate the multiple actors involved in the process is crucial. Much of ICT in education initiatives have centered on the construction of computer laboratories in schools and installation of computers with Internet connectivity in classrooms. Such efforts have largely ignored crucial but nontechnical components of a successful ICT integration in education. A successful collaboration for ICT integration in schools is a complex connection, which entails interdependences finance, technological artifacts, policy implementation and evaluation, curriculum implementation and staff development. ICT has great potential for educational improvement in Africa. However, these potential of technology can only be sustained with some significant changes in how education is organized and managed in many African countries.

Again, the structure of educational management in a country also affects the way collaborative partnerships implement ICT in education. This brings in the issue of centralization or decentralization of education management. Educational technology implementation in schools does not favor either centralized or decentralized system of education. Rather, to avoid unnecessary delays and bureaucratic bottlenecks in technology roll-out by partnership organizations, there is the need for a harmonized implementation processes between the provincial and national department of education. The smoothness of intra and inter-departmental coordination depends largely on the availability of the necessary human resource capacity in each level. Educational change through ICT integration requires a comparable knowledge of the dynamics of the process among department

of education officials at all levels. Apparently, this essential capacity is lacking in the departments and ministries of education in most African countries. Consequently, this gap in educational technology capacity undermines the ability of collaborative partnerships to coordinate and harmonizes the integration of ICTs at the school level. This challenge underscores the imperative for the training and/or retraining of education managers in the overall system of ICT in education. This will entail a change in methodological paradigms of education delivery, teacher development, learning and teaching approaches, accreditation, and the development and consolidation of technology-enhanced learning environments.

Innovative application of ICTs in all facets of life, especially education, enhances the ability of low-income countries to move up the value chain in an enabling environment. Partnership processes within this context is not limited to core or founding members of MSN organization. Rather, by implication of its mandate and objective of integrating technology in education, the partnership process involves the cooperation and participation of other institutions and bodies whose activity or inactivity will directly enable or undermine the realization of improved secondary education through ICTs. For this reason, actor-network and policy network theories suggest regular strong communication and interaction among all parties and stakeholders (both humans and nonhumans) to align activities and coordinate ICT in secondary education for desirable outcomes at all levels. As illustrated in Figure 5 and Table 2, this holds different types of lessons for ICT in education policy processes. This underscores the triangulation of the two theoretical modes in this study.

Therefore, the success of ICT in education collaborative partnerships depends partly on the robustness and cohesiveness of the partnership organization, the readiness of schools, departments of education at the district, provincial and national levels, and above all on the expected value of ICTs in the country. The implementation of technology in education does not depend on one or two of these factors; rather, it involves a multiagency approach. This calls for what Younie (2006, p. 396) called "'joined-up' thinking and planning across agencies" to ensure a harmonized and coordinated program across all levels. Thus, in line with Policy Network and Actor-Network theories (see Figure 5), the success and sustainability of MSN ICT initiatives in secondary schools in South Africa depends on the assemblage of a large network of human and nonhuman actors to support the innovation.

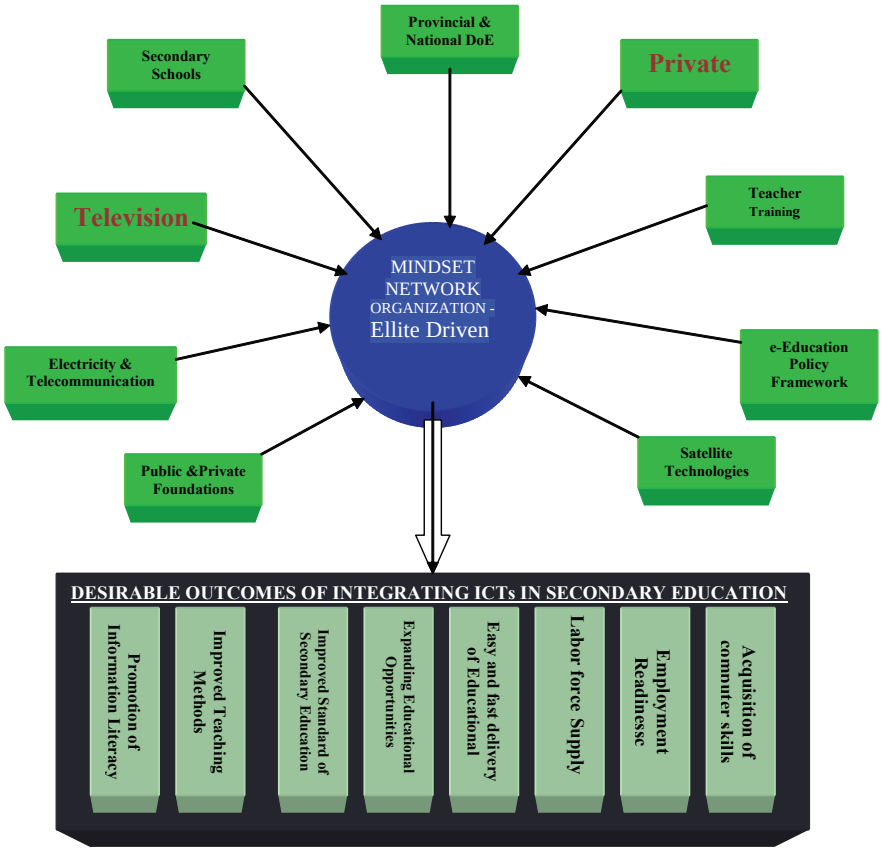
c onclusion

This study focuses on the process of collaborative partnerships in ICT in education in South Africa. Using the Mindset Network Learn as a case study, the study explored the factors that enable and undermine the operation of such collaborative initiatives in South Africa. Four plausible factors emerged as enablers. These are: (1) perceived value of icts in secondary education in South Africa; (2) political will and school support of technology application; (3) partnership structure, management and reward; and (4) choice of technology and technical support. This study also identified three major factors that undermine the implementation of ICT in education by collaborative partnerships in South Africa. These impediments are: (1) misconceptions of "ICT" in education (2) limited technology resources; and (3) lack of ICT development/master plans in schools. The case study of the Mindset Network Learn Channel suggests how complex the process of ICT integration could be as well as the imperative for a multilevel support system for a smooth implementation in schools.

Table 2. Collaborative partnerships and ICT in education policy network in South Africa (Source: Adapted from Perkin and Court (2005))

Stages of policy process	Objectives collaborative partners policy process	The role of Networks
Agenda setting	To convince policymakers that ICT in education is crucial	- Marshall evidence to enhance the credibility of the argument - Extend an advocacy campaign to promote ICT in education - Foster links among researchers, CSOs and policymakers
Formulation	- To inform policymakers of the options and build a consensus	- Collate good-quality representative evidence of the role ICTs can play in meeting the education needs in South Africa - Build long-term collaborative relationships with policymakers - Introduction of ICT in education policy ideas/practices from other developing regions of the world
Implementation	Complement government capacity and realizing the objectives of ICT in education policy	-Role out of ICTs in secondary schools - Professional development of teachers in the use of ICTs -Provision of the necessary infrastructure in schools –Act as dynamic 'platforms for action'
Evaluation	Collate quality evidence and channel it into the policy process	- Provide good-quality representative evidence and feedback - Link policymakers to policy end-users (i.e., secondary schools)

Figure 5. Actor and policy model of collaborative partnerships for the integration of ICTs in secondary schools in South Africa



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Endnot Es

1 Madiba is President Nelson Mandela's honorary name, which means the head of the family, used by most South Africans.

2 Most schools have only one or two teachers that use the kit, while many teachers are not aware of the existence of MSN resources in their school.

3 The e-schools initiative is on a multicollaborative partnership strategy between the NEPAD, major ICT companies and ministries/departments of education in different participating African countries. The objective of the NEPAD e-School initiative, which is at its pilot stage is to respond to the challenges of secondary education in Africa by leveraging the potential of ICTs under the collaboration of African governments and private companies in Africa.

Chapter IX
Technology Leverages a Community University Collaboration

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abstract

This chapter reports on two University of Southern California collaborations that partner business communication classes with not-for-profit agencies. It argues that technology-enhanced community-based collaborations support university initiatives and empower students to be better business writers, engage in community issues, and prepare for 21st century communication strategies. Because business requires teams, networks, and technological communication to operate within a diverse global workplace, business schools need to prepare students to professionally manage the communication decisions and media. Furthermore, it asserts that the collaborations among faculty and the university administrators undergird and promote these undergraduate community projects. It examines the background, goals, issues, assessments, future plans, and recommendations for leveraging university-community projects with technology.

introduction

In the weeks following 9/11, Lehman Brothers conducted business from computers set up in near-by New York hotels and businesses, accessed their remote back-up data storage, and produced the first new issuance bond offering on the Stock Exchange (Anderson, 2007).The company's ability to electronically collaborate after such a disaster validated my sense that multilevel collaboration supported by technology proves more indispensable every day. It reinforced my goal to provide my students with the skills to collaborate successfully in the 21st century.

Helping students to succeed in the world's global enterprise necessitates catalyzing the synergy that results from a technology-enhanced community-based collaboration. My classes, therefore, have partnered with not-for-profit agencies in order to create recommendations for communication changes or to create business documents. The teams rely primarily on technology to communicate with one another, the agency, and me. Forrester's research argues that "technology and social changes are creating a potent mix of forces that will transform the way all businesses—not just media firms—operate, create products, and relate to customers". This shift, which Forrester calls "social computing," and defines as "a social structure in which technology puts power in communities, not institutions," (Charron, 2006, p. 1) validates my assignments for two classes: Advanced Writing for Business, and Communication Strategy for Business. Both have partnered with not-for-profit agencies and relied on social computing to conduct and to assess their projects.

background

In these classes, I compare a moving slinky toy to the communication process; the metal helix changes shape as it's squeezed and rolled. One move catalyzes the next so the fluidity masks the independent steps. Response to its surroundings propels its movement. Similarly, as the communicator repeatedly considers the audience's probable attitudes, values, potential questions, and refutation, she alters her own perception of the content and the organization of the text. This process, commonly unrecognized by student writers, becomes more evident when business people and electronic narratives intervene and compel frequent analyses. Introducing technology which promotes self-reflection, peer-to-peer reviews, and professional assessment increases students' awareness and experience with the communication process.

When student writers engage in a recursive process, generated by the communication need an agency has, they experience a sense of dissonance or a demand that calls on their critical thinking and ultimately produces a product that's mediated through peers' and professional managers' potential or real responses. What distinguishes a generalized approach to process writing from the writing for business, is the know-how to prewrite, revise, and create the professional document that Michaels (2007) would say works "in the discipline." In order to increase opportunities for students to experience this process as it's enacted in business, I establish community partnerships and employ technology as a means to achieve the learning outcomes. Although I provide top-down oversight, individual decisions are made by the students and agency. These self-managed teams depend on technology to create documents, interact, and assess.

Many more opportunities for rhetorical decisions become apparent to the communication students when they partner with a not-for-profit business. Most need to learn how to move from a linear individual communication process designed for a classroom audience. In my communication classes, the students learn how to assess the agency's needs and values, consider peer's and client's comments, and see how their parts fit into the completed product. They learn how to analyze and write for multiple audiences, select the appropriate channels, multiply approaches to organizing a message, respond to feedback, and assess the process.

Evolving Technology-Enhanced Learning Experiences

Today, all of my classes rely on electronic technology to facilitate and measure the learning outcomes, but twenty years ago when I started teaching undergraduates at another university, my classes only used *Daedalus* software to increase discussion and increase an interactive writing

process. Later at another university, the use of technology grew because all of my classes were part of a laptop initiative, and I taught some distance-learning humanities classes. Since that time, learning possibilities have multiplied: the Web's hyperlinks have challenged the linear reading process, e-mail has increased students' writing, and *MySpace, Facebook, YouTube*, tagging, and other social software increase everyone's, including the university's, ability to economically and exponentially expand communication. Now technology supports internal and external collaborations, as well as serving as a topic for analysis in my business communication classes.

When I came to the University of Southern California's Marshall School of Business, I required the use of e-journals for my writing students as I had done with previous classes. First, students created diskettes; later, they posted Word documents to the digital dropbox, both cumbersome processes. A few years later, I applied and received a Center for Scholarly Technology's JumpStart grant which provided software and training on how to use a Wiki. I adopted the Wiki as an interactive tool for individual student e-portfolios, a much more transportable device for students and me. After experiencing the collaborative potential that the Wiki provided, I also established a multiclass Wiki which provided a shared knowledge site for blended and residential classes. It successfully decreased the isolation of my blended students and enriched the learning of both classes by providing a common space to post and comment on writing or to continue classroom discussions.

f ocus

My communication and advanced writing for business classes, a residential section and a blended/online section, collaborate with not-for-profit agencies in order to create recommendations or a business document that the agency needs. Placing an agency's need squarely in front of students provides the motivation, the students' buy-in, which increases learning and produces a more professional product.

Research indicates that commitment to a mission contributes to team success, especially for virtual teams. A team at London School of Business surveyed more than 1,500 virtual-team members and leaders from 55 teams across 15 European and U.S. multinational companies. Lynda Gratton (2007) professor of management at LBS, concludes from this study that "a virtual team must ensure that the task is meaningful to the team and to the company." She points to the successful BP Ignite team which led the corporation to a more sustainable energy program.

What happens when I add technology and the voices of a community not-for-profit business into the academic learning mix? Students value the task as meaningful, learn how businesses communicate, and learn how professionals collaborate.

Teams in the blended/online section compound the necessity for virtual collaboration because the students are not regularly meeting on campus, but both blended and residential classes conduct some virtual meetings and electronic document sharing. Working with a not-for-profit agency increases the need for communication at times and sites not always convenient for students, and traveling from campus to an agency's site adds to the students' time and expenses. Additionally, establishing virtual teams as a piece of that collaboration adds value because virtual teams require different communication skills and frequently encourage different teammates to lead.

Technology-enhanced learning undergirds the partnerships and opens up the possibility for increased student commitment to learning, more input, revisions, and innovative communication. Wikis, personal response clickers, course management systems, team chat rooms, and collaborative writing tools increase communication options and assessment opportunities and better prepare

students for using similar business tools. Increasing the communication between the business and students more effectively engages students with the external interdependent world which expects distance team work and seeks community sustainability.

All members of the multilevel collaboration, including the university administrators and staff, students, agency contacts, and I engage in an interdependent process relying on electronic tools to share information and decision-making in a timely manner. I write more explanations, responses, and evaluations for classes; students explore and assess the communication process, write for a client, write to impact community issues, while agency contacts revise, test the documents, and usually receive useful business documents. Administrators and staff e-mail questions, problems, meeting agendas, and minutes. Technology facilitates monitoring of all outcomes through file sharing, focus group responses, and personal response clicker assessments.

Knowledge Management

Students increase their content base through technology-based course management discussion boards or Wikis. They analyze their community partnership project during a virtual meeting, post the transcript, and then contrast advantages and disadvantages of virtual and face-to-face meetings. Students also learn from one another's class discussions via podcasts. Our e-learning team video-streams the residential class to our course management folder and posts it to the USC *iTunes* site for the blended class or for the residential class's later review.

Both classes create business presentations and documents. Strategic communication team presentations recommended technology that would assist a local business development enterprise. Advanced writing teams learn how to create whatever business document the agency needs. Commonly teams produce a business plan, press kit, or operations manual, but more unusual products such as a financial literacy package for an elementary school and an explanation and permission form for the USC Mobile Dental Clinic were created.

Students also solve real business problems with current electronic tools while learning how to participate in an interactive, multistep communication process. They share that learning much more quickly and more widely with other students and the community with the aid of technology.

Students and community agencies share intellectual capital, experience, and values associated with diverse demographics. The agencies' personnel and its clients increase a student's awareness of community issues, communication strategies, and professional communication's impact while agency administrators learn more about USC's students.

Together the students and agency negotiate a constructed meaning, frequently involving an acculturation process, particularly for the students. Borrowing Mikhail Bakhtin's (1930) notion of the multivocal dialogic novel discourse as a model, we can examine the learning that is created by the many voices speaking and listening to one another, the resultant heteroglossia, the contemporary internal and external forces that shape meaning.

More recent classes have incorporated contemporaneous technology to extend their communication and media learning. Examining corporate blogs, video conferences and videos provides models for the classes. S.E.C. Chairman, Christopher Cox,'s videotaped presentation persuades students to use Plain Language. *YouTube* provides communication examples that can influence future business communication: Bob Eckert's video as an example of message control, Monsanto's testimonials, and General Motors' internal messages to dealership sales personnel.

s olutions: c urricular c ont Ext lE v Erag Es lE arning

These learner-centered experiences support USC strategic initiatives and grow because of the university's commitment to the community and to technology enhanced learning. USC and its Marshall School of Business create the context which encourages, supports, and rewards these innovations. Our Technology-Enhanced Learning/Distance Learning Committee and its predecessor, the Distance Learning Network, provide informative colloquiums, Web sites, awards, and training. Marshall School's e-learning team provides the support services and facilities which we need: video capture room, experiential learning labs, multimedia based classrooms, and computer labs. Annual performance assessment queries faculty on their course technology and community-involvement innovations and awards outstanding contributions.

USC's vision to Promote Learner-Centered Education grounds these collaborations:

"The third pillar of our new vision is nothing less than a new concept of education within research universities, which we are calling a 'learner-centered' orientation […] Because students learn in different ways and bring different goals and aspirations to the university, this new approach translates into greater flexibility and individual responsiveness in the way we structure and deliver education and student services."

"New technology enables and facilitates new ways of teaching students […] we need a new approach to teaching that moves beyond transmitting information. Instead, faculty must play a more active role in helping students learn to locate, assess, apply, and create information." (http://www.usc.edu/about/core_documents/2004_strategic_plan)

Multiple players collaborate to support these technology-enhanced community-based programs; they constitute the multilevel collaboration. In addition to the Technology-Enhanced Learning/Distance Learning team, the Office of Community Outreach and its extension, the Community Based Learning Collaborative, joins students, faculty, and community partners bi-monthly to discuss issues and future plans for annual seminars. Together, CBLC members create the multivoice environment that generates more learning opportunities than most faculty and text-based or Web-based classes can produce alone.

Significantly, students sometimes initiate the technology implementation or another step in the community collaboration. A few years ago, one of the blended students asked if we could podcast the classes so he could listen when he was walking across campus. The Marshall School's e-learning team heard the request and made it happen. Since then, the university has partnered with *iTunes,* so my classes are also posted there. More recently, students persuaded me to use *iChat* and Google docs rather than the Blackboard chat rooms. Happily, since then, USC has partnered with Google so that the students can now access Google Apps.

Another student linked me to a USC student/faculty academic initiative. He invited me to have lunch with him and directed me to the program which lets USC pay for the lunch. After that enjoyable experience, I started hosting another collaboration; one representative from each team in both classes meets me for lunch midway through the semester. The students and I get to learn more about each other's team project and process, and the lunch meeting models the importance of client relationships and different types of meetings.

Creating the first advanced writing blended/online class and joining other faculty with community-based learning projects increased my collaboration with USC colleagues. I have learned

more because I serve as a member of the USC Provost's Committee for TEL/DL, the Community Based Learning Collaborative, the Provost's Committee for Academic Programs and Teaching, and the Blackboard committee. We participate in decisions regarding learner-centered programs, the portable classrooms, and the iTunes installation, and we communicate quickly and create a narrative history when we e-mail and post findings to Web sites.

I share my experiences through campus collaborations, conferences, articles, and e-knowledge sites. I have been an invited speaker for USC symposiums and Community of Practice meetings which focused on learner-centered programs, assessment, or technology-enhanced learning. The TEL staff interviewed me and created two electronic resources for faculty: a CD and a podcast, which discuss different aspects of my classroom applications. All of these presentations are posted on the university's technology Web site.

The collegial knowledge waves widen when I participate in more informal communities of practice and international conferences such as the Social Software in the Academy, the Association of Business Communication, and the International Service Learning Collaborations. As a result of my membership in the USC Distance Learning Pedagogy Community of Practice, one of my colleagues introduced me to a faculty member at another university who was able to use some of my course work in her dissertation

issues

Along with the normal risk of technology failure and the frustrating learning curve, these collaborations with their associated electronic communication tasks require more time, training, and software. Typically, I navigate Blackboard, Turning Technologies, Outlook, the Wiki, iTunes, and Turn-it-in several times a week. Gratefully, it is easier now that Turn-it-in and Turning Technology are Blackboard building blocks.

Planning and assessment for electronically-based collaborations also require more time than my former classes. Agency contacts, increased community of practice and committee work, selecting the appropriate medium for an assignment, and increased student communication add to the time commitment. E-mail contributes a lot to the overload. The necessary communication between community partners, students, and colleagues increases e-mail beyond most of my colleagues'. Cultural and generational e-mail miscues contribute to the "clarification" time. To add to the e-mail overload, the blended class e-mails more than the residential class. Even though blended students can see every residential class on the video, they send in more questions. A small number of students have initially been reluctant to use the technology; most of those were nontraditional students unfamiliar with the electronic collaboration tools. Students complain that it takes time to e-mail, wait for responses, and look for another student's document on the discussion board or Wiki, and to switch from navigating Blackboard to working with the Wiki.

These technological communication enhancements frequently demand more data sharing at the first on-site agency meeting as well as in the classroom. Students need to ask how communication technologies are used at the agency, its familiarity with applications, and its desire to collaborate with this software. Guidelines for response times have to be agreed upon.

The administration, staff, and students with whom I collaborate readily instigate, assist, and applaud the community-based technology-enhanced teams, but not all members of the faculty would support these initiatives. As Chris Anson (1999) notes, "Searching the horizon for signs of educational and institutional reform, administrators are often the first to introduce new campus-wide initiatives to the professoriate, who react with delight, resistance, apathy, or outrage to various proposals for change." Additionally, the interorganizational network does not appeal to

all faculty either for its learning value or for its time requirements.

Collaborations impact the students' emotions and have to be considered both as a piece in decision-making strategies and as a potential block to learning. On one hand, students are frequently moved by the agency's clients' needs and may commit to doing too much. On the other hand, they are also emotional about workload equity. Most want to provide professional deliverables to their agencies, but want the work spread equally among the teammates. Likewise, they want the workload in my classes to be closer to other communication classes. Even with my pre-class warning, a few still complain that most similar classes don't require this time-consuming activity. Lastly, interpersonal reactions, frequently triggered by misunderstood e-mail, generates another obstacle to learning. Students' e-journals have not disclosed whether students alter or refuse to alter their writing because of their emotions about one another, but one incident reminded me of this potential roadblock.

Significantly, these collaborations never rely solely on electronic communication—all classes have some in-class work, conferences with me, and a couple of site visitations as well as the synchronous and asynchronous writing. Technology, however, supports all of these relationships: I e-mail a Request For Proposal to our CBLC Director, who e-mails it to community agencies. Then I e-mail a response to the agencies' proposal, e-mail pre-class introductions, and later e-mail agency acceptances, rejections, and assessments. Students' electronically post their community interests and team skill sets before assembling teams. Later, they post the team's memo of understanding, progress memos, and agency deliverables to a Wiki or discussion board. All of these tasks contribute to the one-to-one relationship building that we strive for.

Assessment

The question of how to measure students' learning and the quality of agencies' completed deliverables weighs on me. I am continually refining metrics that more accurately reflect outcomes. Collaborating with the agencies and my colleagues helps me. I learn from their comments and models. One semester's blended class was floundering so I asked a colleague to facilitate a session of that class and a residential session. She led class discussions that clarified some of the causes for the blended class's unhappiness, and I was able to rectify the situation and improve future classes. Agencies provide a midproject focus group or conduct a survey to test a team's product and e-mail me a brief assessment at the end of the project.

Assessment must begin with students' self-assessment, so the writing classes are required to assess their writing, technology, and community experience in individual electronic journals, and then to compile a collaborative formal report which analyzes the process, based on the individuals' collective reflections of the process. Students examine what makes one document more effective than another, discuss writing options, offer reasons for change, and to apply it to their lives. As Amy Kenworthy-U'Ren notes, "one way of validating a real-world service-learning project is […] to challenge the students to think through how each topic applies to their continued experience" (2003). Additional smaller conceptual collaborative assignments, an internal memo, memo of understanding, and storyboard, also help to assess the learning. Students also assess themselves and one another on their teambuilding.

The classes' Wiki space and Blackboard's discussion board provide peer assessment opportunities as well as writing models. Students rank all teams' formal reports. They assess their peers' and their own contributions to the team at midterm and at the conclusion of the project.

Although the individual e-journal primarily provides the students with opportunity for personal writing reflection, it also fosters the notion of creating a professional portfolio for later assessment by graduate schools or prospective employers. A couple of students did re-organize their reflections and reported that their e-portfolio was praised by job recruiters. The e-journal, therefore, serves as an assessment repository for a writer's meta-cognitive comments, work-in-progress, and final pieces.

These personal e-journals and collaborative formal reports assess the writers' understanding, a practice that Peter Elbow (1994) recommends:

"The most important part of the portfolio is an essay that introduces, explores, and explains the pieces in the portfolio and talks about what the student has learned from these pieces of work. This self-reflexive writing provides a kind of meta-discourse that leads to new understanding and enriches fragile, incipient insights."

Electronic technology dramatically increases the metrics in all of my communication classes. I use personal response clickers prior, during, and at the end of the semester to gauge students' experience with not-for-profit agencies, teams, and technology. Students view these responses and have a more realistic understanding of their classmates' attitudes. Then I compare different semesters' responses to these pieces and have a growing qualitative narrative.

The initial PRS questions probe students' attitudes toward community-based learning, technological readiness, willingness to work with a team, and students' area of concentration. At midterm and at the collaboration's conclusion, PRS questions appraise students' learning and their view of the project's value. Simulating the residential classes' clicker use, Mediasite polls gauge the blended/online students' views. All of these responses provide the potential for faster response to students and a rich database for future longitudinal study. (Appendix A: prs 2006 and 2007 sample responses).

Bene.ts

Dynamism associated with the slinky toy's progress mirrors the reactions between agencies, student, faculty, and community of practice partners. Projects take on a life of their own particularly when technology provides the conduit for the rich learning process. Technology-enhanced collaborations more quickly and more thoroughly share knowledge. They also invite the students to jointly own the class. Consequently, students voluntarily send me links, recommendations, and introduce software even after the class is over.

Students and I share the responsibility for learning with the university's technology committees, community-based learning committees, library, and the external community. The user-generated content reaches expanded audiences including team members, other classes, agencies, Community Based Learning Collaborative Web site and network, academic conferences, and soon, a university in Africa.

Transactional activities and collaborative assessment contribute to transparency which in turn diminishes worry about grade fairness and decreases agencies' concern about the quality of the collaboration.

Happily, current enthusiastic students eclipse the early classes' resistance to community-based projects' extra time commitment. Nine years ago, many students argued for the inequity of work load compared with other advanced writing classes. As a result, now I lay-out the technology and collaborative requirements and require a completed questionnaire by blended students prior to class registration. Later, I e-mail registered students prior to the first class to describe the projects and technology and to encourage students to find alternate classes if they are uncomfortable with these learning procedures. More groups now become teams, building trust and effective

communication through their electronic tools which decrease the amount of time required for face-to-face meetings and their associated long L.A. drive times.

On another positive note, more students come to class comfortable with technology or with an eagerness to learn it. As Robertson (2006) observes: "Multitasking is a characteristic trait of the Net Generation, and many of today's college students are comfortable listening to a classroom lecture while using their laptop computers to simultaneously search for related information on the Internet." In a recent study, EDUCAUSE (2007) reports that 55.5 percent of the students claimed "technology's contribution to 'convenience' trumped that of technology's support for communication with classmates and instructors, managing course activities, or improving learning." Teammates quickly train one another on the technology. They like the fact that their postings can be rated and recorded by Blackboard, resulting in quantitative data for class participation assessment. Students also appreciate learning when and how to use professional social software and electronic networks: peer-to-peer chat rooms, IM, e-mail, Google, Ichat, discussion boards, and blogs.

f utur E t r Ends

The trend toward globalization should compel universities to move beyond their locale, to immerse students in multiple cultures, and to train them in the virtual communication skills necessary to collaborate. Extending the current fine local partnerships will enrich students' learning and contribute to the world's sustainability. Other countries are certainly propelling university and workplace collaborations and relying on electronic technology to support their efforts. Luke Collins (2006) reports that European universities and publicly funded research organizations are receiving new tools to improve their ability to collaborate with industrial partners by means of the United Kingdom's Lambert Agreements.

To compete in this process, universities need more data which assesses students' undergraduate learning as it relates to technology and to collaboration. Alumni and student surveys would contribute to a more thorough evaluation of the cultural and career preparedness that current and previous students believe that they receive. Academia must also encourage and support faculty innovation that empowers students to better participate in the 21st century's technology and global demand.

My classes will continue to expand the creation of online content and delivery with an increased focus on collaborative communication. We are adding pictures and individual's interests to our discussion board or chat rooms so that community partners and peers can feel more comfortable with one another because studies indicate that "recognition and identification encourage participation" (Tarmizi, 2007). We are creating more Wiki, blogs, and other social networks that encourage a participatory student rather than a more passive student who may or may not absorb the traditional information dissemination. We are examining collaborative information "mashups" where pieces from different sources are decoupaged upon one another. We will look at the example of the housingmaps.com site which mashes the listing of apartments for rent on Craigslist onto a Google map of each city to see if we can apply these tools to our collaborations. Finally, examining sites like TakingITGlobal.org will encourage university students to participate in global engagement.

My current classes are preparing for a video conference with a Mozambique university with which they will partner. As we plan for this video conference and for future virtual collaboration, we are reminded by Tran and Latapie (2006) that we will need to bring in experts to train us on cross-cultural awareness.

Examining the impact of the technology on the collaboration will add educational value. Melinda Turnley (2007) argues that students' "critical reflection on technology is a constructive extension of the benefits attributed to service learning: writing for real audiences, engaging larger cultural contexts, and developing experience in analyzing and engaging with workplace environments." The EDUCAUSE report (2007) reminds us that "the push-pull effect of simultaneously untethering students and linking them together lies at the heart of the emerging Web 2.0 paradigm, which stresses complex personal interactions, collaboration, dynamic rather than static information, and immersive environments," creating powerful outcomes.

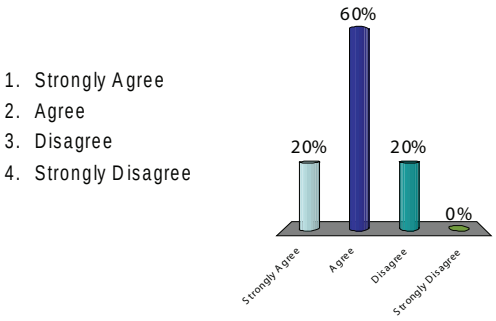
conclusion

When someone asks me if these collaborations and computer experiences improve student learning and modify my teaching practice, I answer "yes." Seeking to reduce my blended students' potential isolation caused me to increase students' input, and subsequently to revise some of my pedagogical tactics, an improvement for all students. Now, I not only have more contact with students but also more with university colleagues. Relationships revolving around technology and community-based projects fuel my professional development and improve students' learning.

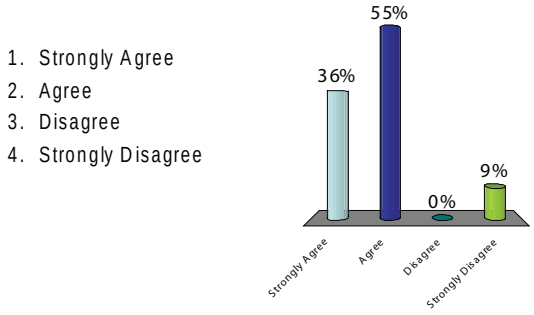
Engaging in technology-enhanced community-based collaboration provides everyone involved with paths towards lifelong learning. They prepare universities and communities for 21st century global partnerships and leverage learning for all constituents.

Personal Response Clickers Assessment 2006

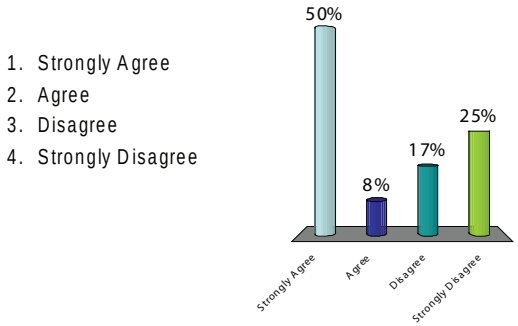
Collaborative writing has improved my writing



The class has taught me more about corporate social responsibility

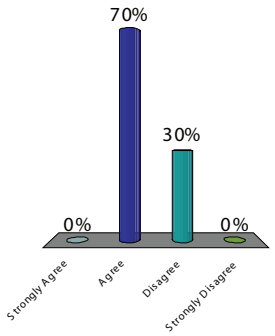


The conferences help my writing



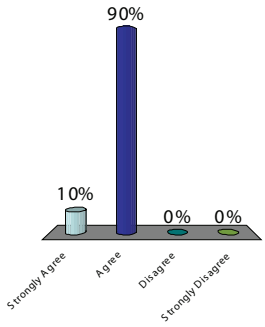
The discussion board and e-collaboration help my writing

1. Strongly Agree
2. Agree
3. Disagree
4. Strongly Disagree



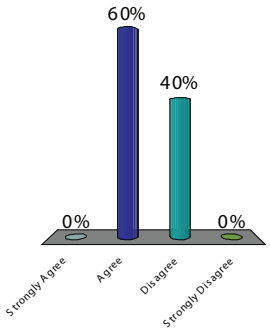
The conferences help my writing

1. Strongly Agree
2. Agree
3. Disagree
4. Strongly Disagree



Reflecting in my personal wiki helps my writing process and product

1. Strongly Agree
2. Agree
3. Disagree
4. Strongly Disagree



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kEy tErms

Computer Literacy: Ability to transmit, investigate, share and create knowledge, and critically reason with a computer.

Communication Networks: Groups who regularly share communication virtually or face-to-face often, but not necessarily, initiated informally.

Community of Practice (COP): Group of people sharing a mission, may be initiated by volunteers or by an organization.

External Collaboration: Between students, the University, and the community extending beyond the university.

Internal Collaboration: Within classrooms, between students within a classroom, and across class sections.

Interorganizational Network: Links between organizations that exist after one team or agency's original collaborative project.

Participation: Practice that engages multiple voices in information-sharing and decision-making.

Professional Assessment: Comments, recommendations, and challenges provided by not-for-profit or for-profit partners and judges.

Social Computing: "A social structure in which technology puts power in communities, not institutions" (Forrester 2).

Social Software: Web-based software that enables to users to establish communities.

Virtual Teams: Teams brought together through technological teams, thus providing communication in different times and places.

Wiki: Collaborative Web site. USC uses Confluence software to provide collaborative sites.

Chapter X
Creating Synergy for Inter-Cultural Learning

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abstract

Internationally distributed teams (IDTs) face challenges related to the team members' diversity and geographic dispersion. However, research on IDTs has yet to explore the joint effects of diversity and dispersion on team processes and performance, as well as the role that cultural norms play in IDT effectiveness. Reporting findings from an 11-week e-mail exchange between American and Finnish business students, the current chapter focuses on how and why cultural communication and coordination norms affect IDT team processes and performance. The data shows that differences in cultural norms were amplified by differences in the local context of IDT members and that successful IDTs also created group norms that helped them manage their cultural diversity and geographic dispersion. Given the teachers' discovery of how they had unintentionally reinforced cultural communication and coordination norms, the authors make explicit how cultural norms unexpectedly influence leadership strategies and learning experiences in positive and negative ways.

cr Eating syn Ergy for int Ercul tural l Earning

Internationally distributed teams (IDTs) consist of team members who are located in different countries and locations around the globe, and who have different cultural backgrounds. In the past decades, international organizations have increasingly used these teams to tap into a larger pool of human and technological resources. On the other hand, previous research on this relatively new form of teamwork has shown that IDTs face

challenges to their productivity and efficiency that are due both to the team members' diversity and geographic dispersion. Most of this research focuses on the effect of one or the other characteristic of IDTs on team performance. Research on IDTs, however, that addresses both the effects of multicultural background and geographic distribution and their interaction on team processes and performance is rare.

The purpose of the current chapter is to explore the specific challenges due to both characteristics and their interaction for communication and coordination behaviors in IDTs. Furthermore, we explore the creation of specific group norms that might help manage these challenges. Using data from an international classroom collaboration between senior undergraduate students in Finland and the USA, we combine different bodies of literature and different approaches to teaching and research to examine the dynamic influence of cultural norms and group norms on interactions between the team members of these IDTs. Moreover, we introduce a unique pedagogical approach to facilitate the team members' cross-cultural understanding of communication and coordination, which are both part of a successful collaboration.

c ommon cH all Eng Es t o idt f unctioning

Some of the most important challenges to team functioning in IDTs relate to communication and coordination among IDT members. Challenges with regard to coordination patterns include (1) frequent breakdowns in communication media such as e-mail and phone (e.g., Hart & McLeod, 2003; Hinds & Bailey, 2003; Hinds & Mortensen, 2005), (2) failure to share sufficient contextual information among team members to ensure successful collaboration (Cramton, 2001, 2002), (3) attributions of failure to communicate and collaborate to other team members rather than to situational factors (Cramton, Orvis, & Wilson, 2007), and (4) delayed detection of these issues (Mark, 2002).

Challenges to communication patterns in IDTs include (1) lack of contextual knowledge and cues, information sharing, and inclusive communication, which ultimately results in a lack of shared understanding among team members (Cramton, 2001, 2002), (2) repeated misunderstandings among team members and misinterpretations of information which leads to frustration, to a loss of trust, and to conflict among the team members (e.g., Hinds & Bailey, 2003; Jarvenpaa & Leidner, 1999), and (3) ambiguity of the meaning of silence which often leads to a breakdown of communication between team members (Cramton 2001, 2002).

Interestingly, research on communication and coordination challenges in IDTs so far has not combined the effects of team members' multicultural background and their geographic dispersion on team processes. While coordination challenges have been researched separately in a multicultural context (e.g., Brislin & Kim, 2003) and in a geographically dispersed context (e.g., Montoya-Weiss, Massey, & Song, 2001), it has overlooked how differences in cultural coordination norms affect the way team members interact across distance. Likewise, research on communication challenges has mainly focused on the problems related to company communication via technology (i.e., e-mail, chat, phone, videoconferencing, etc.; e.g., Cramton 2001, 2002), and has not yet explored the role and effect of different cultural communication norms on communication across distance.

There is evidently a significant lack of research on the actual processes that lead from differences in cultural norms and factors of geographic distribution to actual teamwork outcomes such as team performance or satisfaction with the team (Montoya-Weiss et al., 2001). In addition, to our

knowledge, there is no research that looks at the interactive effects between cultural communication and coordination norms.

importanc E of norms for tE am proc Ess Es

Early research on norms has shown that norms have a strong influence on coordination and effectiveness of teamwork (e.g., Argote, 1989; Schachter, 1951) as well as for other team processes like managing conflict (e.g., Amason & Sapienza, 1997; Marks, Mathieu, & Zaccaro, 2001) or helping behaviors (e.g., Ehrhardt & Naumann, 2004). As Feldman (1984) explains, some of the important functions of group norms are to define appropriate behaviors, to set rules for collaboration, and to avoid mistakes that might be detrimental for group performance and/or the group's survival over time. These aspects of norms are vital for coordination and communication in teams.

Almost exclusively, however, norms research has been conducted in traditional teams, meaning collocated teams with a culturally homogenous background. There is some research on norm creation and maintenance in distributed teams (e.g., Graham, 2003; Postmes, Spears, & Lea, 2000), and there is some research on the usefulness of norms in multicultural teams (e.g., Earley & Mosakowski, 2000). We know almost nothing about the influence of norms on team processes in IDTs and even less about how cultural coordination and communication norms influence team processes.

An exception is Malhotra and Majchrzak's (2004) paper on communication norms which uses a mixed design study (observational case analysis, interviews, and surveys) to identify and define communication norms that are often used in the context of IDTs. Although their methodological approach offers a point of departure, it does not fully capture the dynamic nature of norms or explain how norms influence other team processes such as coordination, conflict management, motivation, group cohesion, or group efficacy. One reason for this is that in their analysis they focused only on previously successful teams that already had norms in place. Furthermore, they did not include differences in team members' cultural background in their assessment. In the following, we will highlight the importance of studying cultural norms for communication and coordination for understanding team dynamics in IDTs.

cul tural norms

Team members from the same culture are often unaware of their taken-for-granted cultural norms. Cultural norms can be defined as collective expectations of appropriate behavior in a specific context. They are part of the concept of culture, which can be defined as acquired knowledge that is used to interpret experiences and generate social behavior. Individuals from the same culture often focus on individual differences until they become aware of their shared cultural norms that are different from those of the cultural strangers on their international team. This lack of awareness of one's own cultural norms can hinder team processes. Awareness of one's own cultural norms as well as of the other's cultural norms only comes when there is organizational support and supportive guidance to make them explicit (Bennett, 1993; Berry, 2006; Berry, Carbaugh, & Nurmikari-Berry, 2004).

Our concept of cultural communication norms is influenced by Dell Hymes's (1979) concept of communication competence within a speech community. According to Dell Hymes (1972a, 1972b, 1996), communication competence is expressed in local ways of living and communicating and can be described as the ability of doing what is appropriate and feasible in a speech community. Dell Hymes's concept involves four sectors of competence:

Whether and to what degree something is formally possible; whether and to what degree something is feasible given the means of communication available; whether and to what degree something is appropriate (adequate, happy, successful) in relation to a context in which it is used and evaluated; and whether and to what degree something is in fact done, actually performed and what its doing entails (Hymes, 1979, p. 281*).*

This does not suggest that all of these dimensions were made explicit to students or were produced in the student data. Future analysis of the students' speech will, however, provide interesting examples of the extent to which successful teams focused on explaining or adjusting to any of the four sectors of communication competence and the extent to which the teachers became more aware of that relationship during the communication process.

Based on this definition of communication competence, our conceptualization of communication norms differs from the conceptualization in Malhotra and Majchrzak's (2004) paper on communication norms in geographically dispersed, cross-functional teams. Malhotra and Majchrzak's definition of norms is based on Krauss and Fussell's (1990, as cited in Malhotra & Majchrzak, 2004) definition of shared understanding, which according to the authors is a "set of norms, behaviors, and understanding team members have about the assumptions, task, work processes and contexts necessary for effective and successful collaboration." This definition shares common characteristics with Dell Hymes's definition of communication competence; however, it does not clearly distinguish between norms (what is appropriate) and behaviors (what is, in fact, performed). Accordingly, it also remains unclear in Malhotra and Majchrzak's article whether they measured norms or behaviors that were frequently displayed.

Being that behaviors are not only influenced by norms but also by contextual factors in the situation, it is important to distinguish between actual behaviors and norms. According to Feldman (1984), "group norms are the informal rules that groups adopt to regulate and regularize group members' behavior." Thus, norms can be interpreted as shared perceptions and expectations of appropriate behavior that elicit a pattern of behaviors which is reinforced if it meets the expectations and reprimanded if it deviates from them. It is unclear, however, whether the behaviors Malhotra and Majchrzak collected in their observations and surveys were based on shared expectations among group members and whether following these expectations was enforced.

In addition, it seems as if the authors only measured norms at the group level, and not at the personal, organizational, or societal level. We agree that group norms are important factors of group performance. However, norms on the group level are influenced by norms at the personal, organizational, and societal level. Although Malhotra and Majchrzak describe their teams to be *global*, far-flung (virtual, cross-functional) teams, they did not include specific reference to cultural communication norms (i.e., societal-level norms) in their article. Furthermore, they did not describe organizational norms of the companies in which they collected their data. We believe that there is great benefit in distinguishing between norms at multiple levels of analysis to really understand how norms affect group dynamics in an international context. Our chapter offers an example of how group, organizational, and cultural communication and coordination norms can influence the practices and behaviors that exist in an internationally distributed environment. Future analyses of our data will also include personal norms.

using norms to manag E cH all Eng Es of idt s

To deal with communication and coordination challenges, IDT researchers often recommend

an initial face-to-face meeting among all team members to build initial relationships, trust, and norms for collaboration (e.g., Armstrong & Cole, 1995; Hackman & Morris, 1975; Zaccaro, Ardison, & Orvis, 2004). While some researchers suggest a somewhat informal meeting to get to know each other and to exchange personal information, other researchers suggest that specific tasks be assigned so that the team members can test their collaboration. For example, Hackman and Morris (1975) suggest that the initial task should be similar to the actual project that team members will be working on. This approach can help them develop a routine for collaboration before the actual start of the project. This cuts down on project losses due to miscommunication and a lack of coordination. Furthermore, the team members can build an understanding of each other's roles and can build cohesion and commitment to the team's task.

While task performance certainly is an important aspect of collaboration success, culturally based norms often receive insufficient attention in team development. Rather than working on a project-related task or to just engage in socializing, we believe that it is of utmost importance for culturally diverse, distributed teams to engage in preparatory activities that help them explore cultural differences and understand their possible meanings during their future collaboration. Activities that highlight different frames of reference, different communication and coordination norms, different interpretations of English words (given that English is the common business language), and different organizational procedures create a deeper understanding of remote team members' ways of communicating and working. When intercultural teams are internationally distributed, these activities become even more useful for improving competence to discover, interpret and communicate while working on joint projects.

dEsign of pEdagogical approac H

To facilitate intercultural learning and understanding, the two authors of the current study organized an 11-week international collaboration between their respective classes in Finland and the USA. American students were enrolled in a cross-cultural and global management class; Finnish students were enrolled in an American culture class focusing on intercultural communication with Americans. We built seven teams with 3–4 American and 3–4 Finnish students in each. A detailed description of team member characteristics related to team members' cultural background and their geographic dispersion follows below.

In their respective classes, students participated in in-class exercises designed to challenge the students' cultural assumptions and to contribute to making explicit the taken-for-granted things in one's own culture. This helps the students understand their own cultural ways and makes it possible for them to explain their ways to their international colleagues. Students were asked to send a summary of their discoveries via e-mail to their international colleagues after each class session. In addition, students were required to ask questions related to the summaries their international colleagues had sent and to engage in a discussion about cultural differences and their implications. In the next class session, the teachers would then bring example e-mails from the online discussion to class to explore and interpret cultural differences that had been mentioned. Students were also encouraged to use voice over IP (VoIP) and chat to talk to their international colleagues during the week.

Our pedagogical approach and current analysis of data produced by Finnish/American student teams emphasizes the importance of

direct experiences and subsequent reflection on cultural insights gained from these exercises. The international distributed teams' tasks are to prepare team members to be able to work on the other side of the Atlantic as well as together on an international team. In our pedagogical approach, students use each other as experts on their respective culture and explain cultural ways to their student colleagues as well as to their teachers. The teachers, on the other hand, monitor the students' learning progress and coach the students from the sidelines. Being socially acceptable in one's own culture does not necessarily mean that one can explain taken-for-granted things to strangers. Therefore, discovery of self as, for example, a person, a professional, and a cultural being requires interaction with strangers and side-line support from the observant-participant ethnographic monitor.

This approach benefits from an extensive analysis of Finnish and American ways of living and communicating, which is based on more than a decade of (1) pedagogical exchanges between Finnish and American students (Berry et al., 2004; Berry et al., 2006; Carbaugh, 2005; Carbaugh & Berry, 2001; Carbaugh, Berry, & Nurmikari-Berry, 2006) and (2) turning local and exchange students into learner-teachers of each other in face-to-face courses in Finland and Austria (Auer-Rizzi & Berry, 2000; Berry, 2002; Berry & Inreiter-Moser, 2002; Reber & Berry, 1999). The basis for the exercises were taken from these courses and integrated into surveys related to internationally distributed teams and the challenges they face (e.g., Cramton, 2001, 2002; Hinds & Bailey, 2003; Hinds & Mortensen, 2005; Jarvenpaa & Leidner, 1999; Montoya-Weiss et al., 2001).

By using this approach, students begin to transcend their own cultural norms and academic context and actively explore a different cultural system of thinking, communicating, working, and living. In collaboration with each other and with the teachers, they developed a competence for discovering, interpreting, and communicating cultural meanings, which helped them to engage in an active cross-cultural exchange. Together they created a learning atmosphere that went beyond the usual classroom experiences and that enabled them to develop helpful skills for their future in a diverse, global workforce.

cont Ext of gEograp Hic disp Ersion

Having just described our pedagogical approach, this next part will provide information about the geographically-distributed context in which the teams operated. The section highlights the most important challenges that team members faced during the collaboration. Specific attention will be given to differences in the academic and general context in which the students took their classes.

Challenges Related to Time Zone Differences

The distributed nature of the teams was such that there was a seven-hour time zone difference. On top of that, the class at the American university and the class at the Finnish university were only twelve hours apart. This meant that students on the American side (who had class around 4 pm on Tuesday) had to send e-mail to their Finnish colleagues (who had class around 2 pm on Wednesday) right after they got out of class, so that the Finns were able to read them before class and so that the Finnish course instructor would have time to make printouts of example e-mails for discussion. That left American students only with a couple of hours to e-mail their insights from the course to their Finnish colleagues. Most of them got out of the class at 7 pm, after which they had to get home, have dinner and write e-mail. Some students had another class after our class and did not get home before 11 pm at night.

Also, if there were any necessary last-minute adaptations of the in-class exercises, they had to be done in this 12-hour window. For the instructors, this often meant staying up very late (until 1 or 2 am on the Finnish side) or getting up very early (around 5 am on the American side) to be able to talk to each other via VoIP.

Challenges Related to Different Contexts

It was very common for American students to work part-time or full-time during the semester. The American students felt that they had substantially less time to spend on e-mails and conversations than their Finnish colleagues, even if the Finns had less time than the Americans believed they had. They felt more of a dual stretch in regard to their class responsibilities. Due to work schedules and the 7-hour time difference, students often found it difficult to schedule a time for real-time VoIP conversations or chat. Also, depending on holidays, exam breaks and other events, e-mails were sometimes sent infrequently and inconsistently.

Furthermore, some students did not have a computer at home and could not come to campus during the times their international colleagues were online. Some students also did not have headsets or microphones to use VoIP. All of these factors made "direct" contact between students (i.e., communicating with each other at the same time via VoIP or chat) very difficult, which deprived some students of this part of the intercultural experience.

In addition to these challenges of differences in general context, student teams also experienced challenges of differences in their academic context. In their classes, the teachers emphasized different parts of the e-mail exchange as being important, which was in part due to the class schedule as described above and in part due to the dominant cultural norms in each location. The teacher on the American side emphasized sending e-mail out right after class more than the content of the e-mail. The teacher on the Finnish side emphasized the importance of explaining aspects of Finnish culture that might be difficult for American students to understand more than sending the e-mail out quickly. In addition, the teacher on the American side often reminded students to complete the work. The teacher on the Finnish side did not do that with the Finnish students as this would have interfered with Finnish cultural norms for autonomy and time for deep reflection about things that are taken-for-granted in the Finnish way of life.

The administrative side of this collaboration was very different too. The course in the U.S. had very bureaucratic guidelines that affected the pace and quality of the collaboration: for example, students were allowed to register for the course up to three weeks into the semester and attendance could not be required. Until then, they had missed a substantial amount of the ground-laying conversations about cultural values, cross-cultural stereotypes, ways of living, and other things.

On the Finnish side the course instructor screened all students concerning their commitment to the online collaboration before the course started. Only students who committed to put in the necessary effort for the collaboration were allowed to enroll in the class. This was not possible on the American side as the instructor had almost no discretion about who enrolled in the class and who didn't. Although the American instructor sent the syllabus out before the class started and emphasized the amount of out-of-class work that would be expected from the students, there was no control over student enrollment and subsequently student commitment. Furthermore, at any point in time, the Finnish instructor was able to exclude students from class if they failed to participate in the collaboration. Again, this was not possible on the American side.

Another example, the syllabus in the U.S. needed to be relatively specific in terms of class topic, grading requirements, and so on, which

left little room for flexibility. On the Finnish side, the teacher could make decisions about class attendance requirements and define the course as an open ethnographic discovery process to become aware of one's own culture, to explain to others and to find ways to create a successful American-Finnish team. The Finnish course was based 100% on the collaboration, which meant that they could not consider it one part of their course, as was the case for the American students whose course also included other topics in the field of international management and business. On the American side the collaboration represented 60% of the entire course, which had positive and negative sides: more international management frames of reference and more time for in-class discussions but, for some students, less interest in the e-mail collaboration when thinking of their final grade.

findings

The findings that will be presented here are based on qualitative data that was produced by the seven American/Finnish student teams during the 11-week online collaboration. Our longitudinal observation of the student teams together with the targeted use of surveys and questionnaires allowed us to explore how norms were created and enforced. Furthermore, it allowed us to observe how the influence of cultural norms and group norms changed over time.

Cultural Communication Norms

As was mentioned earlier, cultural communication norms are deeply embedded in one's own cultural norms and often taken-for-granted as feasible and appropriate. Cultural differences, which are often hidden on both sides, can hinder intercultural exchange and negatively impact on international experiences. Examples of hindering communication norms in an American-Finnish context include the role of "small talk," "stating the obvious," "think before you talk," and "the quality and meaningfulness of the message."

Americans view small talk as a polite form to entertain others. Silence in the presence of others feels uncomfortable. Finns on the other hand are very comfortable with silence because this often means that the other person is thinking about something and needs some privacy to focus his/her thoughts. Respecting each other's privacy is polite and respectful in Finland. Therefore, small talk is minimized to avoid intruding on somebody's privacy. In multicultural teams, these fundamental differences in preferences can quickly lead to the perception that other team members are impolite and do not really want to communicate "properly."

In Finland, discussing the obvious is considered a waste of time because it is only discussing something that everybody else already knew. Finns are very conscious of how others perceive them. Stating something that is obvious likely means that others think one has nothing interesting to say and that one is not very intelligent or knowledgeable. In the U.S., stating the obvious is sometimes seen as necessary to bring everybody on the same page. With the great diversity between people, Americans often feel that they can't make assumptions about anything. In American/Finnish teams, these norms could quickly lead the Finns to believe that the Americans do not invest a lot of thought in their contributions and are therefore not committed. On the other hand, Americans might perceive that Finns are not committed because they do not communicate everything they know.

Related to the point that was just raised, it is very important in Finland to think before one talks. Many Finns spend a long time (according to American norms) thinking before they say something to avoid being judged as careless or insincere. On the other hand, Americans often think while they are talking to somebody else. They actively explore their standpoints in discussion with others. Being in thought for a long time (according to American norms) can be interpreted

in a negative way, such as keeping to oneself, not sharing information, and so on.

Sending a meaningful message by thinking before writing influenced Finnish students' e-mail. They faced the challenge of explaining Finnish ways of living and communicating to Americans who were "uncomfortable with silence" and of being on the defensive about American interpretations of Finnish culture. Using English as the language for communication required a lot of time for reviewing and rewriting their e-mails as they tried to express what they really meant.

Americans favored quickly jotting down something to get a conversation going. Topics would then be explored during the conversation, but it was important that the "ball gets rolling." Finns often perceive this as an insincere effort that is hardly worth reading and feel that they produce higher quality work than the Americans. The Americans on the other side feel that the Finns do not answer their e-mails in a timely manner and must therefore not really be interested in an exchange. They also criticized the length of the e-mail that was sent by the Finns later during the week. The Finnish effort to explain their comfort with quietness to those uncomfortable with silence was often interpreted by the American students as an offer of too many topics to discuss at the same time.

Using English as "Common" Language

The role of "false friends" can unexpectedly complicate the understanding of communication norms on both sides of the Atlantic. A "false friend" is a word or phrase a speaker believes carries a universal meaning, but the cultural other(s) interprets it differently when using English as a shared international language (Berry et al., 2004, 2006). The same lexical terms act as invisible cultural terms with cultural actors interpreting the same words from their taken-for-granted cultural frames of reference.

For example, there is a cultural confrontation between the American's discomfort with silence and Finnish comfort with quietness. Examples of "false friends" related to this confrontation are the words "shy" and "silent/quiet."

"Shy" has a negative connotation in American English. It often means that a person lacks social competence and contact. When Finns use the word "shy" they don't mean it in the "American" sense. Finns mean that they like their privacy and honor other people's privacy. Unless both people have given signs, verbal or nonverbal, that they would like to engage in a conversation, they would want to respect the privacy of the other person.

Similarly, "silent" has a negative connotation in English. "Silent" can mean that somebody consciously avoids conversation. "Silent" is almost passive-aggressive. However, when Finns use the word "silent," they actually mean "quiet" most of the time. They prefer not to say anything over talking just to be talking, and they make no more choice to be quiet than Americans make to talk. They feel comfortable to talk when they have something meaningful to say and they feel comfortable being quiet when they don't. In previous articles Berry et al. (2004, 2006, 2007) and Carbaugh et al. (2006) have highlighted how Finnish comfortableness with quietude can be unsettling to Americans who might misinterpret the quietude as being socially disconnected, in a bad mood, or maybe being dissatisfied with one's communication partner. It can be easily seen how the intersection of these cultural habits can create mutual misunderstanding which can undermine international team cooperation.

During the e-mail exchange Finns quickly realized that words like "shy" and "silent" did not send Finnish cultural meanings to Americans and began to wonder what other words might be a problem when communicating in English with the Americans. Berry and colleagues (Berry et al., 2004, 2006; Carbaugh et al., 2006) noted that Finns discover these differences in cultural meaning when they move back and forth between

English and Finnish during the collaboration. In their most recent book, Berry, Carbaugh, Inreiter-Moser, Nurmikari-Berry, and Oetsch (in press) describe that Finns:

... discover culturally rich/dense terms and phrases such as 'kommunikoida ilman sanoja'; 'harkita', 'mietiskellä' and 'olla omissa oloissaan', which translate as: communicating without words; thinking, reflecting, pondering before acting or using words in important situations, and being in one's own thoughts and/or respecting the privacy of others, even on occasions when surrounded by others (p. 45).

That meant even more pressure when writing e-mail. The failure of the native speakers of English on the American side to understand the role of false friends required even more time when the Finns wrote their e-mail.

Berry's research demonstrates that it is easier for nonnative than native speakers of English to discover the role of false friends because they can be encouraged to move back and forth between English and their mother tongue. The nonnative speakers of English on the American side understood this but had difficulty explaining it to the native speakers.

Cultural Coordination Norms

Similar to communication norms, coordination norms are also implicit until awareness comes through active, explicit exploration of cultural differences. Different coordination norms can undermine teamwork when team members fail to find time to talk with each other or send each other important pieces of information. The most influential cultural coordination norms for Finnish/American teams that emerged from the data were different preferences for autonomy. As will be presented below, following one's own cultural preferences for coordination can offset other team members who interpret one's behavior according to their own cultural coordination norms.

Members of both cultures value autonomy. However, the specific meaning of autonomy differs (another example for a "false friend"). In both cultures, the boss assigns the task and makes the final decision when a project is finished. However, Americans perceive the role of their teacher to be an *Active Pep-Coach*. For American students the leader's responsibility is to define and assign the task and then to monitor the progress by keeping subordinates on track with active pep-coaching. This means that it is the teacher's/leader's responsibility to identify challenges and suggest appropriate solutions for these challenges or conflicts to prevent derailment.

The Finnish students, on the other hand, prefer a form of *Coordinated Autonomy*. For the Finnish students, the leader's responsibility is to define and assign a task with autonomous responsibility. There should be some interaction between the coordinating boss and the subordinate, but it is the subordinate's responsibility to contact the boss if something unexpected comes up. If the teacher/leader were to take an American approach (i.e., constantly checking in to see whether or not the student was on track), the Finnish students could perceive this as micromanaging, as a sign of distrust, and as an intrusion on their privacy.

As can be seen from these examples, team members of both cultures value autonomy; but the actual behavioral preferences are quite different and could have serious implications for intra-team conflict. More specifically, *students on both sides* considered autonomy important but the role of autonomy was assumed to be different on both sides. In addition, communication norms were different on both sides. In the text below, we will introduce how both of these norms can reinforce each other during teamwork in an international context.

The Interaction Between Communication and Coordination Norms

As described above, cultural communication and coordination norms can hinder successful collaboration in an American/Finnish team. Moreover, the interaction between both of them can be especially problematic for effective teamwork as well as for the cultural discovery process. These kinds of interactions can easily go undetected, even if the team leaders as well as the team members pay special attention to the team processes and constantly reflect about their actions. However, the more the attention and reflection, the more the awareness of what is actually happening.

In our collaboration, everybody agreed to "communicate," but not how. Also, everybody agreed to "coordinate," but not how. The instructor on the Finnish side set the norm to write at least one page reflecting on Finnish cultural values and describing Finnish ways to American students. A response to the American students' e-mails was expected to be sent as soon as possible that week, but no specific due date was given. These norms reinforced the Finnish cultural preference for taking into account the big picture, long-term planning, and the quality of the product (especially with English as second language). It reinforced their natural cultural tendency to think long and hard before putting something out, especially when describing cultural values is such a complicated issue. The instructor on the Finnish side wanted them to reflect about their cultural taken-for-granted and to successfully communicate difficult messages to the American students. This could only be done by respecting their need to work according to their autonomous time schedules.

The instructor on the American side set the norm to send e-mail at night right after class with the Finnish class being held only a few hours after the American class. It was important that the Finns had something to talk about in their class. However, the length and detail of the e-mail was not specified. Oftentimes, students were encouraged to split the work so that each one sent insights related to parts of the in-class exercise only. This was done to respect that some of the American students did not get home before 11 pm, when they still had to send their e-mail. American students assumed that they would continue to chat for the rest of the week, so they did not have to put their final best effort into the first e-mail. This mirrors the American "thinking on your feet" approach in contrast to the Finnish "think before you speak" approach. American cultural preferences for communication and coordination were enforced and heightened the cultural differences within the team. Furthermore, the instructor on the American side sent frequent reminder e-mails during each week to remind students to send their e-mails and to engage them to participate in the discussions. This reflects the American preference for a pep-coach.

Thus, cultural autonomy and communication norms, which were reinforcing each other, were also reinforced by the teachers. As a point of departure the American instructor wanted to get chatting going, which would hopefully lead to successful interaction, and the Finnish instructor wanted to have complicated cultural misunderstanding explained, which would hopefully form a basis for successful interaction. The American instructor intervened to support more activity, and the Finnish instructor provided time for dealing with complex issues, just as he had done in previous collaborations during the past decade. These two norms reinforced each other in a negative way because the American students rarely got quick, short responses to their questions about why the Finns have shy, silent , etc. problems, and the Finns didn't get very many in-depth responses to their explanations or to their deeper questions about American taken-for-granted cultural meanings.

Interestingly, students on both sides thought that teachers should have set even more norms. American students felt that norms from the teacher

would increase activity and improve the quality of communication among the team members. Finnish students similarly felt that norms from the teacher could increase activity, but that more norms would not necessarily increase the meaning of the messages sent or the quality of the communication. Finnish students felt that only norms created by the students themselves would foster a more meaningful exchange.

In the following, we will explore the beneficial effects that group communication and coordination norms within the student teams had on teamwork. As was indicated earlier, we expected that group norms would be able to counteract some of the hindering effects of cultural norms that were described above.

Group Communication and Coordination Norms

In many cases, beneficial group norms were indeed able to balance the hindering effects of cultural communication and coordination norms. Successful groups created shared norms dealing with cultural differences in communication and coordination. In other cases, detrimental group norms for communication and coordination even reinforced the hindering effect that cultural norms had.

Beneficial Communication Norms

Beneficial norms that balanced the hindering effects of cultural communication norms included "sharing information," "sharing of context," "sharing of personal information," and "openness and mutuality." For example, some group members made a conscious effort of sharing information. They put in extra detail into their explanations, they went to great lengths to communicate differences in their culture, such as providing internet movie clips or newspaper articles. They also engaged in a lot of VoIP conversations to extend their e-mail discussions, consciously questioned a lot of their assumptions and made many cultural norms explicit.

Some team members shared important context information with their team members, for example, when they were not available, whether or not they had access to the required technology, whether or not they were working, holidays, life at their universities, and many other things. Some members of successful groups shared pictures of their group members, of their homes, their home town, short video clips about life in their home town or university town, what they do for fun, and similar things.

Furthermore, members of successful groups were open to each other's comments. Even though they discussed quite a few culturally touchy topics such as politics or religion, they tried to stay factual. In addition, although humor can generally be a sensitive topic, successful teams found a common basis for humor and used it frequently. Also, these members were not hesitant to ask for clarification if they thought that they didn't understand something.

Beneficial Coordination Norms

Beneficial group coordination norms that balanced the hindering effects of cultural coordination norms were related to "sending e-mail in a timely fashion," "finding a balance between length and detail of content," and the display of 'commitment to the group." For example, timeliness of sending e-mail had a big effect in successful groups as well as in unsuccessful groups. Most unsuccessful groups complained that students on the other side would not get back to them in a timely manner and attributed that they were not interested and committed. Teams that were successful tried their best to send e-mails regularly and with enough depth to keep the conversation going.

E-mails from team members of successful teams also tended to be more detailed and were sent more frequently. Both sides adapted to each other's style and increased rather than decreased

communication. Team members kept each other aware of their timing issues and reminded each other of exam breaks, holidays, vacations, and so on. In addition, if a team member could not e-mail during a certain week, fellow team members on successful teams usually compensated for it.

Teams that felt that their international partners were as committed as themselves were more willing to schedule and coordinate their direct personal contacts via VoIP. They were also more willing to go out of their way to find times to communicate (e.g., being available early in the morning/late at night or being available on the weekend/during holidays).

discussion

As was shown above, cultural communication and coordination norms can hinder effective collaboration in internationally distributed teams. This is especially true for teams in which implicit cultural assumptions as well as cultural frames of reference of team members are never explicitly explored. Making these assumptions explicit is the first step on the way of becoming aware of one's own cultural programming, as well as of the cultural programming of others with whom one works.

In addition to the positive outcomes of this collaboration such as cultural awareness and sensitivity, cross-cultural knowledge and techniques for intercultural learning, we also highlighted challenges to student and teacher learning. We demonstrated how the teachers were initially unaware of how they reinforced local communication and coordination norms by creating norms for their respective class that were based on their respective cultural context. In some cases, this reinforced rather than minimized cultural differences.

The teacher norms were not created out of negligence, but rather teachers operated within their own pedagogical, organizational, and cultural context. Both teachers wanted to optimally motivate their students to engage in the collaboration and unconsciously reinforced the cultural norms they were trying to explore and explain.

The Finnish instructor's reinforcement of autonomy was also influenced by an ethnographic discovery process that he had been coaching his students through during the past decade. Time to reflect when becoming aware of cultural taken-for-granted comfort with quietness and trying to use English in a way that sent a comfortable with quietness message to Americans uncomfortable with silence has been an essential part of his pedagogical approach.

This discovery on the teachers' part has become interesting because the teacher at the American university came from Germany (five years ago) and the teacher at the Finnish university came from the United States (30 years ago). This suggests that a similar challenge might be rather common in organizational contexts. Regardless of cultural roots, the leader on one side of the team might lead his/her team according to the local organizational and cultural norms, while the leader on the other side of the team does the same. Leaders can have extensive international experience but adjustment to the local environment, which is often imposed by organizational contexts, can overshadow their ability to realize when they are interfering with creation of international teams. Reference to "interfering" here does not mean team building was unsuccessful. It only makes explicit how easily leaders with international experience fail to realize that they are never fully aware of the extent to which they influence their team and in what way.

This raises the following questions: to what extent can leaders notice and cope with these challenges? A common answer might be: listen to the team members, interact with the team members, and reflect on their experiences. This response ignores, however, the importance of becoming aware of how a leader's efforts to support team building and cooperation might also interfere, to

some extent, with successful ways of communicating via virtual space.

Fortunately, the successful teams found some ways to deal with these problems, which suggests that the teachers might have used an appropriate approach. Unfortunately, the unsuccessful teams couldn't deal with these problems, which suggests that the teachers did not have an appropriate approach for all the students. Is this reality or a problem that can be solved in a pedagogical context? Can real intercultural learning come via being happy when the teacher gives something that everyone likes or only when there is controllable confrontation, which might suggest that no intercultural approach with multiple context differences can predict deep learning for everyone? We and others can only respond to these questions with future research that digs deeper into the specific challenges of cultural learning in internationally distributed teams.

Limitations with Opportunity

One limitation is that our observations are based on only seven student teams. Another limitation that has been touched upon previously is that the researchers were active participants through their role as teachers in the research context. In their role as participant-observers they consciously and unconsciously influenced their students in their cross-cultural learning process. This can be seen as a limitation in that we could not be impartial and removed from the situation.

However, limitations do not close the door to discovery opportunities. By following an ethnographic reflection on reflection framing process during and after the course teachers can learn more from multiple sources (e.g., e-mail, reflective papers, in-class discussions, surveys, online and class exercises, and so on) during an 11-week period of collaboration. Teachers who act as observant-participant ethnographers can reflect on how students act, verbalize their opinions, and communicate via e-mail. This process, which is never complete, involves an ongoing framing process in which teachers not only interpret their observations but also reflect on how they had acted and interpreted their role as participants.

c onclusion

Our experiential, reflective approach to intercultural learning includes discovery of examples of how norms can support and limit successful development of internationally distributed teams. Our analysis of data produced during an 11-week collaboration offers useful insights for discussions about international collaborations with college instructors, researchers, international professionals, as well as with administrators in interdisciplinary and cross-cultural programs. By identifying important pitfalls that can influence internationally distributed collaborations in the American-Finnish example and suggestions for strategies to cope with them, we have integrated the ethnographic insights of Geertz (1973) into a pedagogical development process: ethnographic discovery can open the doors to previously invisible aspects of intercultural collaboration, but it is never complete. Therefore, we suggest that more pedagogical development and international organizational collaboration can contribute to an ongoing process of discovering, interpreting and communicating previously hidden, often ignored, dimensions of intercultural realities.

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kEy tErms

Autonomy: The extent to which a leader allows subordinates to determine how to do their work. In an American context, the manager's role is seen as that of an active pep-coach who delegates responsibility for task performance, monitors progress, and intervenes when necessary. In a Finnish context, the manager's role is seen as that of a coordinator who oversees the whole project, assigns parts of the task to employees, and stays available should employees request assistance.

Cultural Communication Norms: Yardsticks that often unconsciously or implicitly provide a range of appropriate communication behaviors in a society.

Cultural Coordination Norms: Yardsticks that often unconsciously or implicitly provide a range of appropriate coordination behaviors in a society.

Cultural Norms: Collective expectations of appropriate behavior in a specific context.

Culture: Acquired knowledge that is used to interpret experiences and generate social behavior.

Ethnographic Discovery Process: Teachers who act as observant-participant ethnographers can reflect on how students act, verbalize their opinions, and communicate via e-mail. This process, which is never complete, involves an ongoing framing process in which teachers not only interpret their observations, but also reflect on how they had acted and interpreted their role as participants.

False Friends: A word or phrase a speaker believes carries a universal meaning, but the cultural other(s) interprets it differently when using a shared international language.

Internationally Distributed Teams: Teams in which team members have different cultural backgrounds and work from different locations (e.g., organizations, regions, countries, etc.) around the globe.

Norms: Norms can be interpreted as shared perceptions and expectations of appropriate behavior that elicit a pattern of behaviors which is reinforced if it meets the expectations, and reprimanded if it deviates from them.

Chapter XI
A Training Design for Behavioral Factors in Virtual Multicultural Teams

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abstract

In this chapter, factors "really" influencing virtual multicultural team work shall be described and a training design used for students and company members will be presented. So far, little attention has been paid to behavioural factors influencing virtual team work, or conclusions have been made from what is known about face-to-face teams. In this study, a bottom-up research with empirical data collected directly in the field, discovering such influences will be presented. With the help of grounded theory method factors influencing team members' behaviour and team processes such as isolation, leadership, trust, commitment, conflict, information sharing, or culture will be described. A training design based on a real-time online business game which considers these factors provides a tool for acquiring the skills and abilities needed in virtual multicultural teams.

introduction

Growing internationalization has created a need for communication across geographical boundaries and time zones via e-mail, chats on the Internet, Internet platforms, or videoconferences. These are the tools that facilitate the interaction between people in different geographical regions. At the same time, virtual teams have become more and more common in the business world. According to Cohen and Gibson (2003), virtual teams can be defined as functioning teams whose members are geographically dispersed and whose communication is rather technology-mediated than face-to-face. As geographical distance is one of their key features, most of virtual teams are composed of

members from various cultures, and can therefore be termed "virtual multicultural teams."[1]

In the last few years, researchers have shown an increasing interest for this form of collaboration. Many studies focus on the specific characteristics of virtual teams, such as technological tools (e.g., Bélanger & Watson-Manheim, 2006; Duarte & Snyder, 2001; Riopelle et al., 2003) or communication (e.g., Pottler & Balthazard, 2002). Others deal with team processes and focus on issues such as team building (Beranek & Martz, 2005; Hart & McLeod, 2003; Huang, Wei, Watson, & Tan, 2002) or team performance (e.g., Driskell, Radtke, & Salas, 2003; Lawler, 2003; Levenson & Cohen, 2003). Others simply provide "best practices" (e.g., Lurey & Raisinghani, 2000; Kirkman, Gibson, & Shapiro, 2001; Staples & Webster, 2007). So far, little attention has been paid to behavioural factors (i.e., factors having an impact on or resulting from team members' behaviour and team processes) influencing work in virtual teams. Researchers have only built their arguments on the assumption that such factors were of importance. This means that they considered a particular influence to be of importance in virtual teams and built their arguments or empirical studies around it. Other authors drew normative conclusions from face-to-face teams and provided (theoretical) links to virtual teams. Among these trust (e.g., Castelfranchi & Tan, 2001; Duarte & Snyder, 2001; Gibson & Manuel, 2003; Jarvenpaa, Shaw, & Staples, 2004; Kanawattanachai & Yoo, 2002; Krebs, Hobman, & Bordia, 2006), leadership (e.g., Davis, 2003; Duarte & Snyder, 2001; Lähteenmäki, Saarinen, & Fischlmayr, 2007; Tyan, Tyran, & Shepherd 2003; Zigurs, 2003), or conflict (Griffith, Mannix, & Neale, 2003; Hinds & Mortensen, 2005; Kankanhalli, Tan, & Wei, 2007) are dealt with most frequently. Regarding the crucial issue of culture, some attempts at stating its influence on virtual collaboration have only been made recently (e.g., Fischlmayr, 2006; Gefen & Heart, 2006; Huff & Kelley, 2005; Staples & Zhao, 2006). All in all, there is not only a shortage of theoretical knowledge based on empirical studies (c.f., Hertel, Geister, & Konrad, 2005), but also a need for the training of the skills required in virtual multicultural teams (e.g., Rosen, Furst, & Blackburn, 2006).

So far, there has not been any attempt to look at those factors in a "bottom-up-process," and therefore the aim is to learn more about the influencing factors directly from the field and not to assume factors to be of importance and to conduct a follow-up study later on. Virtual team projects among business students from different universities (two European and one Canadian) have served to put a light on behavioural influences. After experiencing team processes in virtual multicultural teams, essays about their learnings have been written. During the analysis of these narratives the factors influencing team processes and team members' behaviour were discovered. Therefore, this study is unique in that it uses a "bottom-up" approach based on empirical data directly from the field instead of starting out with a set of hypothetical influential factors. Furthermore, the factors build a basis for creating a training design for members participating in virtual multicultural teams.

In this chapter, factors "really" influencing virtual multicultural team work will be described. Based on these factors, a training design used for students and company members will be presented.

background

During several semesters, virtual team projects (participating schools: Richard Ivey School of Business, London, Ontario, Canada; ESADE, Barcelona, Spain; Johannes Kepler University, Linz, Austria) were conducted where business students could gain insight and experiences in virtual multicultural collaboration. The courses focused on topics from cross-cultural management and similar issues within international management. The instructors assigned their students to specific teams which ensured a mixture of cultures in all

the teams. The fact that the courses were taught in English allowed many international exchange students to take part. As a result, numerous countries were represented in these courses, namely Austria, Canada, China, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Ireland, Mexico, Norway, Poland, Slovakia, Spain, Sweden, and USA. Thus, all of the teams were "equally" multicultural, with participants often coming from very heterogeneous cultures.

The teams of 6–8 students (2–3 at each location) had to fulfil several tasks which varied over each semester, for example inventing rules for virtual collaboration, negotiating with dispersed partners based on a three-role case study, writing a seminar paper, or creating a tool which protects an egg falling from a height of five meters. However, for the whole duration of the two-month projects, the virtual teams had to rely exclusively on electronically based communication tools such as e-mail, Skype, MSN, or a discussion forum. None of the students had ever participated in any learning experience of this kind.

Upon completion of the project, the students had to write reflective essays on what they have learnt, on their team experiences, key issues, and so on. These essays, which comprised at three to five pages, served as a basis for grounded theory analysis. In order to have groups for comparison, the same projects were conducted with groups on a face-to-face, multicultural basis as well. On a whole, 215 essays written by students from the virtual teams and 237 from purely multicultural ones, were at the disposal for analysis and comparison.

Since the aim was to look for the influencing factors in primary data from a representative sample rather than verify existing assumptions, the grounded theory approach seemed to be an appropriate method. The grounded theory method aims at finding theories and providing suggestions on how to elaborate and advance processes of theory development. Strauss and Corbin (1998), who further developed Glaser and Strauss's (1967) approach, formed guidelines on how to create theories which help to explain complex social phenomena.

At the beginning of each analysis, no theoretical framework exists but it is developed during the process. Comparison for Glaser and Strauss (1967) does not mean having exact data in order to verify existing theories, but to generate new theories based on issues and sub-themes developed out of the existing qualitative material. Their aim is to find similar reasons and consequences in order to compare different cultures and professional groups, and to explain social phenomena (Lamnek, 1995; Strauss & Cobrin, 1998).

For the analysis of the students´ projects, the relevant data stemming from the written essays were coded. This means that first codes were created and deduced. As examples consensus, silence, information sharing, no answer, initial contact or language proficiency can be named. The codes following similar patterns were grouped into categories which should have comprised of broader issues. Thus, the endless lists of codes could be reduced to groups, such as decision making, communication style, conflicting interests, different aims, information management and so on. Finally, the upcoming categories allowed a conclusion to be made regarding the factors that were meant to be influencing virtual multicultural team work. As soon as no new codes came up (approximately after the analysis of a quarter of all essays) and no new categories seemed to emerge, theoretical saturation as a prerequisite for the grounded theory method (Goulding, 2002) was given. Thus, the number of essays needed, could be regarded as sufficient in order to fulfill the requirements for finding enough stable categories.

main focus of this chapter

Issues, Controversies, Problems, Findings

As pointed out briefly in the introduction, different behavioural factors influence the virtual

multicultural collaboration. The analysis of the reflective essays, revealed a number of influences which will be highlighted in the following paragraphs (Figure 1). Surely, there must be some more factors that have a direct or an indirect, a big or very small impact on virtual team work, but here, the most obvious and most often cited ones are listed.

Team Structure / Diversity

a. **Group size:** Differences amongst the team members in the virtual team projects could be noted in the students' preference for team sizes; while some expressed their wish for smaller, more flexible groups, others even wanted to have more team members. More often though, they complained about unequal sizes of subgroups, as this immediately led to power plays.

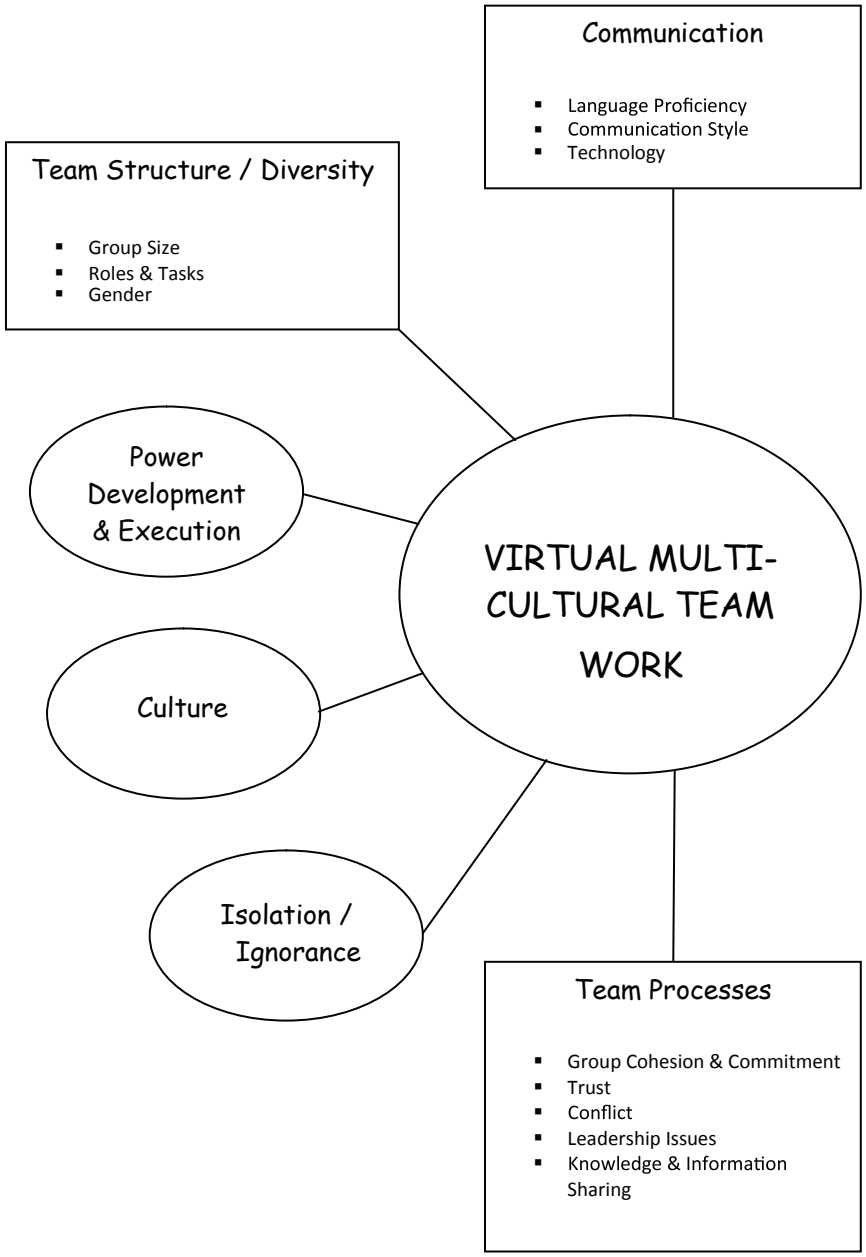
   Especially when subgroups exist (as has been the case in the students' groups), the number of team members is supposed to have impact on the power structures of the team. Riopelle et al. (2003) go further and name the number of people in a team as a crucial factor in team efficiency as it influences, for example, the choice of information technology, and thus communication patterns. While in face-to-face groups an increasing number of team members is said to decrease the number of ideas, the contrary came out for virtual teams, where they have been found to increase (Martins, Gilson, & Maynard, 2004).

b. **Roles and tasks:** As the student teams were self-managed, structures had not been defined in advance. Basically there has only been little discussion about roles amongst the team members. In some teams, leaders emerged due to language proficiency or better organizational skills. When it came to handing in written pieces of work, task distribution was done rather practically by assigning text formulation and final correction to native speakers and text formatting or literature research to non-natives. The effect of subgrouping could be observed in all teams. Geographical distance automatically put a dividing line between the teams and created two, respectively three subgroups at each location.

   Here, one has to distinguish between self-managed teams and predefined ones. Whereas the former are assumed to be self-leading and their members are equally responsible for the outcome of the project (Tyran et al., 2003), the latter have fixed structures. Their members are officially assigned according to their position, knowledge or the department they belonged, leadership roles are clearly communicated, and the team structure is basically formal and stable (Raven, 2003).

c. **Gender:** Perhaps one might assume that gender does not play a role amongst students, as gender equality is supposed to be executed. Surprisingly, gender roles and the treatment of women was an issue in the student teams. Interestingly, culture seemed to be the decisive factor here: while for students from masculine cultures (such as Spain, France, or the U.S.) gender roles were an issue in the essays, for members of feminine cultures though (e.g. Finland, Sweden) they were not (Hofstede, 1980; 2001). Moreover, gender also influences one's behaviour in a team as people tend to behave according to gender based stereotypes. As their roles are internalized, women, for example, behave "typically" (e.g., take on tasks such as protocol writing, typing or have more small talk), which is then observed by others—as a consequence, stereotypes are confirmed, nourished, and continue to exist (Aronson, 1994; Fischlmayr, 2002).

Figure 1. Behavioral factors influencing virtual multicultural teamwork



Power Development and Execution

In their reflective essays, students reported that power was distributed quite equally, when analyzing their texts and reading between the lines, it came out that unequal power distribution did not occur obviously but in a hidden form. As examples, personality, status, organizational background (in that case the university they were coming from), gender, or culture can be named. Also, the official or unofficial role distribution, better organizational skills or the possession of more information brought some team members into more powerful positions than others. Of ut-

most influence though, and this gave most power to single students, was being a native speaker in the common team language (i.e., English). The command of language will most probably be more crucial than managerial knowledge in company virtual teams.

This superior knowledge of a skill is referred to as "expert power" in the literature (Irle, 1971). Besides the differentiation between different types of power (e.g., French & Raven, 1959; Raven, 1965; Collins & Raven, 1969), authors have focused on the strategies on how to exert social power (e.g., Irle, 1971). Social power, according to Collins and Raven (1969, p. 160) is "the potential influence of some influencing agent O over some person P. Influence is defined as a change in cognition, attitude, behaviour, or emotion of P which can be attributed to O." Also the question about the development of social power is interesting as power structures play a crucial role in the success and efficiency of teams. Literature on virtual teams suggests that power inequality might stem, for example, from different language proficiency (Canney Davison, 1996), task expertise such as project experience (e.g., Pawar & Sharifi, 1997; Thompson, 2004), better technological skills (Maier, Herrmann, & Hüneke, 2001), personality, culture, gender, or information sharing (Fischlmayr & Glaser, 2004).

But there are no theories or models on power development in multicultural and/or virtual teams. However, the theory of Popitz (1969), for example, can also help to explain power development in virtual multicultural teams. He provides two models on how a minority can gain influence over a majority and cites better organizational skills, productive superiority based on cooperation, solidarity and mutual trust as key factors.

Ignorance/Isolation

During observation of the student teams, some tactics of isolation or ignorance towards other team members could be detected: for example, students in one location were waiting in vain for answers from the students overseas; people with higher language proficiency typed so fast that others did not have enough time to answer in chats; some members were excluded from group meetings, commentaries and suggestions were provided by others; some students were simply ignored, or some team members were not available at all. This indicates that the phenomenon of isolation and ignorance is highly common in virtual teams, especially in comparison to face-to-face teams.

To ignore or to isolate someone on purpose or unconsciously is referred to as "ostracism" in psychological literature (e.g., Masclet, 2003; Sommer, Williams, Ciarocco, & Baumeister, 2001; Williams, 2001). It becomes apparent when refusing to speak to a person, avoiding eye-contact, showing verbal unresponsiveness or leaving questions unanswered (Ciarocco, Sommer, & Baumeister, 2001). Reasons might be the avoidance of conflict, stubbornness or situational pressure. Whereas in the short run, people might feel hurt and rejected or experience physiological pain, the long-term consequences are even more severe: for example, self-isolation, break-up of relationships, loss of self-esteem, or helplessness may occur (Williams, 2001). More recently, research has also tried to examine the phenomenon of ostracism on the Internet, a phenomenon referred to as "cyber-ostracism" (e.g., Williams, Bernieri, Faulkner, Gada-Jain, & Grahe, 2000; Williams et al., 2002). It becomes apparent, for example, when someone is ignored in a chat-room, put on a black list, when questions are not answered, when answers are given to non-posed questions or when messages are sent with big delays. Those forms of ostracism might even result in depression and loneliness (Kirkman, Rosen, Gibson, Tesluk, & McPherson, 2002; Williams et al., 2000).

So far, this phenomenon and its consequences have only been discussed on an individual level in the literature. As the impact on teams has hitherto been neglected, a question for further research is

certainly whether and how cyberostracism affects virtual team work.

Communication

Communication has not only been shown to be a crucial influence in the form of linguistic skills, but also the communication style, the tools and the communication technology.

a. **Language proficiency:** Above all, language proficiency was named as *the* main factor influencing virtual multicultural collaboration by the students. Being a native speaker automatically meant more power and consequently dominance or leadership. As a result, even though they may have had all the qualities to be good leaders, people with insufficient language skills found it virtually impossible to achieve legitimate or expert power quickly in the team, unless they had very specific skills. Non-natives fast became outsiders and/or were isolated which lead to lower coherence with the group, frustration and less commitment. Lower performance due to decreased participation and emerging power plays was the logical and unavoidable consequence.

   Again, this expert power is decisive in determining who will become part of the in-group or the out-group. As the latter will end up feeling very powerless and excluded, especially in larger teams, they will eventually lose commitment (Canney Davison, 1996).

b. **Communication style:** Not only language but also the communication style influenced the virtual multicultural collaboration. Here, cultural differences also led to communication differences. Students coming from low-context cultures (e.g., Germany, Finland, U.S.), for example, tended to send short, precise messages without much context such as greetings, personal issues or any form of small talk. Contrary to those from high-context cultures (e.g., Spain, Russia, China), who put an emphasis on relationship building, and their communication was, therefore, rich in small talk and personal issues (c.f., Hall, 1976). As it is hard for each party to get familiar with the other one's communication style, difficulties are predestined.

c. **Technology:** The special issue of expertise in technology is mainly relevant for virtual teams. Apparently, the students in the teams who had no permanent Internet access were in a weaker position compared to their other team members. Those who were more familiar with the Internet and the communication tools, were given a competitive edge. Their everyday use of and experience with computers allowed them to type faster, which did not give the other students enough time to answer the messages. Tension and dominant behaviour were the consequences. The observation of such behaviour is confirmed by Pfeffer (1992) who states that advanced technological knowledge enhances the power of a subgroup. Riopelle et al. (2003) even speak of "derailment" of a team in the early stages, if members are not able to solve the issue of different technological levels. For Maier et al. (2001), media and communications skills are the key qualifications for cooperation with geographically dispersed team members. Media richness (Daft & Lengel, 1984) has a positive impact on a team's effectiveness, efficiency, the amount of communication, the quality of relationships, and team commitment (Martins et al., 2004).

Team Processes

Regarding processes in teams ("how teams achieve their outcomes" [Martins et al., 2004, p. 812]), different influencing factors have emerged: among others commitment, conflict, trust, in-

formation sharing or leadership issues. Besides that, the starting phase has been shown to have a crucial impact on the team processes. As many problems or hindrances in virtual teams seem to stem from interferences in the team process, these factors play a crucial role.

a. **Starting phase:** As a landmark for further collaboration and its quality, the starting phase is named by the students. The first contact is seen as decisive as trust is built, personal and also cultural information is exchanged, which allows one to get a picture of each other, so that relationships can be established. During some semesters, a videoconference, which enabled students to get a mental picture of one another, was held at the beginning of the project. Retrospectively, it was said to have helped immensely with the building of trust and personal relationships.

   Also, in the literature the starting phase is referred to as crucial for effective and successful team work, as it allows for quicker integration as a team, better sense is made of the assigned tasks, one gets to know each other personally and definition of specific roles and responsibilities is made. If in this phase a face-to-face contact is enabled, virtual team work might result in sustainable collaboration and stable connections that withstand influences from the environment (Gluesing et al., 2003; Hertel et al., 2005).

b. **Group cohesion and commitment:** Many students also brought up the concept of participation and commitment in their essays. Free riding (i.e., profiting from a group's result or performance without contributing accordingly or consuming unfair shares of resources) or missing active participation have been issues that team members have had to cope with. Furthermore, complaints about misunderstandings, long and complicated decision making processes and lack of commitment have been raised.

   Literature suggests that due to the missing direct contact and non-verbal communication, team members do not have close relationships and do not feel cohesion to the group. Moreover, the spatial separation might even have negative impact on teams (Driskell et al., 2003; González, Burke, Santuzzi, & Bradley, 2003) such as longer decision making processes and consequently less satisfying results (McLeod, 1992).

c. **Trust:** In a couple of reflective essays, trust was mentioned as an important factor in virtual team collaboration. Moreover, it has not often been recognized as such—but reading the texts between the lines trust turned out to be an issue (e.g., after a while students started to make decisions independently; a team member stated the need to know the persons being dealt with personally; and so on).

   What is inherent to all virtual teams, temporal or ongoing, is a high complexity (Duarte & Snyder, 2001). Especially this complexity, which might complicate the collaboration, the relationship building as well as the efficiency of virtual teams, brings certain uncertainty to the members. Very often, a big leap of faith is necessary to even be able to start. A high amount of initial trust (also referred to as swift trust [Mayerson et al., 1995]) is said to be typical and necessary for virtual teams (e.g., Jarvenpaa & Leidner, 1999; Kranawattanachai & Yoo, 2002). As social contact is rare or even completely missing in virtual settings, the existence of cognition-based trust (grounded in the trustee's competence and responsibility) has been shown to play a bigger role than affect-based trust (based on emotional bonds among individuals) (Kranawattanachai & Yoo, 2002). The relationship between the team members is more task-oriented and information tends to be less emotional. Thus, relationship building is slower and the level

of affective trust is lower in the beginning (Bordia, 1997).

Furthermore, between cultures, the issue of trust differed in the essays—whereas members from relationship oriented cultures wanted to be trusted as a friend, those from task oriented cultures strove for acceptance as professionals and experts. Furthermore, the development of trust varied between people from high- and low context cultures—whereas for members from high context cultures, again relationship building was important, for the latter, the focus was more on the task and little or no effort was made to build-up trust. Research about trust in virtual teams, and consequently also about the cultural differences concerning trust is still in its infancy. Only few authors have made attempts to put light on this field (Fischlmayr, Lähteenmäki, & Saarinen, 2007; Huff & Kelley, 2005; Krebs et al., 2006).

d. **Conflict:** Issues of conflict in the student teams mainly stemmed from aspects inherent in the project such as having subgroups at two different continents, the existence of different cultural backgrounds, time constraints and missing initial trust or even prejudices. Others occurred because of some team members´ personality, missing structure or a subgroup's superiority over the other. The results have been decreasing trust, frustration, lower motivation and weak performance.

Conflict is said to be more likely to occur in virtual teams (Mortensen & Hinds, 2001) but remains hidden for a longer period of time compared to face-to-face teams (Griffith et al., 2003). Although it is suggested by Scholl (2005) not to suppress or avoid conflict in virtual teams, particular preventive actions in order to minimize negative consequences do make sense. As examples regular face-to-face meetings, the reduction of differences by creating a common group identity and the introduction of common standards might be helpful. Furthermore, using appropriate communication media (e.g., "rich" media such as videoconferences) and increasing media and communication competence of the team members, might help to avoid initial tension and conflict (Hinds & Bailey, 2003; Mortensen & Hinds, 2001).

e. **Leadership issues:** Whereas, in some teams or subgroups a leader was officially nominated, in others leaders emerged over time, yet in others, the clear decision was not to have any kind of leader at all although most of the subgroups explicitly saw the need for a leader and appointed one during the very early stages of the project. Those subgroup leaders primarily had the role of communicator and coordinator and moved the work process forward.

This role is seen as rather typical for virtual teams. Even if teams are not able to choose a leader, such a person may emerge as a consequence of missing coordination and cooperation (Hollander & Julian, 1969). As a solution for teams that tend to be more authority-aversive, Zigurs (2003), for example, suggests that leadership roles in virtual teams might shift in a team's life cycle according to the changing needs during the different stages. As one single person cannot fulfil all those roles, role rotation in terms of task and relationship needs is recommended (Katzenbach & Smith, 1993).

f. **Knowledge and information sharing:** In the virtual team projects, selective communication of information (Irle, 1971) could be mainly observed through the subgroup leaders' handling of information (e.g., one subgroup leader withheld information; another one saved the data only on his computer and did not forward the relevant data to the other group members). In both cases, this resulted in a lack of trust.

Literature confirms that especially in virtual teams, the distribution of information and facts as well as the erosion of trust are critical issues for team efficiency as well as for power (Pfeffer, 1992; Cramton & Orvis, 2003). Furthermore, ineffective information sharing might result in wrong attributions about other team members. Due to stress and time pressure, situational and also social information is frequently unavailable. Consequently, the lack of information is attributed to the leader's or a fellow team member's personality. Such personal attributions affect the team process and might hinder team members from solving a problem situation (Cramton & Orvis, 2003) in a way that is beneficial to the project and the entire organisation.

Cultural Values

From the data, it can be seen that cultural differences had a great impact and influence on each team member's behaviour and thus, the efficiency of the team. The importance of culture was reflected in personal aversions rooted in history, in status differences between the different schools involved (organizational culture) or in gender issues. Instead of being mentioned explicitly in the essays, culture seemed to be displayed in many different facets and influenced many behavioural aspects. Students named personality, attitudes or external influences instead.

In some cases, culture as such, was also mentioned to influence the virtual multicultural collaboration. The students´ statements included reports about different working styles across cultures (e.g., relationship versus task orientation; working together as one single team versus splitting tasks among team members, striving for consensus in decision making versus autocratic decisions), or students had observed different habits (e.g., using first names for the professors versus use of titles), or they had found confirmation for commonly held stereotypes (e.g., the silent Finn or the correct Germans who stick to rules).

Sometimes, the influence of culture was not mentioned explicitly by the students but showed in different facets such communication, power, decision making, leadership, trust, or the general approach towards the project (including commitment and participation). When grouping the essays during the analysis and comparing the statements to what has been written on cultural differences, cultural patterns could be observed. Students from high power distance countries (Hofstede, 1980; 2001) such as France, Asian countries, Spain, or Latin America strove for having a strong autocratic leader who also took decisions autonomously. The consensus-oriented Swedes (Hofstede, 1980; 2001), on contrast, took a lot of time for finding a solution where each team member would agree. Furthermore, preferences in communication tools could be stated—whereas, low-context cultures such as Finland or Germany preferred the less personal written e-mail, students from high-context cultures (e.g., Spain, Latin America, France) wanted to talk on the Skype instead.

Also, literature states without any doubt that cultural values and consequently cultural diversity have a great influence on multicultural teams (e.g., Cox, 1993; Cox, Lobel, & McLeod, 1991; Adler, 2002; Watson, Johnson, & Zgourides, 2002) and virtual teams (e.g., Duarte & Snyder, 2001). Basic differences among cultures such as time perception, the attitude towards unequal power distribution, the handling of uncertainty and risk, individualistic or collectivistic orientation or feminine versus masculine life styles, have been shown in different models on cultural dimensions (e.g., Hall & Hall, 1990; Hampden-Turner & Trompenaars, 2000; Hofstede, 1980; Kluckhohn & Strodtbeck, 1961; Trompenaars, 1993). Authors differ in their opinion on whether cultural diversity is increasing (Driver, 2003; Richard, 2000; Stumpf & Alexander, 1999) or decreasing team performance (Kirchmeyer & Cohen, 1992; Watson, Kumar, & Michaelsen, 1993). Moreo-

ver, national culture is said to influence values and expectation about work behaviour (Erez & Early, 1993), communication styles (Hall, 1976), information & knowledge sharing (Ardichvilli, Maurer, Li, Wentling, & Stuedemann, 2006; Dahlin, Weingart, & Hinds, 2005) or the meaning of teamwork (Gibson & Zellmer-Bruhm, 2001).

Solutions and Recommendations

Comprising of the above mentioned influencing behavioural factors, a training design for virtual teams has been developed[2]. Also literature stresses the urgent need for high quality training for virtual teams (Rosen, 2006). In this unique experimental setting, the participants are confronted with difficulties both due to cultural differences and physical separation, as they are divided into several teams whose members are geographically dispersed (i.e., some team members sitting at one, the others at the other location), and groups are composed multiculturally. The participants work simultaneously in both locations (by seeing the same computer interface via a remote connection) and communicate on-line during the exercise. As communication channels Skype, Skype Chat, or E-Mail are at their disposal.

During the first step, the participants play the RealGame™[3]—a real-time online business game that involves them in continuous decision making on typical business processes in a multicultural production company such as stock keeping, amount of produced material, number of production shifts, price of goods, and so on. As the whole setting is real-time processed, what means that the participants are part of the business process, the company functions as well as the external market data are always transparent for each group and can be followed on the computer screens. This setting requires constant decision-making and action-taking from the students, otherwise their companies run into trouble. Any effect on the company performance such as not meeting delivery times, keeping too much stock or having extended prices show immediately in the business figures. This allows the participants to get a holistic view on the processes in a multinational company. The teams function either as producers or subproducers in the market and have thus to negotiate as competitors and/or cooperate as interdependent partners. The negotiation could be done either face-to-face when discussing locally or through Skype when talking to the distant members. The fact that the game is real-time processed allows for presence on the market, control of and decision making about company functions and a follow up of all that on a team's computer screen. The result of an action (e.g., keeping too little stock, taking last minute orders, cancelling a production shift, and so on) can immediately be seen in the company performance.

Based on their experiences, the participants are interviewed or have to write reflective essays on issues such as decision making, cultural influences, power distribution, critical incidents or leadership. The analysis of these essays/interviews and the learnings from previous studies as mentioned above, form the body of a training session. In this locally held training session the participants are introduced to concepts of multicultural and virtual decision making, leadership styles and their applicability to virtual teams, and virtual multicultural communication. Furthermore, they can acquire and train typical skills needed in virtual multicultural collaboration in different virtual team exercises. With the help of mini-case studies, role plays, discussions, simulation games and theoretical knowledge, they learn and train abilities such as leading virtual multicultural teams, cultural sensitivity, intercultural negotiation, cross-cultural communication or non-verbal communication. Exactly these issues have been proven to be of highest relevance for virtual team training in past studies although those approached the issue differently (Blackburn, Furst, & Rosen, 2003; Hertel et al., 2005; Rosen, 2006). Above all, cultural sensitivity (i.e., the ability to better understand "the otherness" of the interac-

tion partner and accepting it as "different" [and not worse]), was stressed as crucial in virtual multicultural teams. This conclusion from the essays is also supported by former studies which highlighted the importance of different cultural backgrounds of the team members for training modules about virtual teams (Hertel et al., 2005; Rosen, 2006)

In order to use the acquired abilities practically and to verify their relevance, RealGame™ is played again as a final step. The basic setting remains the same as in the first round but with few changes, for example, the clock is running faster, external (computer-simulated) influences such as strikes or delivery delays happen or new production companies occur on the market. At the end, participants are asked again to reflect what they have learnt and their experiences in the form of interviews and reflective essays. This time, the theoretical knowledge is included in their analyses as well.

f utur E t r Ends

So far, the training design has already been tested with student groups, but will be used for multinational companies in the near future as well. The employees involved in virtual multicultural team work will undergo the same procedure as described above. With the only difference that, at first, interviews with key persons of the company shall help identify problematic areas in terms of knowledge, information sharing and cooperation.

The experiences already gained in the students' training will serve as a basis for creating a training tool for managers. Basically, there are many similarities between business students and managers but one has to be aware of the differences as well. Some factors might play a bigger role in the business context than among students. An example is power, which depends on resources, department belonging, functional and organizational structures and not only on better organizational skills, expertise, knowledge, personality or language skills, as was mentioned in the student teams. In terms of culture, age, gender, and history are supposed to matter more than found in student teams, where everyone is about the same age, where there is gender equality and where historical facts do not play a role among cultures. Whereas roles and team members' tasks are somewhat predefined in management teams, they can be chosen or evolved in self-managed student teams. The same is true for leaders who tend to be officially nominated or predetermined in the business world. Among the students, leaders might or might not be chosen. Although there are these differences, the gain is seen as more valuable and bigger than the hindrances. With the given design, students might gain insight into the real business world, into realistic business settings, as well as into time and financial pressure. Furthermore, they have the opportunity to acquire skills and abilities required in their future business lives as well. Besides that, behavioural factors which are the main subject in this setting have proven to be similar between student and manager teams in past studies (e.g., Reber & Berry, 1999).

In terms of further research, a lot can be suggested as the field is still in its infancy. So, the links between cultural values and team members' behaviour in virtual teams has not been the focus of profound research up to now. Large-scale studies as well as culture-specific results are required in this field. The field of cyberostracism in virtual teams might also be an interesting aspect to look at. More knowledge on power development in virtual teams could help broaden the perspectives. Empirical studies on cultural differences in terms of trust are also missing so far. Last but not least, ideas about high level training for virtual multicultural teams are also scarce.

c onclusion

The research setting can be seen as a contribution to the theoretical knowledge as well as the practical one, as it includes a bottom-up research aiming at detecting factors contributing to virtual multicultural teams as well as a training design based on these results. Although the training design has only been tested with students so far, it will (a) provide a good tool which can be offered to the business world as well, and (b) can be seen as a good training for the students' future business life. Doing business in a highly competitive environment—as is simulated by RealGame™—enables the students to cope with the increasing pressure for better financial results and the demand for time efficiency. The students will not only be confronted with the complexity of processes and their consequences in a production company, but will also gain valuable experience in terms of virtual and multicultural teams by playing the game in small competitive groups.

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kEy tE rms

Behavioural Factors: Factors stemming from human behaviour. They might be due to personality, the situation, or are a reaction to the environment.

Cultural Sensitivity: Different cultures show different behaviour and attitudes. Cultural sensitivity implies being open, tolerant, and flexible in the interaction with foreigners, and adapting to their behaviour to a certain degree.

Electronic Communication Tools: Technology-mediated tools of communication such as e-mail, Skype, MSN, fax, videoconference, or chat. Computers or other electronic devices are used as tools for communicating.

Grounded Theory Method: Grounded theory aims at finding theories and providing suggestions how to elaborate and advance processes of theory development which help to explain complex social phenomena. Through constant comparison data from the field are reduced to main influencing variables.

Leadership in Virtual Teams: Virtual teams in business most often have project leaders, but it is recommended that leadership should rotate in a team according to the different tasks and stages of a project. In self-managed teams leaders might emerge.

RealGame™: An online business game which is real-time processed and forms the body of a virtual team training design.

Trust: Having a relation to someone and having faith in this person. Distinction between cognitive and affective trust. Initial trust is also referred to as swift trust. Trust is said to be the glue that holds teams together.

Virtual Multicultural Teams: Functioning teams whose members are geographically dispersed, and their communication is technology-mediated rather than face-to-face. As geographical distance is one of their key features, teams are characterized by cultural diversity, and can thus be named "virtual multicultural teams."

Endnot Es

1 Certainly, there are also monocultural virtual teams that are composed of team members coming from the same culture or working within national borders only. But nowadays, the majority works across borders and shall therefore be in the focus of this article.

2 The training design is part of the project LIIKE, initiated by Turku School of Economics and funded by TEKES in Finland. It has been developed by Professor Satu Lähteenmäki (Turku School of Economics, Finland), assistant professor Iris Fischlmayr (Johannes Kepler University, Linz, Austria) and PhD Timo Lainema (Turku School of Economics, Finland).

3 Developed by PhD Timo Lainema, Turku School of Economics.

Chapter XII
Working Collaboratively on the Digital Global Frontier

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abstract

An international online collaborative learning experience was designed and implemented in preservice teacher education classes at the University of Calgary, Canada and the University of Southern Queensland, Australia. The project was designed to give preservice teachers an opportunity to live the experience of being online collaborators investigating real world teaching issues of diversity and inclusivity. Qualitative research was conducted to examine the complexity of the online collaborative experiences of participants. Redmond and Lock's (2006) flexible online collaborative learning framework was used to explain the design and the implementation of the project. Henri's (1992) content analysis model for computer-mediated communication was used for the online asynchronous postings and a constant comparative method of data analysis was used in the construction of themes. From the findings, the authors propose recommendations for designing and facilitating collaborative learning on the digital global frontier.

introduction

Teaching and learning across borders can be accomplished using contemporary information and communication technology (ICT) tools. Online synchronous and asynchronous technologies provide the ability to share ideas, gain multiple perspectives, collaboratively co-create knowledge and develop a collective intelligence. The power of anyone, anywhere and anytime online learning

along with the social and collaborative nature of learning valued in the 21st century creates new learning opportunities.

This qualitative research examines the design and the implementation of an international online collaborative learning experience within preservice teacher education classes in one Canadian and Australian university. The project was launched in 2006 and modified for re-implementation in 2007. The aims of the work were to:

- Model the use of ICTs within teaching and learning;
- Advance educational thought and practice;
- Develop global relationships; and
- Develop an increased understanding of diversity and inclusivity in today's classrooms.

f l Exibl E onlin E collabora t E lE arning f ram Ework

The conceptual framework for an online collaborative learning environment is grounded in social constructivism. "Social constructivists believe that meaning making is a process of negotiation among the participants through dialogues or conversations" (Jonassen, Peck, & Wilson, 1999, p. 5). With social constructivism "learning is essentially a social activity, that meaning is constructed through communication, collaborative activity, and interactions with others" (Swan, 2005, p. 5). The opportunity to interact with other learners in sharing, discussing, deconstructing, and negotiating meaning leads to knowledge construction.

When designing for knowledge building using a social constructivist approach, the work begins with an understanding of the relationship between pedagogy and technology. ICT tools, such as asynchronous discussion forums, provide a medium for communication and collaboration to occur. The challenge is to change the focus of teaching and learning from being *about* the technology (e.g., added to practice), to a focus *on* the pedagogy that allows for the creation of new spaces for deep learning in which the technology is purposefully selected and used to enhance and extend learning.

New technologies "demand that educators rethink the nature of their work and the forms of collaboration and communication" (Clifford, Friesen, & Jardine, 2003, p. 1). Given this demand, Redmond and Lock's (2006) online collaborative learning framework, an adaptation of Garrison, Anderson, and Archer's (2000) *Community of Inquiry* model, provides a structure to design online collaboration. Figure 1 shows the relationship between the seven elements of the Redmond and Lock (2006) framework. Later in the chapter, this framework is discussed and used to describe the design and implementation of the online collaborative project for preservice teachers and in discussing the research findings.

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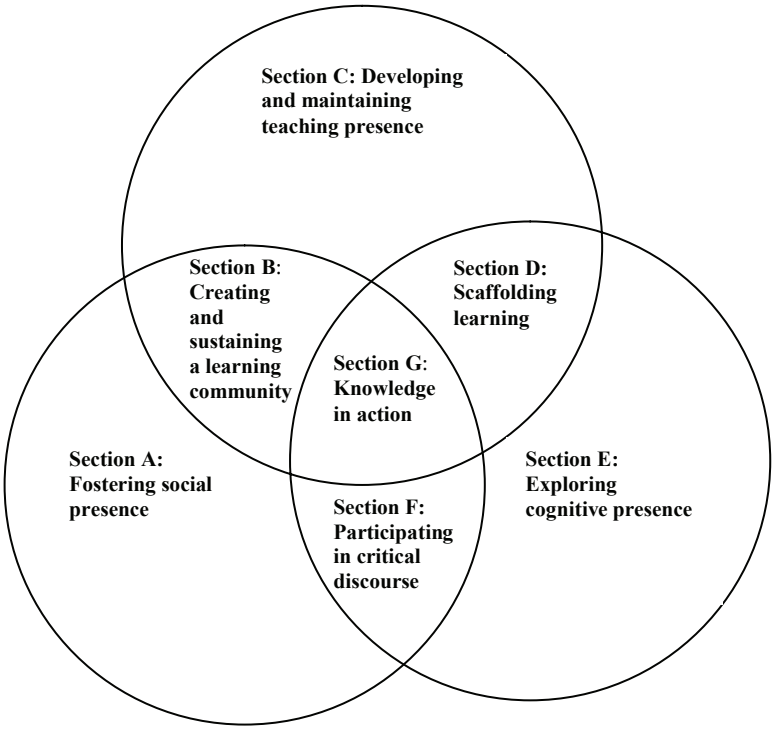
For this research, a case study approach provided a means to report in a holistic fashion the authentic online collaborative learning experience of preservice teachers in two iterations of the project and to examine the complexity of the online collaborative experience. The study investigated how preservice teachers in two countries identified and explored critical issues embedded in cultural diversity and inclusion, and inquired into how to honour this diversity in elementary/primary classrooms.

The project occurred over a six-week period in early 2006 and 2007, using a three-phase project design based on the Redmond and Lock (2006) online collaborative learning framework. All students were in face-to-face courses, however the work for this project occurred online using the learning management system, Blackboard™, and videoconferencing. The 2006 case study involved

Figure 1. Redmond and Lock's (2006) online collaborative learning framework (Adapted from the Garrison, Anderson, & Archer community of inquiry model, 1999)



preservice teachers from two of the classes from the University of Calgary, Canada, and one class from the University of Southern Queensland, Australia. A total of 22 preservice teachers participated in the research element of the project. The study was replicated in 2007 with one group from the University of Calgary and four groups from the University of Southern Queensland. A total of 57 preservice teachers participated in the research study.

Three factors were addressed in the 2007 redesign. First, preservice teachers appreciated the videoconferencing opportunity that occurred at the end of the project and recommended a videoconference at the start. As a result, the instructors organized a videoconference at the start and towards the end of the 2007 project. Second, based on the nature of the online discussion in 2006, the instructors facilitated an activity to help preservice teachers develop greater awareness of quality online postings for the purpose of fostering discourse. Third, a separate content section was placed on the navigation bar in Blackboard√ for the purpose of introducing experts and instructors. Pictures and biographies were available for participants to read before they posted questions and engaged in discourse within the discussion forums.

The study explored the following questions:

- In what ways can international online collaboration promote deep inquiry?
- How can online collaboration promote inquiry into teaching within diverse contexts?

Multiple sources of data were used. First, the main data source for the study was the asynchronous online communication. Second, preservice teachers were invited to participate in a focus-group

interview at the end of the study. Third, data also came from a reflective activity that the participants completed and posted online. Fourth, we, the researchers, were the designers, developers, and facilitators of the project. We had a teaching presence while we fulfilled the roles of being online experts and researchers. We were observers/participants monitoring the various interactions and development of artifacts for the project.

The transcripts from the discussions were analyzed using Henri's (1992) content analysis model for asynchronous computer-mediated communication. It provided a way to conduct analysis of online dialogue both in terms of quality and quantity of messages. The following five dimensions along with specific indicators in Henri's (1992) framework were used in the content analysis:

- **Participative:** Quantity of messages posted by one person.
- **Social:** Statements that are social in nature or are not related to the specific subject matter.
- **Interactive:** Linkages between messages and other sources of information.
- **Cognitive:** Postings of a higher intellectual quality where participants apply, analyze and evaluate information found or provided by others.
- **Metacognitive:** Statements "related to general knowledge and skills and showing awareness, self-control, and self-regulation of learning" (Henri, 1992, p. 125).

We independently coded the data using the dimensions and indicators provided by Henri's (1992) framework. This process was followed by check-coding (Miles & Huberman, 1994) to address the reliability of the analysis. Where the data was coded differently, discussion occurred whereby we came to a mutual decision on the final coding based on justification and negotiation.

The constant comparative method of data analysis was used in the construction of themes through capturing patterns and consistencies from the reflective activity and from focus group interviews. Categories and themes were further analyzed by looking for similarities or differences and areas of conflict in the data.

Implementation and discussion of findings

In the 2006 and 2007 implementation of the project, data has been shared and findings discussed using the seven elements of the Redmond and Lock (2006) framework. Further, quotes from preservice teacher participants are included and to protect their identity pseudonyms have been used.

Fostering Social Presence

Garrison et al. (2000) define social presence as "the ability of participants in a community of inquiry to project themselves socially and emotionally, as 'real' people though the medium of communication being used" (p. 94). Garrison and Cleveland-Innis (2005) argued that social presence is a precondition to support a purposeful and worthwhile learning experience. This element focuses on non-subject specific discussions where preservice teachers were socializing and getting acquainted. The participants introduced themselves to the broader group and they were asked to reply to a number of their colleagues who were located in different geographical areas. This activity was focused on building rapport.

The total number of introductory postings from 2006 (n=22) as compared to 2007 (n=57) increased from 59 to 252, with the average postings per preservice teacher in 2006 being 2.68 and 4.42 in 2007. The nature of the postings did not change significantly over the two years. Using Henri's (1992) framework, the majority of

postings were identified as interactive or social in nature. This is not unexpected given the nature of the introductory task.

The goal of fostering social presence was to gain a sense of connectivity, community and trust so that everyone could feel free to express ideas, to articulate questions, and to contradict others. One of the preservice teacher noted, "I could freely comment on topics." This is an indication that, at least for this preservice teacher, they felt a level of trust and openness in the online environment. The increase in the average postings per preservice teacher might also support this outcome.

Creating and Sustaining a Learning Community

The creation of community should provide learners with "comforts of home, providing a safe climate, an atmosphere of trust and respect, an invitation for intellectual exchange, and a gathering place for like-minded individuals who are sharing a journey" (Conrad, 2005, p. 2). Communication, collaboration, interaction and participation are four cornerstones of an online learning community (Lock, 2002). Therefore, when designing the online space, careful consideration should be given to how these cornerstones are used to foster growth and sustainability in a community of learners.

In our study, preservice teachers were able to refer to biographies and pictures posted by facilitators and experts as another way of connecting with members of the community. An important role of teaching presence in this phase was to encourage the participants to see themselves and others as individuals and as active members in the learning community.

In addition, in 2007, a videoconference was held at the start of the project that connected all four geographical locations (e.g., one in Canada, and three in Australia) for the purpose of nurturing community development. During the videoconference, icebreaker activities were implemented and the nature of the project was discussed to foster a shared understanding of expectations. They were given the opportunity unpack Henri's (1992) dimensions for analyzing the quality and quantity of online interactions so to develop an expectation of effective online postings.

For most preservice teachers, videoconferencing was a new experience. It was to assist with the development of social presence and group cohesion. Jim commented that through the videoconference it was "easier to express emotions and provide and receive clarity of varying topics." Nick stated, "Incorporation of videoconferences helped to bridge the gap between campuses" these concepts were echoed by a number of their colleagues. However, Sue indicated that the videoconference did little to contribute to her learning and stated, "beyond the novelty factor, I am not sure about the benefits of the videoconferences."

Developing and Maintaining Teaching Presence

Anderson, Rourke, Garrison, and Archer (2001) "define teaching presence as the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learn-

Table 1. Frequency of preservice teachers online postings in the introduction discussion forum

Year	Number of Participants	Participative	Social	Interactive	Cognitive	Meta-cognitive
2006	22	59	18	41	0	0
2007	57	252	51	203	1	0

ing outcomes" (p. 5). According to Garrison and Anderson (2003), "teaching presence brings all the elements of a community of inquiry together" (p. 29). Without significant teaching presence it is unlikely that effective social presence and cognitive presence would be evidenced.

There are three key roles of teaching presence: course design and organization, facilitating discourse and direct instruction (Garrison & Anderson, 2003).

Course Design and Organization

Teaching presence starts before students commence the educational experience. It begins with the preparation of curriculum materials, aligning of the assessment with the learning outcomes, creating timelines, sequencing of key concepts, and the creation of the learning tasks and activities. In the design of the project, attention was given to creating a three-phase project and accommodated different Canadian and Australian course schedules. One of the challenges was to provide opportunity for rich online discussions for all participants and at the same time being respectful of differences between individual and program schedules (e.g., professional experience and scheduled program breaks).

Phase One: Introduction and book rap: The focus was to develop a sustainable learning community through overt social presence (through videoconference and asynchronous online discussion) and common experience from which to launch initial discussions. Participants were required to read one of a number of novels. In novel teams, they were to review the book. Inquiry questions drafted by preservice teachers were used to spark initial discussions related to the novel and to diversity and inclusivity.

Phase Two: Online discussions with preservice teachers and experts: Structured online discussions allowed for sharing of experience and integrating information from multiple sources for the purpose of enriching the personal and shared learning experience of all members of the learning community. Experts and practitioners were invited to participate in asynchronous conversation with the preservice teachers.

Phase Three: Exploration of pedagogical practice and classroom applications: Drawing on their experiences and knowledge gained from the first two phases, preservice teachers were to develop a professional growth plan identifying elements of pedagogical practice and application. They were invited to participate in a second videoconference. In addition, they were to post a reflection on their learning experience from the project.

The intentional design of ICT integration in the work was to have participants *doing* as well as *thinking* with technology. Other controlling influences in the design included authentic uses of technology; genuine links between relevant concepts and students teaching practice; social constructivist pedagogies; higher order thinking; comparing and contrasting of perspectives from different locations; communication with a real audience and increased global awareness of educational issues. Therefore, as designers and facilitators, we anticipated that with ongoing and visible teaching presence, access to contemporary resources, and the design of well-structured tasks would assist in enhancing preservice teachers' online cognitive presence.

Facilitating Discourse

"Good discussion should engage students in collaborative meaning making, but the challenge lies with the instructor to facilitate" (Black, 2005, p. 19). Effective facilitation results in moving the discussion beyond serial monologues, such as public and unsupported claims of "I think…" and "My experience is…" to postings which integrate ideas from multiple sources, provide critical reflection and/or an analysis of previous postings.

Akin and Neal (2007) argued that "interaction does not just occur but must be intentionally

incorporated into the design of the class" (p. 191). Teaching presence through the facilitation of discourse was embodied by strategies such as contacting preservice teachers who had limited participation, establishing starter questions that would spark the online discussion, providing examples of constructive online participation, and modeling effective postings during the project. Further, we maintained an ongoing online presence throughout the project and discussed the work in our face-to-face classes to help support the online experience.

Direct Instruction

With direct instruction, according to Anderson, et al. (2001), "teachers provide intellectual and scholarly leadership and share their subject matter knowledge with students" (p. 8). Working in a social constructivist paradigm requires instructors as facilitators to undertake direct instruction through the provision of additional resources, diagnosing and addressing misconceptions, and direct/redirect learning to map onto the key concepts and major learning outcomes (Anderson, et al., 2001).

As instructors it was our role to teach subject matter, structure and model learning and assessment tasks, and provide opportunities for participants to gain multiple perspectives. As online discussions developed, preservice teachers were provided with a range of perspectives, and they could modify their own perspectives in light of new information or the shared experiences of others. Joanne commented:

"I think that it forces those in the discussion to consider ideas and beliefs beyond what they already hold. For myself I find that a willingness to be open to the opinions of others is vital to becoming a successful teacher. If we were to have completed an independent inquiry paper I would not have been forced to examine views beyond what I already hold."

Scaffolding Learning

Scaffolding learning occurs at the intersection of teaching presence and cognitive presence. It is the intentional design of activities that help move learners from social relationships to the development of cognitive relationships designed to foster deep and meaningful learning opportunities.

In an effort to "judge the nature and quality of critical reflection and discourse in a collaborative community of inquiry" (Garrison & Anderson, 2003, p. 60) the practical inquiry model was developed. The model enables student and instructor postings to be mapped against indicators to assess the critical thinking made visible in their postings. In this initial stage, students encounter what Garrison and Anderson (2003) refer to as a triggering event linked to curriculum. The triggering event for this project was to create heterogeneous groupings of preservice teachers who read the same novel. The following three novels were selected:

- *The Curious Incident of the Dog in the Night-time* by Mark Haddon (2002)
- *Group of One* by Rachna Gilmore (2005)
- *Parvana's Journey* by Debra Ellis (2002).

The novels created a catalyst for interaction and also had a clear relationship to the key concepts related to the courses. After reading their selected novel, preservice teachers were asked to create an overview of the book, identify key concepts, and note the relationship between the novel and the K–12 curricula. In addition, they created inquiry questions that were used to further explore diversity and inclusivity.

When reflecting on tasks, Jan indicated the "incorporation of the novel at commencement of the course was a new and interesting idea. I found reference to the novel and key learnings were repeatedly being included in course content."

This was the first opportunity preservice teachers had to make their private thoughts public and to view and respond to a range of ideas coming

from others in different courses and geographical locations. Phil commented "text can be interpreted by different people and the differing ways they reflect on their own experiences." Williams (1998) suggested that online novel studies (e.g., Bookrap):

"provide a different audience for ideas, reviews, questions and answers, than their teacher. The process of articulating to an unknown audience requires more specific use of language and greater articulation of ideas than is usually practiced in an oral conversation."

As seen in Table 2, from 2006 (n=22) to 2007 (n=57) preservice teacher responses in this phase almost doubled. The average total number of postings per preservice teacher increased from 3.23 to 6.22. This substantial increase was seen in all of Henri's (1992) dimensions except for metacognitive. It was disappointing in this area that the number of postings decreased by half rather than increased. We were unable to determine why this decrease occurred, especially given the intentional activity during the first videoconference where participants unpacked Henri's dimensions through the use of examples.

The triggering event, reading the novel and creating an overview to launch the online discussion, was to create discord or stimulate interest in discussing issues that arose from the novels. We felt the novels took the role of stimulating interest. However, Andrew observed that he "was apprehensive about this assignment, I was forced out of my comfort zone and was challenged to learn a new piece of technology to communicate. I'm glad that I had the opportunity to participate in this experience." It appeared from Andrew's comments and those of many of his peers that the use of technology itself created dissonance.

Exploring Cognitive Presence

Cognitive presence is the "the intellectual environment that supports sustained critical discourse and higher order knowledge acquisition and application" (Garrison & Anderson, 2003, p. 55). "Cognitive presence reflects the intellectual climate and is associated with the facilitation of critical reflection and discourse" (Garrison, 2003, p. 49). Johnson (2006) suggested that asynchronous discussions facilitate "student learning and higher-level thinking skills, perhaps due to the cognitive processing required in writing, time to reflect upon posted messages and consider written responses, and the public and permanent nature of online postings" (p. 51). This concurs with Fred's comment that the project was an "innovative way to deepen my understanding as a student on the topics of diversity; special needs mainly autism, humanity, and inclusive practices."

In the exploration, the second phase of Garrison and Anderson's (2003) practical inquiry model, learners seek further information, brainstorm ideas, consider their own prior knowledge and experience and the knowledge and experience that others share in relation to the triggering event. The triggering event lead into an exploration phase where preservice teachers were seeking further information and brainstorming ideas around the issues that emerged from their initial novel discussions and were exploring ideas and solutions in

Table 2. Frequency of preservice teachers online responses in the novel study and inquiry questions forums

Year	Number of Participants	Participative	Social	Interactive	Cognitive	Meta-cognitive
2006	22	71	0	71	27	6
2007	57	355	1	215	131	3

response to inquiry questions. They often lacked the theoretical and experiential knowledge of the topics as noted in Mandy's words "this required a lot of extra reading time before I could respond." Paul's positive comment also indicated that the learning experience was both innovative and also challenging: "This project really got my thinking bone to do its job. It was something very new to me. I do think overall this project was a credit to my learning and not a complete bore-o-rama."

Participating in Critical Discourse

Critical discourse, the intersection between cognitive presence and social presence, involves the integration and analysis of multiple sources of information used by learners to resolve their feelings of dissonance experienced from the triggering event. It is here that the third phase of the Garrison and Anderson's (2003) practical inquiry model, integration, is addressed. Analysis, construction, deconstruction, and confirmation of meaning occurs at both a personal and public level and include skills such as reflection, analysis, and metacognition. Informed voices engage in dialogue, debate and higher order thinking that influences the learners' future actions and reflections.

Teaching presence supports development of cognitive presence through participation in critical discourse by providing constructive criticism, challenging beliefs, posing further questions, and providing the opportunities for students to self-assess their contributions against criteria (Black, 2005; Fabro & Garrison, 1998; Kanuka & Garrison 2004). As a learning community, the learners and instructors connect to, critique and build on the ideas of others, as well as begin to provide tentative solutions with justifications through critical discourse.

From the online discussions various topics and issues were emerging that required greater expertise in responding to questions. Various experts were invited to respond to the participants' queries in relation to:

- ICT integration;
- Adaptive and assistive technologies;
- English as a second language;
- Internationalization of education;
- Special needs; and
- Autism.

During this phase, preservice teachers were invited to compare, contrast and connect ideas from other participants and from relevant literature in order to participate with an informed voice and to create new knowledge. Adam reflected that, "a lot of research was required to participate in any forum." It was found that preservice teachers valued the multiple sources of information. For example, Ben commented, "I learnt that personal experience counts as well and I gained invaluable insights from others."

Table 3, shows the four fold increase in average posting per preservice teacher. In 2006 (n=22), the average person's posting was 1.36, as compared to 2007 (n=57) where the average per person posting was 5.58. Interestingly there were some social postings in the 2007 cohort and also the addition of metacognitive postings. Within the postings in the expert forums, there

Table 3. Frequency of preservice teachers' online responses in expert discussion forums

Year	Number of Participants	Participative	Social	Interactive	Cognitive	Meta-cognitive
2006	22	30	0	20	10	0
2007	57	318	7	212	97	2

was evidence that participants were engaged in higher order thinking.

In a study conducted by Hemphill and Hemphill (2007), it was found that "[s]tudents' critical thinking skills and interest levels were enhanced by the presence of the guest speakers" (p. 292) in asynchronous discussions. This aligned with findings in our study. For example, Lesley commented that "I really found the expert forums and the input from 'experts' very helpful." Similar comments were shared by many of their colleagues and was supported by Peter who noted that within the forums a "lot of good advice that was given, along with some really interesting questions, but I benefited most from experts."

Knowledge in Action

Knowledge in action is the culmination of all the work that has occurred in the previous six sections of the online collaborative learning framework. It represents the fourth phase of the practical inquiry model, resolution (Garrison & Anderson, 2003). It is here that learners apply their knowledge, create artifacts, solve problems, or implement an action plan. The resolution phase will often "raise further questions and issues, triggering new cycles of inquiry, and, thereby, encouraging continuous learning" (Garrison & Anderson, 2003, p. 60). It fuels the iterative inquiry cycle.

Knowledge in action was made visible in two ways. First, in the second videoconference, preservice teachers explored scenarios in which they applied what they had learned over the past weeks and were asked to create personal professional development action plans. Within these plans, they identified short and long term learning goals, articulated specific tasks or understandings they would undertake during their next field placement or school experience placements. Second, preservice teachers concluded the project with a written reflection based on their overall educational experience during the project. Albert revealed that "it has been of great interest to see changes in my personal teaching pedagogy and preparation for an up-coming prac[practicum]….directly related to my learnings from this course."

A number of participants commented that the project assisted them in gaining knowledge and experience in how they might use a novel study, integrate ICTs and bring experts into their classrooms. For example, Jerry reflected that:

"I enjoyed the challenge that this project gave me. I also think that this project gave me a new insight into teaching with technology. I would be interested as a teacher to find ways to use a similar discussion forum to allow students in my class to learn about cultures in the world and to develop their ability to become a global citizen."

The overall view of the project was best summed up by Terry:

"I gained experience using a different mode of electronic communication and it was unique experience and although challenging, and sometimes frustrating, I have had opportunities to hear the view of many different people about inclusive education in a way that would not normally have been possible."

Final Comments

Although the reflective comments from preservice teachers were overwhelmingly positive and participation was high, there were also some comments that indicated that preservice teacher participation was not at levels that they would have preferred. For example, Mary mentioned, "I was unable to contribute as much as I would have liked to." This corresponds with what Pena-Shaff, Altman, and Stephenson's (2005) findings that indicated "[s]ome students noted lack of time as a reason for not participating more actively, even when they enjoyed the discussions" (p. 425).

The use of online collaborative learning was a new experience for many preservice teachers. Some commented they were unable to keep up with the amount of postings and were confused by the layout of discussion threads. The increase in the number of postings was exacerbated because the preservice teachers were encouraged to lead discussion into areas that were of personal interest to them. Bob suggested that another factor which impacted participation was the "[i]ncreased workload/pressure for some who were students lacking ICT skills and the project was limited to a short period." In the next iteration of the project, these challenges need to be addressed in the design and facilitation of the online collaborative work.

Limitations of the Study

There were two major limitations in the study. First, there was a low response rate. This may be attributed to how students were invited to participate in the study (e.g., e-mail invitation and unknown research assistant presenting the research opportunity). Further, given the heavy workload and the timing of the research in the semester, preservice teachers may have viewed research participation as additional work and opted to remain focused on course work. Second, data were collected from preservice teachers and an untapped data source is that of experts, faculty members, who shared their expertise in the discussions. Having an opportunity to interview experts and analyze their online discussions may provide greater insight into the learning experience.

rE comm Enda tions

From the two iterations of the project, we propose six recommendations in the following two areas to assist educators in creating and facilitating online collaborative learning.

Design of Online Collaborative Work

We present four recommendations for designing online collaborative work. First, to foster greater interaction and quality online discussion that supports meaningful learning begins with purposeful selection and implementation of innovative instructional methods. "In order for meaningful learning to occur, the task that students pursue should engage active, constructive, intentional, authentic, and cooperative activities" (Jonassen, Howland, Marra, & Crismond, 2008, p. 2). According to Kanuka, Rourke, and Laflamme (2007), instructional methods influence the quality of students' contributions to online discussions. Further, high-level questions need to be asked in the online discussions to foster constructive thinking (Bender, 2003).

Second, there is a need to align goals of the authentic learning experience with authentic assessment strategies. Lombardi (2007) has recommended various design elements to be addressed when creating authentic learning environments (e.g., real-world relevance, collaboration and integrated assessment).

Third, to develop and sustain an online learning community requires the focus to be on "the whole group, which should then collaborate and support each other towards their learning goals …This model depends on both students and teacher taking responsibility for their learning and motivation" (Jonassen, Peck, & Wilson, 1998, p. 2). Rovai (2002) noted that if instructors believe their job is done after they create and put the course online the result is that the "sense of community will whither unless the community is nurtured and support is provided in the form of heightened awareness of social presence." Instructors need to understand what makes a learning community and appreciate their dynamic role to strengthen and support the community.

Fourth, adequate time is required for responding and reflecting both in the design of the work and

by providing the appropriate technology. Adequate time should be provided to allow online participants the opportunity to work collaboratively. They need time to arrange how the work will be completed, as well as have time to work independently and collaboratively. Further, designers need to draw from the lessons learned from scholarly literature in areas of computer-mediated communication and online learning environments to guide the selection and use of various ICT applications that are appropriate to support collaborative and active learning environments (e.g., synchronous for quick problem-solving and asynchronous communication when time is needed to reflect).

Facilitation of Online Collaboration

When facilitating online collaboration, we share two key recommendations. First, online instructors and experts or guests need to develop an understanding and a skill set in facilitating online discussions. According to Collison, Elbaum, Haavind, and Tinker (2000), three roles of a facilitator are: guide on the side, instructor or project leader, and group process facilitator. In each of these roles, facilitators must develop skills and confidence in moderating online discussions, in asking questions to provoke critical thinking and in responding so to foster dialogue.

Second, participants in the online collaborative learning environment need to understand the expectations of the learning tasks and discussions. When facilitating online collaborative work, the established expectations need to guide the work of all participants. Bender (2003) has advocated for instructors to clearly define expectations and they need to encourage students to be active learners. This may require teaching students to moderate a discussion, to ask open-ended questions to generate rich conversation and to respond in a manner that nurtures dialogue. By developing online facilitation skills among all participants, it allows people to share expertise and experience, to collaborate and to co-construct knowledge.

f utur E t r Ends

Our challenge as teacher educators is to help preservice teachers to develop an understanding of the relationship between technology and pedagogy so they can design and facilitate deep learning in technologically enhanced environments. They need to have rich experiences of how technology can be used to support meaningful learning in the 21st century global classroom.

From the study, three trends have emerged. First, as educators, we need to continue to find ways to move learning onto the digital global frontier so all stakeholders develop a deeper understanding of global relationships and to help nurture global citizenship. In a discussion on communities of learners, Jonassen et al. (2008) argued, "[s]eeing the world through another's lens expands each individual's worldview and lays the foundation for respectful, collaborative working relationships as students grow into the adult workers and leaders of tomorrow" (p. 135).

Second, acknowledging the current focus on social software and social networking, how can they be combined with various technologies accessible in classrooms to support student learning? Given the investment in ICTs, teacher educators need to help preservice teachers to explore ways to use various technologies and applications that best support learning outcomes such as critical and creative thinking, communication, collaboration, and problem solving.

Third, the challenge is to design learning that effectively and appropriately integrates a blend of technologies that allow stakeholders to create learning networks of people who share mutual interests. As we design collaborative learning opportunities, we need to determine what can be done best online and how to facilitate that experience, and at the same time determine what is best done in the face-to-face environment to support learning. In our classrooms and through the use of technology, we now design learning experiences for these two learnscapes which merge into one.

c onclusion

To move learning onto the digital global frontier requires an intentional and flexible design that fosters collaborative learning. From our experience, we have developed a greater understanding of the nature of the learning experience and the capacity of knowledge building. It is our hope that the preservice teachers who were involved in the project have the confidence to design innovative learning experiences with technology for their students and to bring the world into their classrooms.

What happens to learning when classrooms are no longer defined or confined by the physical space but are open to a digital landscape where people who share mutual interests come together to learn? Welcome to digital global frontier.

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kEy tErms

Cognitive Presence: "The intellectual environment that supports sustained critical discourse and higher order knowledge acquisition and application" (Garrison & Anderson, 2003, p. 55) of the learner.

Collaboration: "Involves interactions with other people, reciprocal exchanges of support and ideas, joint work on the development of performances and products, and co-construction of understandings through comparing alternative ideas, interpretations, and representations" (Wiske, Franz, & Breit, 2005, p. 105).

Community: "A social organization of people who share knowledge, values and goals" (Jonassen et al., 2008, p. 134).

Community of Inquiry: Where "students listen to one another with respect, build on one another's ideas, challenge one another to supply reasons for otherwise unsupported opinions, assist each other in drawing inferences from what has been said, and seek to identify one another's assumptions" (Lipman, 1991, p. 15).

Learning Communities: "Communities are collections of individuals who are bound together by shared ideologies and will, so a learning community emerges when people are drawn together to learn. Although learning communities emphasize outcomes in education, their power resides in their ability to take advantage of, and in some cases, invest a process for learning" (Kowch & Schwier, 1997, p. 1).

Social Presence: "The ability of participants in a community of inquiry to project themselves socially and emotionally, as 'real' people though the medium of communication being used" (Garrison et al., 2000, p. 94).

Teaching Presence: "The design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes" (Anderson et al., & 2001, p. 5).

Chapter XIII
Engineering for Interdisciplinary Collaboration

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abstract

This chapter introduces Collaboration Engineering as an approach to developing more effective collaborative sessions for interdisciplinary teams. Collaboration is the foundation for success for many academic teams; however, the benefits of collaborative sessions can be lost when group processes are not well understood and the needs of interdisciplinary teams are not met. As such, this chapter will identify key facets of how interdisciplinary teams develop and evaluate potential solutions. Groupthink and disciplinary ethnocentrism are also presented, as these factors can negatively impact interdisciplinary teams, and techniques are proposed that can help teams avoid these potentially negative effects. The central position of this chapter is that Collaboration Engineering based on proven group processes and guided by design recommendations specific for interdisciplinary team collaboration can result in session designs that improve outcomes for interdisciplinary teams.

introduction

Many interdisciplinary teams rely on group processes, and collaboration in particular, as a foundation for success. However, disagreements over a team's purpose and goals, lack of reliable information to base decisions upon, and poor communication are just a few of the challenges that collaborative teams face. These challenges are exacerbated when a team is composed of

people from diverse academic disciplines. Despite these drawbacks, interdisciplinary collaboration is commonly used in academia as the problems under study demand the skillful blending of the perspectives, concepts, and methodologies from diverse academic fields. As such, the goal of this chapter is to identify and examine issues that impact interdisciplinary collaboration in order to better understand how to design collaborative sessions for interdisciplinary teams. Blending this better understanding with the advanced capabilities of electronic Group Support Systems can help teams avoid potential pitfalls in interdisciplinary collaboration and lead to more synergistic solutions.

The chapter begins with a background of group processes, interdisciplinary teams, and Collaboration Engineering. An analysis of this background information then provides a theoretical basis for recommendations on ways to design better interdisciplinary collaboration sessions. Next, the chapter presents a discussion of possible research issues and future trends which when explored may offer potential for improving these results. The chapter concludes with an example of the approach presented.

background

A deeper understanding of the core processes that underpin collaborative initiatives can improve the process of designing successful interdisciplinary collaboration. This section will describe general group processes, aspects specific to interdisciplinary teams, and the emerging discipline of Collaboration Engineering.

group processes

Teams employ a number of processes and strategies to produce solutions to problems they face. Of specific interest here are the processes of brainstorming and evaluation of the ideas from a brainstorming session. The basic concept behind brainstorming is that when a group works together to generate ideas, each new idea contributed can trigger additional ideas in the minds of the participants. Osborn (1957), the father of the brainstorming technique, called this synergistic effect the "two-way current" of group collaboration and described a significant boost in the number and quality of ideas a group could generate. However, academic study revealed problems with the practice and showed that group participation could actually inhibit creative thinking, particularly when group size increased (Diehl & Stroebe, 1987; Taylor, Berry, & Block, 1958). Table 1 lists and defines some of the potential drawbacks that have been associated with traditional verbal brainstorming sessions.

Examination of the drawbacks identified in these studies and others showed that computer-assisted ideation techniques could be used to overcome several of these problems (Gallupe, Dennis, Cooper, Valacich, Bastianutti, & Nunamaker, 1992; Pinsonneault, Barki, Gallupe, & Hoppen, 1999). Specifically, research has shown that the use of computer-assisted ideation techniques in the design of a collaborative session can improve the results of brainstorming activities for the group (Gallupe et al., 1992). As a result, specific tools that embodied those computer-assisted ideation techniques were built into a class of computer applications referred to as Group Support Systems (Nunamaker, Briggs, Mittleman, Vogel, & Balthazard, 1997).

Once the brainstorming process has provided a collection of potential solutions, teams naturally turn to evaluating those options. At this point a potential pitfall termed "groupthink" emerges. First coined by Janis (1971), groupthink describes the tendency for a group to avoid negatively-perceived social consequences when evaluating contributions. For example, someone may choose to not question or criticize a possible solution for fear of being perceived as "not being a team player." Teams that experience groupthink will seek to

Table 1. Sources of productivity and quality losses in brainstorming

Source	Description
Production Blocking	Losses that occur when people have to wait while another person is speaking. Examples of how this might affect participants include that they may simply not get the opportunity to contribute within the allotted time, they might forget their ideas, or they may withhold ideas because they no longer believe it is an original or relevant idea. (Lamm & Trommsdorff, 1973)
Evaluation Apprehension	Losses that occur when people are concerned that others will perceive them negatively because of their ideas. (Diehl & Stroebe, 1987)
Social Loafing	Losses that occur due to a decrease in individual effort when people believe they have less directly-attributable responsibility for the team result (Latané, Williams, & Harkins, 1979)
Cognitive Interference	Loses that occur when the content of the ideas generated by others interfere with an individual's own ability to generate new ideas. (Lamm & Trommsdorff, 1973)

maintain unanimity and consensus regardless of possible errors in direction or effort (Janis, 1982). Classic examples of this phenomenon are the decisions made surrounding the Bay of Pigs Invasion in 1961 and the NASA Space Shuttle Challenger explosion in 1986. In both cases, incorrect actions were not challenged or questioned due to a desire to maintain consensus within a group (Janis, 1982; Moorhead, Ference, & Neck, 1991). The manifestation of groupthink is rooted in an inadequate effort to reasonably appraise alternate courses of action (Mullen, Anthony, Salas, & Driskell, 1994). Consequently, if groups are to prevent groupthink, alternative suggestions must be judged objectively and sufficient time must be spent on the evaluation process so that potential flaws or drawbacks are not overlooked.

A second integral component of evaluating options, especially as it relates to ensuring objective evaluation of those options, is the notion of persuasion. Persuasion is the act of influencing people to agree with a position—in this case that an option has merit and so is worthy of further consideration. A dual-process model of attitude change referred to as the Elaboration Likelihood Model describes two different methods in which information is processed that might result in attitude change (Petty & Cacioppo, 1986, 1996). The two routes to persuasion in the Elaboration Likelihood Model are the direct route and the peripheral route (Petty & Cacioppo, 1986, 1996). When an individual carefully and effortfully evaluates the merits of a given position, the message is following the direct route to persuasion. An example of this direct means of influence would be someone citing a credible fact from a known reference. This credible information is more likely to result in real, long-term change of opinion (Mcgarty, Haslam, Hutchinson, & Turner, 1994; Turner, 1991). Conversely, when a message follows the peripheral route to persuasion, it is typically not evaluated on information central to its merits or intention but instead is evaluated on less important characteristics like the attractiveness of the source (Petty & Cacioppo, 1986, 1996). For example, if the person being persuaded processes the information solely on the basis of the source's group membership, a peripheral means of influence, then the information tends to be less persuasive (Turner, 1991).

As such, information that possesses more substantive value and logical information stands the greatest chance of persuasion when communication is following the central route. Messages with weaker substantive grounding stand a greater chance of being persuasive if they are processed through the peripheral route where they will not be evaluated on the central merits of the message, but instead on less important characteristics like the attractiveness of the source (Petty & Cacioppo,

1986, 1996). Considering both the direct and peripheral routes to persuasion, the persuasive power of an argument depends on which route of persuasion is employed by the audience when the argument is evaluated (Mcgarty et al., 1994; Turner, 1991).

Within the context of our initiative, an inescapable fact of collaborative group work is that options will only continue to be evaluated if the team is persuaded that the option is worthy of further consideration. Because messages that follow the direct route to persuasion possess greater persuasive strength than messages that follow the peripheral route, it is beneficial to design interdisciplinary collaborative sessions in ways that emphasize the use of central route processing strategies. Specifically, this translates into de-emphasizing irrelevant peripheral factors like group membership of the individual providing a message and increasing opportunities for individuals to contribute relevant, credible information.

Interdisciplinary Teams

While there are numerous definitions of the word "interdisciplinary" that vary in their precise word choices, the theme that runs through these definitions is the integration of knowledge. Building on this theme, interdisciplinary teams are those teams with members drawn from different academic disciplines in order to accomplish a specific purpose through the careful integration of their respective philosophies, concepts, and methodologies. Academic environments, such as a university, provide rich opportunities for such teams, as evidenced by recent trends in research funding (Derry & Schunn, 2005).

Previous research has suggested that if heterogeneous teams are going to benefit from including different disciplines on a team, they must "consciously integrate knowledge from the different disciplines included" (O'Donnell & Derry, 2005, p. 54). An obvious opportunity for integrating knowledge from the different academic disciplines is during the search for alternative solutions to the challenge the team faces. It is during this "search phase" that teams may be able to achieve better collective comprehensiveness in solutions by intentionally including ideas from all of the disciplines equally. Campbell (2005, p. 3) described this approach when he said that interdisciplinary teams must deliberately create "overlapping patterns of unique narrowness" as they interact to solve problems. These overlapping patterns serve to focus each discipline's knowledge and experience on various aspects of the problem, providing in-depth knowledge within their specialty area and working knowledge of related areas to yield a more robust solution.

Carrying this idea a step further, the heterogeneous nature of interdisciplinary teams can help prevent phenomena like the groupthink effect described earlier when those different perspectives are integrated. The thought here is that each discipline represented in the team will have its own unique perspective of the circumstances due to their respective philosophies and educational backgrounds. By ensuring that each discipline has the opportunity to study and comment on the ideas that the team is evaluating without pressure from the other disciplines, the chances of overlooking drawbacks will be reduced. Unfortunately, Campbell (2005) noted that a primary barrier to effective communication across disciplines is what he called ethnocentrism of disciplines. Campbell (2005) draws parallels to the phenomenon that occurs when nationalistic or tribalistic tendencies cause one group to shun members or ideas from another group. Building upon this concept, he described disciplinary ethnocentrism as a tendency of disciplines to look within themselves for solutions rather than including people from other disciplines.

In some respects, disciplinary ethnocentrism is a special case of stereotyping. The holders of stereotypes believe their simplified views of members of other groups can be used to understand important background characteristics of

people, such as their beliefs, values, or personal characteristics (Jussim, Coleman, & Lerch, 1987). In the case of disciplinary ethnocentrism, the use of stereotypes will likely hinge on the perceptions of in-groups and out-groups. An in-group is the group that a person sees himself or herself belonging to, and out-groups are made up of those not belonging to the in-group. Individuals tend to view the characteristics of out-group members as homogenous within the out-group, and as a result, act upon those stereotypes when interacting with out-group members (Park & Rothbart, 1982). In an interdisciplinary collaboration context, disciplinary ethnocentrism increases the risk that team members will look at the overall group as a collection of in-groups (e.g., teammates from their discipline) and out-groups (e.g., teammates from the other disciplines) and apply stereotypes based on these perceptions.

These in-group/out-group stereotypes can also influence how people process information from other members (Mackie, Worth, & Asuncion, 1990; Vonk, 2002). Oftentimes information will be received and processed so that it fits within the stereotype in use at the time the information becomes available. The traditional thinking on this topic has been that people tend to view in-group members as more important and so pay more attention to information from those sources (Mackie et al., 1990). However, when new information does not fit the listener's stereotype of what was expected from the information source, it creates conflict in the listener's mind. This conflict between available information and salient stereotype can force the listener to re-categorize the source of the information (Vonk, 2002). This reconciliation and re-categorization process causes the listener to pay closer attention to the original information, which in turn may increase the chances of that new information being more persuasive in the evaluation process (Vonk, 2002).

When considering what types of information can trigger re-categorizations, out-groups are generally perceived as being more homogenous and the stereotypes as more narrow (Park & Judd, 1990). This means that out-group members are expected to respond in similar ways, and the variety of responses will be limited. For this reason, when new, or unexpected, information comes from out-group members (i.e. people from other disciplines in our interdisciplinary context) it could trigger more instances of re-categorization with an attendant boost in the quality of the evaluation process. On the other hand, stereotypes of in-group members tend to be much more malleable and so are more easily adjusted to accommodate stereotype-inconsistent information (Vonk, 2002). As a result, new information from an in-group member may not receive the increased level of attention that new information from an out-group member would receive. The important consideration in terms of interdisciplinary collaboration is that exposure to out-group member's statements increases the variability of stereotypes associated with those members and may prompt greater attention to out-group comments (Vonk, 2002). Accordingly, when designing a collaborative session for an interdisciplinary team, there is benefit in promoting individual dialogue on key issues to promote higher cognitive attention to these ideas so as to level the playing field between in-group and out-group members.

Another aspect of leveling the playing field within an interdisciplinary team arises from the fact that there has been an historical "pecking order" among the disciplines that devolves from the perceived ranks of the disciplines. This pecking order has been seen to cause certain ideas to be valued more highly than others (Klein, 2005) and can generally frustrate the equal participation that quality decisions depend upon. Campbell (2005) noted that phenomenon like this isolates the team from skills, knowledge, and perspectives that may be useful. These effects further demonstrate the importance of designing sessions that encourage equal participation with an emphasis on the individual vice their respective group.

Collaboration Engineering

In the past, teams have recognized the difficulty of reconciling the many considerations identified in the previous section and so have sometimes called on professional facilitators to design processes and conduct group interactions for them. This tendency is even more pronounced when they intend to use sophisticated Group Support Systems in their work sessions (Briggs, de Vreede, & Nunamaker, 2003). Research shows that a facilitator using collaboration technology can significantly improve a team's efficiency, effectiveness, and satisfaction (Anson, Bostrom, & Wynne, 1995; Miranda, 1994). However, the cost of facilitation services can be considerable, so facilitation is beyond the reach of many teams who could benefit from such assistance. Collaboration Engineering is a newly emerging field that seeks to bring some of the benefits of facilitation to teams who do not have access to facilitators (Briggs et al., 2003). Collaboration Engineering is a two-pronged approach to the design of reusable collaborative processes for high-value tasks and the transfer of those processes to teams to execute for themselves without the on-going intervention of professional facilitators (Kolfschoten, Briggs, de Vreede, Jacobs, & Appelman, 2006).

On the design front, Collaboration Engineering researchers have made considerable progress developing methods to support the design of predictable collaborative work processes that reliably move a team to its goals. One of the major breakthroughs in this effort came when researchers realized that people tended to move through a reasoning process that consists of a core set of six basic patterns of collaboration (Briggs et al., 2003). Table 2 presents a description of each of these patterns.

Each pattern of collaboration produces its own unique result, but in general, these patterns of collaboration represent actions that move a group from one state to another. For example, when diverging, a group moves from having fewer ideas to having more ideas. Extending that example, it is possible to relate these patterns of collaboration to the group processes of brainstorming and evaluation that were described earlier. For example, the generate pattern reflects the same basic process that is used in brainstorming, and the evaluate pattern relates to the process of weighing these options.

These patterns of collaboration represent the building blocks a collaboration engineer uses to develop a process design, and they are instantiated through the use of thinkLets (de Vreede & Briggs, 2005). As described by de Vreede and Briggs

Table 2. Patterns of collaboration

Pattern	Description
Generate	Move from having a few concepts to having more. Possible subpatterns may include gathering, creating, or elaborating.
Reduce	Move from having many concepts to focusing on a few worthy of more attention. Possible subpatterns may include selecting, abstracting, or summarizing.
Clarify	Move from having concepts in little detail to having them in more detail. A possible subpattern may include describing.
Organize	Move from less understanding to more understanding of relationships between concept components. Possible subpatterns may include classifying or structuring.
Evaluate	Move from less understanding of concepts to more understanding. Possible subpatterns may include polling, ranking, or assessing.
Build Consensus	Move from having less agreement to having more agreement. Possible subpatterns may include measuring, diagnosing, advocating, or resolving.

(2005), each thinkLet represents one repeatable, predictable collaboration activity that can move a group toward a goal. To accomplish this goal, each thinkLet must define the specific activity necessary, the capabilities that the participants need to complete that activity, any rules necessary to constrain their actions, and parameters that inform the activity leader how to guide the team through the activity (Kolfschoten, Briggs, Appelman, & De Vreede, 2004). ThinkLets can be then combined in different ways to build a tailored process for the specific task at hand. This tailored process, built by a collaboration engineer, becomes a packaged, repeatable pattern of collaboration that moves people toward their stated goals and represents the end product of a Collaboration Engineering effort (Briggs et al., 2003).

De Vreede and Briggs (2005) further argue that all Collaboration Engineering interventions (i.e. a purposeful combination of thinkLets used to move a group toward a specific goal, in Collaboration Engineering parlance) are meant to cause particular outcomes. To be purposeful, an intervention should be built upon theoretical foundations that suggest what those expected outcomes should be. For example, Collaboration Engineering processes, guided by specific domain theory, have been used to successfully assist groups with collaboration in areas such as usability testing (de Vreede, Fruhling, & Chakrapani, 2005), creativity (Santanen, Briggs, & de Vreede, 2000), and incident response planning (Davis, Kamal, Schoonover, Nabukenya, Pietron, & de Vreede, 2006). In the case of interdisciplinary collaboration, the collaboration components should be efficacious to the interdisciplinary nature of the team (Murphy & Yurkovich, 2007).

Turning to the second "prong" of Collaboration Engineering, the transfer of these designs to practitioners, the specific processes used to implement the designed session rely heavily on the person who executes the session, often called a facilitator. Facilitation is defined as "a dynamic process that involves managing relationships between people, tasks, and technology, as well as structuring tasks and contributing to the effective accomplishment of the meeting's outcome" (Clawson, Bostrom, & Anson, 1993). In a team meeting, the facilitator is responsible for leading team discussions and should act impartially in regulating and supervising a team's communications, and Collaboration Engineering research has shown that facilitation is a critical success factor for Group Support Systems sessions (de Vreede, Boonstra, & Niederman, 2002). According to Briggs et al. (2003) "a good facilitator is capable of designing and supporting any collaborative process that is required by drawing on facilitation techniques and Group Support Systems functionality" (p. 44). Collaboration Engineering facilitators rely on the techniques and methods of thinkLets and the patterns of collaboration. Within the context of interdisciplinary collaboration the facilitator plays a crucial role in helping the team avoid groupthink by ensuring that all of the options are fully and objectively evaluated and not limiting the time allotted for that discussion. Furthermore, while the session design should account for issues of ineffective brainstorming activities, groupthink and disciplinary ethnocentrism, the facilitator is the last line of defense against these interdisciplinary collaboration challenges.

Engin EEring Eff Ectiv E int Erdisciplinar y c ollabora tion

Given the challenges to successful interdisciplinary collaboration described above, how can one use the principles of Collaboration Engineering to design an interdisciplinary collaboration session that has high potential to yield successful results? This section ties the chapter together by presenting a design solution that incorporates key dimensions of the theoretical bases of group processes and interdisciplinary teams.

The product of a Collaboration Engineering initiative is a collaboration process design. As informed by the theoretical work described above, there were several key points relative to group processes and interdisciplinary collaboration in particular that should guide the design effort. The potential problems identified above include: less effective brainstorming activities (e.g., due to production blocking, evaluation apprehension, social loafing, and cognitive interference), the propensity toward groupthink, and disciplinary ethnocentrism. The success of an interdisciplinary collaboration session depends on the degree to which the session design addresses these potential challenges. Addressing these issues requires that the collaboration engineer ensure that each individual participant gets ample opportunity to get their ideas out into the open for everyone to consider and that the team then devotes adequate time to developing shared understanding of those ideas (Brown & Paulus, 2002; Campbell, 2005; Klein, 2005; Mullen et al., 1994). For example, if the team needs a brainstorming activity, previous studies have identified the use of electronic brainstorming as a viable strategy to increase the effectiveness of ideation sessions (Dennis, Aronsen, Heninger, & Walker, 1999; Gallupe et al., 1992). This tool enables everyone to contribute ideas, helps avoid groupthink (Brown & Paulus, 2002), and fosters social exchanges (Klein, 2005) that ameliorate potential effects of disciplinary ethnocentrism (Campbell, 2005).

If the interdisciplinary team needs to create clear, concise, non-redundant statements of topics identified in a brainstorming session, they should use a guided dialogue format that promotes social exchange (Brown & Paulus, 2002; Klein, 2005; Nunamaker et al., 1997). This social exchange helps build shared understanding, brings diverse disciplinary knowledge to bear, and helps participants understand additional ways they can contribute to projects that might have been ignored without appropriate discussion. Additionally, this social exchange improves every facet of interdisciplinary teamwork—producing better overall quality ideas while avoiding groupthink and disciplinary ethnocentrism (Brown & Paulus, 2002; Campbell, 2005; Klein, 2005; Moorhead, Ference, & Neck, 1991).

To prioritize topics identified by an interdisciplinary team, a two-stage evaluation pattern is recommended. First, each participant should get the opportunity to individually advocate for the topic he/she felt was most important, giving them their "day in court" for their number-one topic and allowing the team to process the information in the most persuasive way possible (Mcgarty et al., 1994). Then, a non-binding, anonymous straw poll (i.e., a thinkLet for evaluation in which participants cast votes and review consolidated results) allows participants to evaluate ideas without attribution which could expose them to social pressures (Mackie et al., 1990; Vonk, 2002). This approach helps avoid the groupthink and disciplinary ethnocentrism issues (Campbell, 2005; Moorhead et al., 1991; Mullen et al., 1994). Together, these thinkLets that support the pattern of evaluation also helped build consensus and shared understanding among the participants (Briggs et al., 2003; Klein, 2005).

The Collaboration Engineering process demands that a session designer carefully consider the meeting objectives and the psychological/sociological needs of the team requesting collaboration support. These factors then guide designer choices for specific thinkLets to fit with those factors. In the case of interdisciplinary collaboration, the nature of the interdisciplinary team steers those selections towards collaborative activities that emphasize individual dialogue and perspective on potential solutions for the team (Murphy & Yurkovich, 2007). Collaboration Engineering currently provides a collection of 50+ thinkLets that can be used in various scenarios; the specific thinkLets discussed here are not the only choices available, but they represent examples of specific choices that can fit the needs of an interdisciplinary team.

rE s Earc H issu Es and f utur E t r Ends

While the previous section presented some specific, theory-driven design recommendations for interdisciplinary team collaboration, there are still several aspects of Collaboration Engineering for interdisciplinary teams that need more study.

First, some authors have argued that little work has focused on interdisciplinary work and education to date (Derry, Schunn, & Gernsbacher, 2005). To some degree this may be due to the complex nature of interdisciplinary work—research into interdisciplinary collaboration should itself be conducted by interdisciplinary teams too. Our position is that the mixed background of interdisciplinary teams creates an ideal situation for thinking about phenomena and concepts in a different light. For example, we have followed such a practice with this research, with two authors from information technology backgrounds, and the third from a psychology background. Despite the inherent challenge of interdisciplinary research, there is a growing interest in interdisciplinary research as evidenced by the publication of this book and by the increase in funding available for interdisciplinary work (Derry et al., 2005).

Also, while there has been significant research into the general topic of facilitation within the Collaboration Engineering community, there has been little research into facilitation of interdisciplinary teams. Most studies to date have examined subjects with similar backgrounds or have not described the backgrounds of the subjects. This challenge of studying interdisciplinary facilitation is made more difficult by the fact that not everyone has access to the skilled facilitators who are necessary to run successful sessions. This lack of availability was one of the primary reasons that thinkLets, which can be executed by less skilled facilitators, have been proposed as easy-to-follow repeatable patterns. Another specific research issue related to the execution of sessions is the lack of methods for the measurement of the interdisciplinary effects such as those mentioned in this research; specifically, phenomena such as groupthink and disciplinary ethnocentrism. While one can build on previous studies and derive recommendations from those theoretical bases, without validated measurement instruments it is difficult to show conclusively that recommended techniques have actually achieved the desired effects.

Future research on Collaboration Engineering for interdisciplinary teams might also focus on the technologies that teams use. Increasingly, educational institutions and private/commercial organizations are relying more heavily on technology-supported collaboration due to the expansion of global markets and the need to access experts who are geographically dispersed (Beranek, 2005; DeRosa, Hantula, Kock, & D'Arcy, 2004). This chapter has focused on face-to-face collaboration for interdisciplinary teams, however additional challenges may be found when moving these interdisciplinary teams to a more virtual workplace. For example, even something as simple as setting a meeting time can be challenging for a globally distributed team meeting inside a virtual environment—when the team intends to meet at 2:00pm, is that 2:00pm Eastern Standard Time, or is that 2:00 pm in Calcutta which is 12 time zones away? And this challenge just scratches the surface for the multitude of cultural, social, and psychological issues that can surface when moving a CE-designed session into some of the more robust virtual environments, such as Second Life.

c onclusion

This chapter has presented a background of group processes, interdisciplinary teams, and Collaboration Engineering in order to provide a theoretical basis for recommendations on ways to design better interdisciplinary collaboration sessions. Engineering a collaborative session involves mak-

ing a series of choices that are ultimately guided by the participants' purpose for meeting. Different patterns of collaboration are linked together to lead the team through a series of activities necessary to achieve this purpose. Making good choices of which pattern of collaboration to use at each step and how to implement each pattern lies at the heart of successful Collaboration Engineering. Understanding the particular needs of interdisciplinary teams allows a collaboration engineer to be even more effective for interdisciplinary teams. Blending that better understanding with the advanced capabilities of electronic Group Support Systems can help groups avoid the pitfalls attendant to interdisciplinary collaboration, leading to more synergistic solutions to the challenges interdisciplinary teams face.

The approach described in this chapter was used for an interdisciplinary team at a metropolitan university in the mid-western United States. The Colleges of Architecture, Construction Sciences, and Information Sciences and Technology had the opportunity to develop proposals for interdisciplinary research projects. A total of $20,000,000 was available to fund interdisciplinary research, with one of the few stipulations being that each project had to include students from multiple colleges. The team met for a 2-hour collaborative session that was designed using the principles outlined here and identified over 20 potential opportunities. The top ten of these projects were selected for further development during the session and multidisciplinary teams with talents and interests specific to each project were identified at the end of the session. The participants were surveyed at the end of the session and reported high levels of satisfaction with the process (4.2 on a 5-point scale) and acceptable levels of satisfaction with the quality of the session results (3.89 on a 5-point scale). Perhaps more importantly, several participants reported continuing to work together two weeks after the session, though it is not known if any of the proposals ultimately received funding. Either way, this chapter has made a clear argument for the value in relying on interdisciplinary teams in order to identify and solve problems and shown how the techniques described in this chapter can be used effectively in a real-world environment.

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kEy tErms

Brainstorming: When a group works together to generate ideas, one person's contributions may trigger ideas in the minds of the other participants while at the same time their ideas may also spark ideas in their own mind too.

Collaboration Engineering (CE): An approach to the design and deployment of reusable collaborative processes that support mission-critical tasks and posited that to achieve a goal collaboratively (see Briggs et al., 2003).

Groupthink: The tendency for a group to avoid negatively-perceived social consequences within the group when evaluating contributions.

In-Group: The group that an individual sees himself or herself as belonging to.

Interdisciplinary Groups: Groups with members drawn from different academic disciplines to accomplish a specific purpose through the careful integration of their respective philosophies, concepts, and methodologies.

Out-Group: The people outside the group that an individual sees himself or herself as belonging to.

Persuasion: The act of influencing people to agree with a position.

ThinkLets: Represents one repeatable, predictable collaboration activity that can move a group toward a goal.

Chapter XIV
Back to Basics:
Electronic Collaboration in the Education Sector

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abstract

Communication technology, which is not constrained by geographical boundaries, has increasingly resulted in faster and more efficient ways to maintain contact. When utilising electronic technology in the classroom it is essential for teachers to respect cultural differences and instil the importance of basic communication skills to their students. Many school students are extremely comfortable in using developing technologies, but are unaware of the equally important need to establish relationships to enhance the quality of information they are exchanging. Electronic communication is a necessary part of developing the skills of a lifelong learner. These forms of communication have encouraged processes such as collaboration to occur by creating exciting synergies between people and resources that may have not been previously possible. This chapter will explore several examples of how schools and teachers are using the Internet to collaborate and share ideas and resources between staff and students.

introduction

At no other time in human history have humans been able to communicate as freely or as widely as they now do in the digital age. Because of its ability to speed up communication processes, as well as its inclusion in many diverse areas, technology has increasingly become an important

element in many collaborative processes. Many of the traditional tools used to collaborate, such as phone calls, letters, and personal conversations are time consuming, and at times, inappropriate for the speed of communication required. Most areas of our modern life are affected by digital technology from global positioning systems (GPS) in vehicles, which help us find our way, through to mobile telephones that allow us to communicate anywhere and anytime. This pervasive and rapidly developing technology gives us rapid and easy access to information. Technology has enabled people to meet regionally, nationally, and internationally through the technology of videoconferencing, which allows them to interact in real time (synchronous communication). The rapidity and frequency of this type of communication, however, presents new challenges to society's values. As technology develops, it is necessary to develop or recontextualise laws, policies, personal skills and attitudes to foster its desirable aspects and mitigate its undesirable aspects.

Digital technology—specifically computers, the World Wide Web (Web or WWW), and the Internet—are reshaping communication processes. Geographical boundaries, which belong to the traditional era of communication, are becoming less important as technology pervades the globe. The rapid and pervasive nature of technology means that communication across the globe can be as instantaneous as face-to-face communication. Therefore, digital communication, which can occur globally or in the local classroom, conveys cultural and ethical values and meanings. These need to be understood and respected by school students if they are to be purposeful and productive users of digital technologies. In recognising these changes, it is important for the education sector not to see global changes only insofar as they affect local change. It is imperative for the education sector to recognise how electronic information can be used to provide greater depth and breadth to the process of learning in a global context. An important concept underpinning the effective use of digital technologies is *communication* and *collaboration*. In this chapter, the term collaboration refers to a pervasive relationship in which all parties are fully committed to a common goal. This chapter aims to highlight current practice and research as it pertains to digital communication in education, and along the way to stimulate thought on the topic of synergy and educational collaboration.

Collaboration

The term collaboration has been generally considered to be a process engaged in by more than two people; but this is where general agreement of the meaning ends and misuse of the term begins. Many people purport to work collaboratively when in fact the process is more cooperative, meaning there is less personal and financial risk (White & O'Brien, 1999; Winer & Ray, 2000). Engaging in a collaborative process is about embarking on a relationship which relies on the positive aspects of human nature to work effectively. Although there are many texts, particularly in management or business which describe group work strategies (Brown, 1991; Chalmers, 1992; DuBrin, 1997; McDermott, 2002; Reed & Garvin, 1983; Toseland & Rivas, 1998), it has been only recently that the human aspect of working together has been emphasised (Barrentine, 1993; Buzzanell, 1994; Clift, Veal, Holland, Johnson, & McCarthy, 1995; Farrell, 2001; John-Steiner, 2000; Paulus & Nijstad, 2003; Rosener, 1990; Rost, 1991; Winer & Ray, 2000). For the purpose of this chapter, the word *collaboration* is defined as a durable, intense and pervasive relationship which is built up over time. People who collaborate are fully committed to the relationship, and there are well-defined communication channels which operate on all levels.

Communication

Communication is such a basic, and perhaps fundamental, element that it is often a process that is taken for granted. As humans, we communicate in

person, via the post, over the telephone, and in the last decade, increasingly with computers over the Internet and via mobile phones. Whilst the basic tenets of communication have not changed, the pace and amount of information has increased. This is particularly true in the education sector. Whether communication takes place between teachers, students, parents, administrators or other individuals it needs to be done purposefully and productively if organisational goals and objectives are to be achieved. If effective communication channels are not established and maintained, or if staff communication skills are not adequate, the schools' ability to work and operate is significantly impeded. If this occurs, the schools' purpose to educate its students may not succeed. Collaboration is not just utilising a range of enabling technological tools, it also requires a committed and effective group with members willing to openly share and respect one another's ideas. Technology, in particular e-mail and mobile telephony, has changed not only how we communicate but also when we communicate. This mobile and fast paced communication is also changing the language of communication which can lead to breakdowns in communication and miscommunication between people.

The microprocessors which form the "brains" of computers, mobile phones and other information and communication technology (ICT) devices are unique amongst machines. The microprocessor enables ICT devices to be logically malleable. This malleability means that new algorithms (computer instructions) can be written which alters how the machine functions, performs and interprets data. The adaptability of ICT devices has been the major driving force behind the digital revolution. Information and communication technology generally refers to those technologies that are used for accessing, gathering, manipulating and presenting or communicating information. The technologies could include hardware (computers, mobile phones, personal digital assistants); software applications (word processing packages, presentations software); and connectivity (Internet access, local networking infrastructure, videoconferencing). What is most significant about ICTs is the increasing convergence of computer-based, multimedia, and communications technologies into a new field of technology called digital technologies which is characterised by the rapid rate of change of both the technologies and its use.

Technological advances in communication have resulted in a greater awareness of the global community in which we live and interact. Many countries, including Australia, the United States and the United Kingdom, are part of a global shift from "material to knowledge and intellectual resources as the basis for economic growth" (Commonwealth of Australia, 2000) and reform. The knowledge economy is driven by the requirement for rapid innovation in competitive global markets, and is enabled by the capacity of digital technologies to store, process and deliver information. Shifts in global corporate and industry markets has prompted educators across the globe to recognise that school students must have an education that will enable them to participate purposefully, productively and as contributors to the global market. The emphasis on the analysis of information has been in direct contrast to the dotcom boom of the 1990s, which connected suppliers and customers with a way to exchange information electronically, rather than analysing the information being exchanged. World wide, the trend is for governments to support major program initiatives to increase the use of digital technologies in schools.

In Australia and New Zealand, this is evidenced in the government funded Learning Federation (http://www.thelearningfederation.edu.au/tlf2/) which designs and delivers online curriculum content for all Australian and New Zealand schools. The United Kingdom has the British Educational Communications and Technology Agency (BECTA) (http://about.becta.org.uk/) to foster the improvement of technology in schools. The

United States through the Office of Educational Technology (OET) (http://www.ed.gov/about/offices/list/os/technology/index.html) is responsible for coordinating, developing and implementing the Department's educational technology policies, projects, professional development programs and executing The No Child Left Behind Act (NCLB, 2001) and the Elementary and Secondary Education Act (ESEA). Each of these countries national initiatives are supported by a host of state and local school initiatives many of which are using highly successful schools and teachers as role models for other schools, thereby acting not only as role models but also as catalysts for change. For these and other programs to be effective, stakeholders need to collaborate and communicate effectively and often this communication and collaboration is done via digital means due to the size of the countries and the number of individual schools involved in the program.

What each of the preceding programs has in common is that at the heart of each is the belief that the purpose of schooling is the education of others. The teaching and learning process is based on communicating effectively. Without effective communication ideas, directions, and thoughts are lost or misunderstood. In the education sector this can have serious repercussions. Students may not understand class material, teaching support staff may not understand directions given to them, and teachers may not understand that a communication gap is hampering their teaching efforts. In order to be understood in the manner in which we intend we must learn to communicate effectively. Vygtosky (1978) proposed that collaborative activity allowed children to imitate one another, demonstrating behaviours that were beyond their individual abilities. The open form of communication, necessary in the collaborative process, also supports the mastery of language as an important aspect of this exchange. Vygotsky proposed that an individual learns through relationships with other individuals and this new knowledge was internalised by the individual and became part of their own development.

For the purpose of this chapter, communication is the ability to share information with people and to understand what information and feelings are being conveyed by others. Communication can take on many forms including body language: gestures, facial expressions, signs, vocalizations (including pitch and tone); in addition to speech and written communication. It is possible to also communicate with others using devices such as phones and the Internet (e.g., voice-over Internet services such as Skype). Additionally the technology can communicate with humans or with another machine, based on their internal algorithms, and so communication can occur between humans, between machines or between humans and machine (*humachines*). As the technology becomes more sophisticated, it is becoming increasingly difficult to distinguish between human users and machine users (Lyytinen &Yoo, 2002). By this, we mean that a human may e-mail what they think is another human, such as a news group or discussion board, and get a reply from a machine that appears to the sender to have originated from another human. Additionally, humans may register personal interest items with a Web site or news group (e.g., Listserv) which in turn sends the user information on their interests (see language translators later in this chapter). Often, these messages are in a personal tone and hence appear to have been written by a human, when in fact, they have been written by a machine based on a specific algorithm.

In a school context, teacher, students, and support staff frequently rely on nonverbal methods to communicate directions and feelings. A smiling, nodding face indicates that the listener is interested in what we are saying and encourages us to continue, whilst negative body language such as folded arms or being engaged in marking papers whilst a person is talking to you indicates that the listener may be disinterested. Communication includes a broad range of verbal and nonverbal clues which need to be considered when one uses digital devices to communicate to others. Being aware of the necessary skills that promote and

encourage open communication is important when working with others. Open and effective communication promotes an awareness of others' interests and needs and enables individuals to work collaboratively. This may be difficult to achieve in machine-driven communication (see netiquette later in this chapter).

The importance of effective communication is particularly evident in small communities, such as schools. As the majority of teachers will attest, in any sector of schooling there is an ever-increasing diversity of cultural, ethnic, language, social-class, and family backgrounds amongst the school community. However, the language of parents and educators can be very different, resulting in communication problems. As Henry (1996) notes, the irony is that although educational jargon is not difficult, it can be used in such a way as to alienate and exclude people, automatically sabotaging any attempts to communicate effectively. Because of this perceived superiority, many parents may defer to a teacher, even when they have an important contribution to make (Henry, 1996, p. 147). Educators, teachers and administrators should be able to communicate easily with a wide range of people, particularly if they are sincere in sharing decision-making. In the same way, technology also utilises jargon which needs to be understood by users in order to know what they want and how they can achieve it.

Communication and Collaboration

Collaboration, by necessity, utilises an open form of communication. Participants have to reveal their thinking to one another in order to facilitate the collaborative process. Communication is such an important element in collaboration that time, before and during the project, should be set aside so that participants have the opportunity to engage with one another. In all collaborative groups, it is important to meet regularly to ensure that everyone has access to the same information. If this does not occur, participants may feel that they and other members were being treated differently. There also needs to be both formal and informal ways for communication to be facilitated within the group. Procedural issues such as payment, or work schedules on the project must be necessarily formalised. However, informal communication where participants have the opportunity to establish personal connections is extremely important. Providing opportunities for social occasions when this can occur will result in opportunities to network. Ultimately, the group will be more informed and will have more cohesion.

In collaborative groups, it is also important to acknowledge the power of language. The use of jargon and terms which all participants may not be familiar with will be ultimately divisive. Clarification and clarity of terms utilised, ensures that all members of the group are speaking the same language. Meaning can be easily misconstrued, both in terms of text and language. Facilitative leaders must encourage participants to clarify anything they are not sure of, nor are comfortable with; however, this does not infer that collaborative groups have to be passive.

The establishment of rapport, in a collaborative group, can only occur if relationships have first been fostered within the group, or developed during the collaboration. Encouragement to share stories and achievements in an atmosphere of mutual respect, understanding and trust creates rapport between participants. This mutual sharing also allows participants to ascertain the different types of personalities within the group. As the group progresses, these stories of its achievements will become shared stories for, and of, the participants. Becoming part of a group can be inherently risky for individuals, and demonstrates a degree of trust or willingness on the part of the participant. This trust needs to be reciprocated by the collaborative group.

Electronic Collaboration

As has been noted earlier in the chapter, collaboration involves individuals coming together to work on a shared purpose. Traditionally, collaboration

has utilised face-to-face, mail correspondence, or the telephone as forms of communication. The advent of the World Wide Web and the Internet in the mid 1990's resulted in communication mediums becoming quicker and more accessible. Individuals can now communicate anywhere and anytime regardless of their physical location or language[1]. Electronic collaboration connects individuals together using electronic communication tools such as e-mail, bulletin boards and newsgroups. To understand electronic communication and how to communicate electronically for collaborative purposes requires an understanding of how this medium differs from other communication mediums.

Fundamentally, electronic communication differs from other methods of communication, as shown in Table 1. The differences as indicated in this table have implications for how the medium is used for communication and collaboration. In particular, electronic communication may require participants to re-evaluate their communication etiquette.

When using digital technology—and in particular, Web-based resources including e-mail, blogs[2], Wikis,[3] and to a lesser extent, video conferencing—users need to be aware that the etiquette or rules of communicating are different from face-to-face environments. The rules of the Web or *netiquette* are evolving rapidly, due to the evolution of the Web from its static click and read pre1995 asynchronous days to the growing proliferation of Web-based sites and materials that can be accessed synchronously and contributed to by any user. This new adaptable Web was termed *Web 2.0* by Tim O'Reilly (2005), and was meant to distinguish the differences between the Web as we knew it; as a one-way communication medium, a collection of silos of information, and a reference source, towards a new-wave interactive Web.

The term "Web 2.0" is meant to represent a new version of the Web and follows the protocol of releases of new versions of software—for example, Word 6.0 or Internet Explorer 7.0. It is argued that this new Web will allow users to take control, to self publish, to own information and to collaborate. This version 2.0 of the Web is still the Web as we knew it, but it has evolved and is able to represent social networking and collaborative working through add-ons such as RSS[4] (Really Simple Syndication), Podcasting[5], Blogging and Wikis, to user-defined Web applications such as MySpace[6], Flickr[7], or del.icio.us[8] which work on social bookmarking or tagging (folksonomies). The debate centres on questioning whether this is a *new* Web or simply the old Web evolving through increased and diverse usage.

Educators have been slow comprehending the new uses of the Web and especially to envisage the benefits to learners. Figure 1 (García, 2006)

Table 1. Electronic communication differences as compared to nonelectronic communication

Communication element	Difference
Speed	The time required to generate, transmit, and respond to messages
Performance	The methods of storing and archiving messages and the permanence of these files
Distribution cost	The financial and time costs associated with sending messages to one or more individuals and in receiving messages from others
Accessibility	The ease of accessing and directing communication between individuals
Security	The ability of authorised and unauthorised individuals to access electronically stored mail and files
Verification/Authenticity	The ability to verify the sender of a message

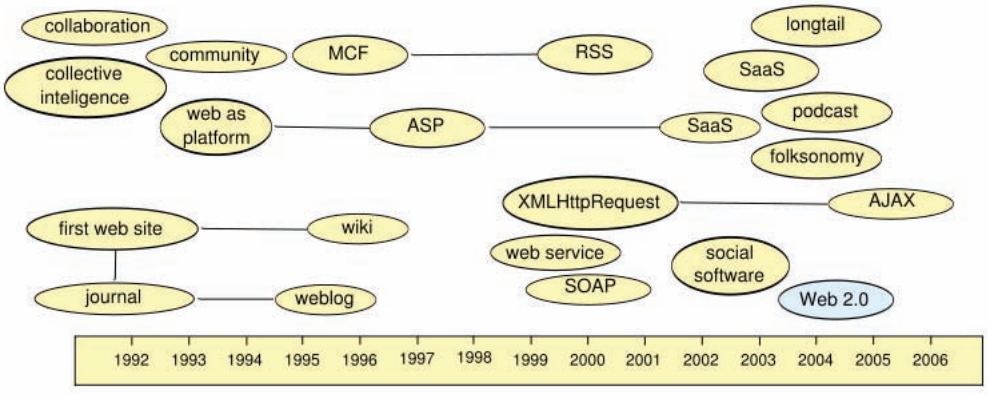
illustrates the age of Web 2.0 technology in which some of the previously mentioned options have been available for over a decade; yet educators are just beginning to cautiously investigate its place in the learning process. O'Reilly (2005) argues that the debate over whether Web 2.0 actually exists boils down to a simple debate over language, "[...] it's the old debate between language purists, and language pragmatists. The right words are the ones people actually use, and this word is catching on." Whatever the outcome of the debate, there have been some remarkable developments which allow teachers and learners to exploit the Web to author, inform, debate, collaborate, share information, and create knowledge.

Many of the Web 2.0 applications have been claimed by the Digital Natives[9] as their own, and they often resent educators' attempts to mainstream their use in schools. Educators themselves, whether they are Digital Immigrants[10] or Natives, are often divided about the learning benefits and opportunities stemming from such social software. Some educators favour a blanket ban on their use in schools due to the lack of control over the content, ethical and legal implications which may result from improper use. Others, whilst aware of the complications, evolve from readers into writers of the Web. Others argue that the new technology allows users to filter and track the ever-growing number of resources coming online each day more effectively and efficiently which then allows them to use these resources for communication and collaborative activities.

Weblogs, or simply "blogs," are Web sites that can be easily created and updated by those with little or no technical know-how. Internet publishing was once a complicated process; now it is almost as easy as sending an e-mail; there is no code, no file transfer, and in many cases, there is no Web site hosting setup. Users simply login to their Web site from any Internet connection, enter the content in a form then press a button to update their blog. Furthermore blogs do not have to be confined to text, they can display pictures, video, including audio and Flash, and even store other files like PowerPoint presentations or Excel spreadsheets that can be linked to other sites and materials.

The following paragraphs highlight several excellent examples of how schools are taking advantage of Web 2.0 technology to communicate and collaborate in cyberspace. For example, Meriwether Lewis Elementary School in Portland, Oregon (http://lewiselementary.org/blog/3) uses Web 2.0 technology, in particular podcasts to inform the school community of news and events and to showcase student work. Sandaig Primary School in Scotland (http://www.sandaigprimary.co.uk/) uses Web 2.0 technology to inform parents and the community about learning and events

Figure 1. Evolution of the Web



within the school. The school's Web site includes a variety of blogs which students under guidance, regularly contribute on a wide range of topics. It also includes regular podcasting activities where the students have created their own radio station and broadcast their shows for download. The site (http://www.sandaigprimary.co.uk/radio_sandaig/index.php) is fully interactive as users are able to listen to podcasts and leave their own voice message.

Digital communication does not have to be limited to countries that are seen as technological leaders. A prime example of collaboration between an economically rich country and a developing one is the Flat Classroom Project Wiki, (http://flatclassroomproject.Wikispaces.com/) where two schools, one from Bangladesh and one from the US, are sharing resources for the teaching of country specific history, geography and cultural studies. They are also using Flickr to share and store images and sound files. Another example of interglobal collaborating (http://classroomgoogleearth.Wikispaces.com/) is based on Google Earth[11] and allows educators and students across the World to share resources and ideas. Through educators and students sharing ideas and resources they are able to communicate and collaborate with others across the globe on the further development of ideas and materials. This effectively ensures that materials are constantly updated and participants become active and engaged members of the education community.

Collaboration in Schools

What the previous section has shown is that communication and collaborative practices are occurring in the education sector through the use of digital technologies. However, we believe that the adoption of these practices in conjunction with digital technologies is limited. In order to improve digital collaboration, a thorough understanding of what collaboration is and how to do it well is required. Malone (2005) describes collaboration as shared planning, with administrators talking to each other daily, sharing information and making decisions through a collaborative process. Although Malone did not fully explain how the collaborative process worked, she did indicate that it was a shared process which reflected the change in education and business from a less hierarchical "top down" approach to a more devolved horizontal structure with opportunities for decision making from those who were not in leadership positions. Friend and Cook (2003) in the text *Interactions: Collaboration Skills for School Professionals* state: "Interpersonal collaboration is a style of direct interaction between at least two coequal parties voluntarily engaged in shared decision making as they work towards a common goal" (p. 5). Friend and Cook contended that the use of the word "style" distinguished between the interpersonal experience of collaboration and the collaborative activity. They described the defining characteristics of collaboration in this context as follows: collaboration was voluntary; collaboration requires parity among participants; collaboration was based on mutual goals; collaboration depended on shared responsibility for participation and decision making; individuals who collaborated shared resources; and individuals who collaborate also shared accountability for outcomes (Friend & Cook, 2003, pp. 6–11). They further described the outcomes of a successful experience with the collaborative process as: individuals who collaborate valued this interpersonal style; professionals who collaborate trusted one another; and a sense of community evolved from collaboration (Friend & Cook, 2003, pp. 11–13). Although *Interactions* was written for teachers, there were many characteristics of collaboration described by Friend and Cook, which had commonalities across other sectors. The emerging goals from successful collaborations were the valuing of interpersonal style, trust and a sense of community.

Leonard and Leonard (2003) consider the institutionalisation of collaborative working environ-

ments to be critical to the creation and maintenance of schools as places of learning. Institutionalised collaboration takes on a higher level of significance as teachers, administrators and policy makers at all levels of the education sector are continually challenged to devise more effective and efficient ways to monitor, facilitate and enhance teacher performance, and thereby, improve student achievement and outcomes (Hall & Hord, 2001; Peterson, 2002). The concept of collaboration in schools and more generally schools as organisations has come to the forefront of the educational reform and school improvement literature (Beck & Foster, 1999; Darling-Hammond, 1997; Fullan, 2001; Garet, Porter, Desimone, Birman, & Yoon 2001; Hargreaves, 1998; Harris & Lambert 2003; Hopkins & Jackson, 2003; Uhl & Perez-Selles, 1995). Leonard and Leonard (2003) conducted a survey of 238 classroom teachers in 45 schools across Louisiana to examine how effectively teachers were collaborating in their schools. The Leonards' study indicated that teachers were collaborating to varying degrees and using a variety of collaborative practices, however even those who reported regular professional collaboration with their peers still reported dissatisfaction with some aspects of the process.

Schools are places where people and resources come together for a shared purpose. A school is thus a social community with culturally uniform entities in much the same way as other organisations including businesses, universities and clubs. Accordingly, Brown and Duguid (2001) and Pullen (in draft) believe that organisations find it difficult to transfer knowledge inside the organisation because of internal epistemic barriers amongst the members of the organisation. To overcome the epistemic barriers to knowledge promotion and transfer Brown and Duguid make extensive use of Lave and Wenger's (1991) notion of communities of practice (CoP). A community of practice focuses on the social and collaborative processes and practices of how individuals work and learn together within the context of finding a solution or an innovation to a problem. As such, CoP is concerned with situational learning and how individuals and groups come together to collaborate on a shared problem.[12]

Schools may be places of student learning but as the Leonard's (2003) study indicated they may not be places for teacher learning, as many teachers feel dissatisfied with the amount, timing and quality of the professional collaborative experiences they encounter. This finding is pertinent for as Wagner and Masden-Copas (2002) warn, school improvement will not be realized "unless teams of teachers improve together" (p. 43). The community of practice approach offers teachers and schools an opportunity to work together in a collaborative and synergistic way. Within the school community, or organisation, different individuals (humans) and machines (the technology) communicate and collaborate to achieve individual and organisational objectives. This humachine interaction needs to be acknowledged when collaboration and communication is facilitated by digital technologies.

Working from within the notion of schools as communities of practice (Brown & Duguid, 2001; Lave & Wenger, 1991) teacher peer mentoring is one strategy that schools can use to support teaching staff in their use of digital technologies for communicating knowledge and for their professional development. Peer mentoring is a professional development strategy that enables teachers to consult with one another, to discuss and share teaching practices, to observe one another's classrooms, to promote collegiality and support, as well as to help ensure quality teaching for all students. Teams of teachers can come together to share in conversations and reflect on and refine their teaching practice. Relationships built on confidentiality and trust in a nonthreatening, secure environment can help all participants learn and grow together. A school's leadership team can support such an approach through an inclusive learning culture that provides staff with:

- Scheduled time to work with colleagues.
- Opportunities to observe classroom procedures and teaching practices.
- Discussion time for curriculum planning.
- Opportunities to design lessons with colleagues.
- Opportunities to model technology-supported lessons.
- Opportunities to observe each other teaching with ICT.
- Provision of feedback on lessons taught.
- Active support for teachers to help and learn from each other.

One way schools can address these and other teacher learning requirements is through the provision of "on the job" experiences. These can incorporate online delivery and technical support or working in a mentoring team, as demonstrated in the following case study.

Case Study of Collaboration in Schools

Academic staff from the University of Tasmania's School of Economics and Finance, year 12 students and school economic teachers collaborated in a meaningful and productive manner using digital technologies to achieve synergy between all participants. The project examined the teaching and assessment of economics at a pretertiary level in Tasmania and involved collaboration (both electronic and face-to-face) between the following groups:

- Tasmanian Qualifications Authority (TQA)
- Economics teachers and year 12 economics students in the schools and colleges
- Tasmanian Certificate of Education (TCE) Setting Examiner (currently a member of the University of Tasmania School of Economics and Finance)

In January 2006, the TQA introduced a new syllabus for the TCE Economics ECN5C. This was the end-product of a period of collaboration between the teachers, the TQA and the School of Economics and Finance. During this period the previous syllabus was revised and updated. Drafts of the new syllabus were circulated electronically which facilitated the efficient distribution of material. Electronic collaboration greatly eased communication during this period, particularly given the constraints on teachers time and the fact that they were spread around the state. The teachers have two moderation days per year, in March and August, so during the development of the new syllabus these days were devoted to discussion of the draft syllabus.

In March 2006, a member of the School of Economics and Finance was invited by the TQA to set the exam for November 2006. A sample exam based on the new syllabus had been drawn up by the teachers at the end of 2005 using electronic collaboration. The Setting Examiner was provided with an electronic copy of the sample exam in March 2006. In November 2006, year 12 students around the State sat the new Economics ECN5C exam based on the new syllabus. Student marks reflected an improved assessment tool with a distribution of marks which enabled the Economics ECN5C students to get a higher weighting than in previous years for this pretertiary unit. In 2005, five of the forty-eight pretertiary subjects gained an EA (Exceptional Achievement) Max score higher than Economics EC851 (based on the previous syllabus). In 2006, only two subjects (Maths Specialised and Physics) gained a higher EA Min score than Economics ECN5C. Collaborating in the development stage of the syllabus and undertaking to provide a sample exam to the Setting Examiner enabled the economics teachers to contribute to a worthwhile outcome. The distribution of award scores for 2005 and 2006 are illustrated in Figure 2, which indicates that the results distribution has shifted slightly to the right. Data from further years will need to be

studied before conclusions can be drawn regarding the statistical significance of the change.

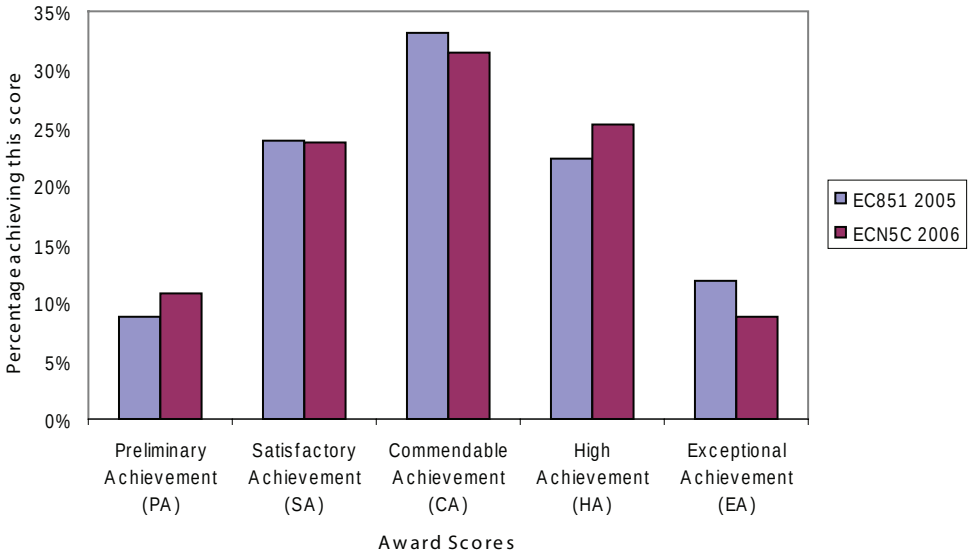
The sample exam was also made available to students in early 2006, and it emerged that the final section of the exam (Section E) could prove to be a considerable challenge for the economics students. In this section students were presented with three articles from newspapers or Web sites and asked to answer questions on one of the articles. The questions required the students to apply their economics skills to the particular topic. In view of the difficulty attached to answering this section, the Setting Examiner and the Moderator provided a sample article and set of questions and answers for revision purposes prior to the exam in November 2006. This involved electronic collaboration between the Setting Examiner and the Moderator.

Following the teachers moderation meeting in March 2007, it was agreed that two Section E sample articles and questions would be drawn up for the 2007 midyear exam. Electronic collaboration between the Moderator, the teachers and the Setting Examiner enabled these sample articles and questions to be constructed. Once the midyear exam was completed, the Moderator was able to electronically distribute a set of student answers for moderation purposes. Prior to the August moderation meeting marks from each of the teachers were compiled electronically. This meant that the time in the moderation meeting could be used efficiently, to investigate any wide distributions in marks.

Following feedback in early 2006 from the Setting Examiner to members of the School of Economics and Finance, it was decided that the School would set up a resource of Section E sample questions. Consequently a School of Economics and Finance 'Schools Blog' will be launched in the near future with one sample article and questions with solutions added by a member of the School of Economics and Finance each month. The year 12 students and economics teachers will be able to use this blog as a teaching and learning resource. The School of Economics and Finance also plans to use the blog to communicate with the year 12 students about other aspects of the study of economics, both at UTAS and elsewhere.

Hence electronic collaboration has enabled, and continues to enable participants, namely the

Figure 2. Distribution of TCE Economics Award scores for 2005 and 2006



year 12 students and their teachers, the TQA and the School of Economics and Finance to work together to achieve outcomes that they could not achieve (or would take a longer time to achieve) independently. A synergy has been created between the participants, which enables productive communication to occur related to the economics discipline.

Professional Development, Peer Mentoring and Collaboration

In designing professional development and peer mentoring programs to promote a community of practice, schools need to consider not just the human side of the equation, but also the potential for technological facilitation, albeit in line with a school's priorities and culture. Teacher mobility requires schools to be able to accommodate teachers from different school cultures. The elements that any school would need to address include:

1. *What is the school's "shared vision"?* The development of a set of Foundation Statements that includes a commitment to positive relationships with an aim of producing individuals who are adaptable, innovative, confident and technologically literate members of society. This translates into ongoing discussions on implications and priorities. A commitment to communication and seeking best practice has been instrumental in the development of the mentoring system.
2. *What are the practical structures and limitations?* What skills do you want to cover, and to what end? (There are many, so judicious selection is important).
3. *Where is the leadership going to come from?* Proactive use of digital technologies is a specialist field that needs nourishment. This is not always to be found in those whose primary interest is looking after the machines, or in individual teachers coping with a plethora of demands.
4. *Where do you want to start?* Thinking small can work, as long as it is part of a bigger picture.
5. *Where does the mentoring program fit into the wider school community?* Teacher skill development and groups working together need time and space. A school needs a teacher learning policy, not just a computer-resourcing budget.
6. *How will you know if you are succeeding?* Evaluation criteria need to be written and published. Good work needs to be celebrated and considered by the school community. Teacher, parent, and student feedback can be used to take stock and to make the most from the resources allocated.
7. *How do you get going?* By starting. The process will have its own rewards and challenges. Sell to the teachers the opportunity to become involved with students who already understand many things about the digital world of which we all are now a part.

Collaboration in education therefore can be treated as both a learning and teaching strategy, which empowers both students and teachers to work together to achieve a supportive and nurturing environment. Henry (1996) states that collaboration was built on cooperation, group effort, and a sense of belonging to a caring community. She believes that such an approach has been displaced in many of our institutions, including schools (Henry, 1996, p. 133). This is one reason why many parents and students prefer smaller schools, as they feel the communication process is much clearer and the staff have the opportunity to know students more intimately, than perhaps they would be able to in a larger school. Schools are also recognising the fact that that they are a part of a wider community, not an exclusive entity within it. Through the valuing and recognition of students' backgrounds, schools are able to provide a more relevant and diverse curricula which will help prepare students more effectively. Histori-

cally, teachers, principals, staff, and parents have had very little power to change the larger organisational structures operating within schools. However, Henry (1996) believes that:

The time is right for a shift to organisational structures and leadership that works against racism, sexism and classism, and truly puts students and their needs at the centre of the educational conversation. People have a right to be involved in schools, and they also have a responsibility. Opening up the schools to parents and others means that we all have to be prepared to invest more fully in our schools. Schools cannot do it alone. The future of our children depends on the commitment of society's leaders to educate and bring up young people to be socially responsible (p. 193).

f utur E t r Ends

Although this chapter has emphasised technological advances and how these have facilitated collaboration, the most important aspect in a successful collaboration relies on the people involved and how they communicate with one another. Collaboration requires a form of facilitative leadership. A facilitative leader should be recognised as someone who has good knowledge in the subject area. This type of leader also requires organisational and interpersonal skills, and must be seen to carry out their role with fairness to all participants. They should be able to converse with all participants in a collaborative group on a regular basis. Regular communication ensures that all participants comprehend their role and are aware of any changes which may affect the collaborative group's goal/s. A facilitative leader should also ensure that adequate resources are provided, such as facilities, materials, and funds.

Expertise, skill, and personality should also be taken into account when choosing roles in a collaborative group. Each participant must be able to see how their role contributed to the group, so that they value not only their own input but other people's. It is also important for people to feel supported within the collaborative group. People have a strong need to be acknowledged, and to belong.

Another aspect of collaboration is the final product or goal of the group. The "third entity"[13] is the outcome of the group's purpose for engaging in the collaborative process. The "third entity" encapsulates the group's identity, and therefore particular attention is paid to its professional presentation in the public domain. As the project intensifies, the third entity will seemingly become to the participants more important than their own needs. Issues of ownership and authorship are also encapsulated in the third entity. The need for recognition within a collaborative group varies and can be related to the "cultural assumptions regarding individual or community priority, which [are] carried in the habitual relationships of everyday life" (Rogoff, 2003, p. 234).

These five elements: leadership; communication; skills and expertise; support; and third entity are integral elements within a collaborative process (Baguley, 2007). Each element can be carefully considered by using some guided questions to enhance the success of the collaboration. Table 2 below provide some examples of these guiding questions, particularly after the collaboration has been formed, to help facilitate this process (Table 2).

Being aware of the essential elements required to facilitate a successful collaborative process, and knowing the types of questions to clarify this journey cannot be neglected as technological processes are utilised to increase the speed and progress of communication.

c onclusion

This chapter has examined the process of electronic collaboration with particular emphasis

Table 2. Questions to consider when engaging in collaboration

Elements	Questions to Consider
Leadership	• Has your leadership style adapted and changed to suit the evolving nature of the collaboration? • Have you delegated responsibility to participants who have shown they are enthusiastic, committed to the third entity and have sound interpersonal skills? • Have you clearly conveyed to all participants, if appropriate, how leadership has been devolved to other participants and the reasons for this?
Communication	• Have you ensured that communication flow is maintained between participants, and that there are designated responsible persons for groups of more than fifteen people? • Have you ensured that as the intensity of the group increases good communication is maintained? • Is a common language being used by all participants to refer to particulars of the third entity?
Skills & Expertise	• Have you ensured that all participants are aware of the in-built flexibility in the project to cater for changing roles and responsibilities? • Is there more than one person who is aware of what is required, and has the necessary skills to take over if needed? • Are there designated leaders who can offer support and ensure the level of expertise is consistent throughout?
Support	• Have you continued to ensure that participants' input is valued and acknowledged? • Have you continued to acknowledge important milestones during the project? • Do participants still feel a sense of belonging and commitment to the group?
Third Entity	• Does the Third Entity have a well established identity which encapsulates the vision and goals of the group? • Do participants refer to the Third Entity by name? • Does documentation contain both the Third Entity's name in addition to individual participants' names?

on the interpersonal aspects which are vital to its success. Of particular note, has been the importance of communication, between people, machines and *humanchines*. The growth of technology and its inherent issues regarding globalisation, personal security and values were all considered. Schools are microcosms of society and therefore the effective and judicious use of technology, particularly how teachers are guiding students in using it, provides a litmus test for the wider community. Communication utilises an open form of communication and therefore participants reveal their thinking processes to one another through numerous forms of communication. As people become more flexible in their working arrangements, they utilise forms of technology to enable their participation in a range of ventures. Removing the personal interaction from electronic collaboration can undermine the emphasis which must be placed on the establishment of relationships beforehand. Without this, the establishment of rapport and support may be limited which will ultimately affect the quality of the collaboration.

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kEy tErms

Collaboration: For the purpose of this chapter, the word *collaboration* has been expanded on from the general definition defined elsewhere in this book. Collaboration for this chapter is defined as a durable, intense, and pervasive relationship which is built up over time. People who collaborate are fully committed to the relationship, and there

are well-defined communication channels which operate on all levels.

Communication: The process of sharing information between two or more individuals to reach a common understanding of the ideas or information being conveyed. In the context of this chapter, communication also includes information, or data, that is shared, or transmitted, between two or more actors. These actors may be human or machine. This sharing of information between human and human; machine and machine; or between human and machine is underpinned by the need for the information to be understandable to both parties.

Community of Practice (CoP): Refers to the process of how learning occurs in a social context and that learners and instructors (teachers) come together through a shared interest or problem and collaborate over time to share ideas, experiences, and solutions to build the community. Within CoP, teacher peer mentoring offers a model for teachers to come together to learn from one another and to support each other in the learning process.

Digital Technology: The word "digital" comes from Latin—*digitus*, finger—and refers to one of the oldest tools for counting. When information is stored, transmitted or forwarded in *digital* format, it is *converted into numbers*—at the most basic machine-level as "zeroes and ones." In the context of this chapter, the term represents technology that relies on the use of microprocessors; hence, computers and applications that are dependent on computers such as the Internet, as well as other devices such as video cameras, and mobile devices such as phones and personal-digital assistants (PDAs).

Education: Education encompasses teaching and learning specific knowledge, skills, and also something less tangible: the imparting of "learning how to learn" or "the concept of life long learning" which is based on knowledge, sound judgement, and wisdom. Education has as one of its fundamental goals the imparting of culture from generation to generation in addition to the skills and knowledge required to operate in society. At the heart of this teaching-learning process is communication and collaboration.

Knowledge Economy: Refers to how society and economies are changing their reliance from the labour and manufacturing of products or goods to an economy that is more reliant on the production and reengineering of information into knowledge. Hence, society and the economy are being transformed from a "physical-based" labour force to a "knowledge-based" one. The knowledge economy is centeralised on how digital technologies are transforming the way humans work, think, and act.

Netiquette: Refers to the rules or guidelines that users should follow when communicating with others over the Internet. The rules or etiquette of use ensure that users of technology know of and can follow rules to ensure that they do not offend other users and that what they communicate to others is understandable. These points are important when we consider that e-mail, bulletin boards and blogs often only reveal the text which the user has posted. This may lead to some ambiguity or miscommunication between users. To overcome some of this ambiguity, many users are taking advantage of emotion icons (emoticons) and acronyms to portray their feelings, emotions and facial expressions. For example, emoticons include :-) "happy," :-/ "sceptical," :-C "bummed," :-O "oh," :-& "tongue tied," :-["not amused," O:-) "angelic." Whilst some common acronyms are BTW "by the way," LOL "laughing out load," ROTFL "rolling on the floor laughing," TTFN "ta-ta for now," IMHO "in my humble opinion," IYKWIMAITYD "if you know what I mean and I think you do," JK "just kidding," NP "no problem," WBS "write back soon," and XMEQK "kiss me quick." These emoticons and acronyms can also be used in text messages between mobile phone users.

Synergy: Describes the type of energy created when participants are working towards the same goal and are able to share, exchange, and debate ideas in a supportive, constructive, and creative environment. Synergistic energy is necessary to create the third entity which although representative of the participants becomes more important than any individual in the collaborative group.

Third Entity: The outcome of the group's purpose for engaging in the collaborative process. As the project intensifies, the third entity will seemingly become to the participants more important that their own needs. The third entity appears to take on its own personality as participants sublimate their ego and work effectively together towards a shared goal. The third entity encapsulates the group's identity, and therefore, particular attention is paid to its professional presentation in the public domain.

Endnot Es

1 Web-based translators such as BabelFish (http://babelfish.altavista.com/) allow machines to translate text from one of several languages into another.

2 Educational Blogs: There are so many blogs focussing on Education and learning, it is impossible to summarise them all here, but Gagglenet is a safe, filtered blog for schools. www.gaggle.net or www.21classes.com

3 Educational Wikis : One the of the best places to get an overview of educational Wikis is: http://educationalWikis.Wikispaces.com/

4 RSS is a way Web sites can deliver regularly changing site content to users automatically without users having to visit particular Web sites see http://news.bbc.co.uk/1/hi/help/3223484.stm for more details

5 Podcasting can be a little difficult, but the simplest and quickest way to get your own or students' podcasts going is: www.podomatic.com You will need Microphones and a free program like Audacity to record and edit audio and then convert the sound into an MP3 file. This sounds much more complicated than it is. It really is easy and you can download Audacity here: http://audacity.sourceforge.net/download/ windows Mac Users will have the necessary software already on their computers and will not need Audacity.

6 An online site that allows users to share files and to communicate using text or Web cameras (www.myspace.com)

7 Flickr – Image sharing http://www.flickr.com/

8 Del.icio.us – Social Bookmarking http://del.icio.us/

9 Digital Natives refer to that group of individuals who have grown up immersed in digital technology and the Internet.

10 Digital Immigrants refer to that group of people who grew up before the digital age and the Internet and are now using these forms of technology

11 Google Earth combines the power of the Google Search Engine (www.google.com) with satellite imagery, maps, terrain and 3D buildings to put the world's geographic information at your fingertips. Google Earth is a virtual globe browser, available in a limited free version or an upmarket user paid version. NASA's World Wind (http://worldwind.arc.nasa.gov/) and ESRI's ArcGIS Explorer (http://www.esri.com/software/arcgis/explorer/index.html) are its main competitors.

12 More information on CoP can be found on Etienne Wenger's Web site: http://www.ewenger.com/

13 The third entity is created from the collaborative process and is a physical manifestation of the group's common goal. Although created by the participants the third entity is also independent of them.

Chapter XV
Designing University Techscapes

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abstract

This chapter presents and analyzes the scholarly basis and empirical work that resulted in the development of Techscape, the application of collaborative technology use as one approach to achieving the larger aims of Civilscape. Civilscape, a loosely networked collaborative university-wide effort on a state-supported university campus in the United Sates, is designed to achieve two major goals: (a) to advance equivalent opportunity for full participation as a civil right for all qualified students; and (b) to expand the reach and benefits of the university for the advancement of healthy, safe, moral, equitable, and socially responsible societies in which universities exist. Technology, because of its omnipotence and potency, provides an important vehicle through which collaborative participation in education, research and technology transfer can occur. We first present the theoretical and empirical background for the project and then discuss and illustrate it. We conclude with a summary and important points for future consideration.

introduction

"An institution of higher education is a community dedicated to the pursuit and dissemination of knowledge, to the study and clarification of values, and to the advancement of the society it serves"(Middle States Commission on Higher Education, 2002, p. iv).

Universities are both civilized and uncivilized organizations. By civilized, we refer to environments that embody and practice socially responsible, humane, moral, and fair principles that

are applied equivalently to actual and potential members of that environment and those affected by it (DePoy & Gilson, 2007). And while administrators, faculty, students, and others employed by or governing university environments ostensibly aim for the collective goals of intellectual development, an educated, moral, and socially responsible citizenry, and advancement of civil societies (Colby, Ehrlich, Beaumont, & Stephens, 2003), practices both intentional and unintentional are often exclusionary and thus create "uncivil" conditions in our university communities. In concert with the definition of higher education advanced by the Middle States Commission on Higher Education (2002), this chapter presents and analyzes the scholarly basis and empirical work that resulted in the development of the University Civilscape model. The Middle States Commission on Higher Education is the unit of the Middle States Association of Colleges and Schools of the United States that accredits degree-granting colleges and universities in the Middle States region of the United States, specific US Territories, and several international locations. The Middle States Commission on Higher Education is a voluntary, nongovernmental, membership association.

In this chapter, we focus our discussion of Techscape, the application of collaborative technology use, as one approach to achieving Civilscape aims. Civilscape, a loosely networked collaborative university-wide effort on a state-supported university campus in the United States, is designed achieve two major goals: (a) to advance equivalent opportunity for full participation as a civil right for all qualified students; and (b) to expand the reach and benefits of the university for the advancement of healthy, safe, moral, equitable, and socially responsible societies in which universities exist. Technology, because of its omnipotence and potency provides an important vehicle through which collaborative participation in education, research, and technology transfer can occur.

We begin the chapter with a summary, critical discussion, brief synthesis, and application of the following substantive bodies of literature that informed the total University Civilscape model:

- Contemporary design theory and its application to university organizations and technology environments (Eames in Annink & Schwartz, 2003; Lidwell, Holden, & Butler, 2003);
- Universal access theory and principles and beyond (DePoy & Gilson, 2005/2006; Preiser & Ostroff, 2001; Scott, Loewen, & Funcjes, 2003);
- Organizational change theory relevant to public universities as complex organizations (Medina, 2007; Slaughter & Rhoades, 2004).

To inform Techscape we then review theory and knowledge relevant to technology development, transfer, and use in higher education (Burgstahler, 2003; DePoy & Gilson, 2005/2006; Stephanidis, 2001).

We then overview a study which ascertained awareness of universal access principles and faculty practices with a specific focus on use of technology to promote full student participation in didactic, laboratory, and experiential education, and then move to an illustration of the model through a visual matrix and discussion of initiatives that emerged from the theoretical framework and the findings from our study. The chapter concludes with an evaluative and critical discussion of the model and its desired outcomes.

background

What is Design and How Does it Apply?

In our work, we delimit our discussion of design to human activity or properties that occur as

a result of human intention. Under this rubric, design is a complex construct which has been increasingly used to describe abstract and concrete human activity, and to name a property of virtual, physical, abstract and, of course, technological phenomena.

The following list presents representative lexical definitions of design.

1. To create, fashion, execute, or construct according to plan: DEVISE, CONTRIVE (Merriam Webster, 2006–2007).
2. Means any design, logo, drawing, specification, printed matter, instructions, or information (as appropriate) provided by the Purchaser in relation to the Goods (SAGE Enterprises Company, Ltd., 2007).
3. Design is a set of fields for problem-solving that uses user-centric approaches to understand user needs (as well as business, economic, environmental, social, and other requirements) to create successful solutions that solve real problems. Design is often used as a process to create real change within a system or market. Too often, Design is defined only as visual problem solving or communication because of the predominance of graphic designers (Shedroff, 2007).
4. The plan or arrangement of elements in a work of art. The ideal is one where the assembled elements result in a unity or harmony (WorldImages Art Corporation, 2001).
5. Both the process and the result of structuring the elements of visual form; composition (Ackland Art Museum The University of North Carolina, 2007).
6. A clear specification for the structure, organization, appearance, and so on of a deliverable (TenStep, 2007).
7. Intend or have as a purpose; "She designed to go far in the world of business" (Princeton University, 2006).
8. A plan for arranging elements in a certain way as to best accomplish a particular purpose (Annink & Schwartz, 2003).

What is evident in the diverse definitions is the broad scope of phenomena to which design applies, including but not limited to the activities of conceptualizing, planning, creating, and claiming credit for ones ideas, products, and entities as well as the inherent intentional or patterned characteristics of bodies, spaces, and ideas (Annink & Schwartz, 2003; Margolin, 2002). However, despite the ubiquitous and diverse use of the term, of particular note is the commonality in all definitions of design as *purposive and intentional.* Applied to the University Techscape goal of collaborative technology use for the advancement of civilized university organizations we therefore view design not as frivolous decoration but rather as powerful, political, and both shaped by and critical in influencing views and practices of interaction, learning processes, outcomes, membership, and relationship in university communities and in environments within university reach (Annink & Schwartz, 2003; Foster, 2002).

Universal Design, Access, and Usability

Although distinct, we discuss these theoretical principles in one section to provide an overview of their commonalities, to clarify their uniqueness and to synthesize tenets of each that form the foundation for the University Techscape model element.

Universal design is an approach to shaping diverse environments for the widest range of difference (Nasar & Evans-Cowley, 2007). Unlike accommodation, which fashions special solutions to barriers encountered by atypical individuals who cannot access or use standard environments and resources, or inclusive design (Imre & Hall, 2001) which seeks to eliminate barriers for disabled populations, universal principles ostensibly

guide a socially just design process from its initial conception. Underpinning this approach is the value that human difference is inherently good, exists, and should be an important element that drives the design of abstract, virtual, built, and natural environments and resources (DePoy & Gilson, 2007).

However, because of its historical emergence as a response to disabled bodies, universal design is often mistaken for and limited to an inclusive response to disability. The distinctions among barrier free design, inclusive design, accommodative design, adaptive design, universal design, universal access, and maximum usability are often unclear. As the basis for this discussion, we define each in Table 2 below.

Given its roots in disability rights and responses, it is not surprising that universal accessibility is often used interchangeably with disability-focused design concepts highlighted in Table 1. More recently, universal access has been expanded to refer to other groups who have experienced barriers to environments and resources, such as those who have limited literacy, cultural practices which are not consistent with environmental standards and so forth. However, in our work, we have synthesized universal access with maximum usability to define the theoretical foundation of our work as "Civilscape design." Civilscape design is conceptualized as environmental, space, and product design thinking and action which take into account the full diversity of human bodies, ideas, experiences, and preferences and hold full participation as its value foundation.

Note that, as expressed by the name Civilscape, our approach is based on social justice and civil rights ideologies which view equality of access to and use of public environments and resources as a civil right (DePoy & Gilson, 2007). This perspective attempts to decrease the consideration of group specific responses in favor of diversity as a human trait that belongs to all people (DePoy & Gilson, 2006, 2007). Lidwell et al. (2003) have proposed what they refer to as "universal principles of design." Informed by their approach and others such as Stephanidis (2001), while embodied disability is one consideration in Civilscape, it is one among many, with principles guiding

Table 1. Definition of terms

Term	Definition
Barrier free design	Practices focusing on retrofitting standard environments typically in compliance with legal access statutes such as the Americans with Disabilities Act and Disability Discrimination Act, UK, and Australia
Accommodative design	Response to disabled populations within the constraints of what is "reasonable"
Inclusive design	Attitudes, values and practices focusing on the needs of disabled people (Imre & Hall, 2001)
Adaptive design	Customized environment and products for disabled individuals (DePoy & Gilson, 2004)
Universal design	The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" (Center for Universal Design, College of Design, North Carolina State University, 2007).
Universal access	The ability of the greatest number of people to reach environments and resources (DePoy & Gilson, 2004)
Maximum usability	The ability of the greatest number of people to participate in and use environments and resources respectively (DePoy & Gilson, 2005/2006, 2007)

designers beyond essentialist and prescriptive environment and product design.

One of the major trends of the late 20th and early 21st centuries that has facilitated the actualization of universal and Civilscape design ideologies is the development, expansion, and omnipotence of technology. And while access to technology, information and communications technology (ICT) in particular, is not yet equivalent for all citizens, this technology genre to a great extent has foregrounded ideas over "bodies and backgrounds" (DePoy, 2007) as the basis for human interaction, collaboration and thus of Techscape. Learning communities, which seek to collaboratively build, exchange, and use information and knowledge therefore benefit from ICT and other technologies in Techscape design.

Numerous universal design efforts have capitalized on technology to promote student diversity in higher education as representatively listed in Table 2.

With the exception of the Center for Universal Design, College of Design, North Carolina State University, each of the "universal design" initiatives listed in Table 3 is primarily a response to disability accommodation. The Center for Universal Design has expanded its scope beyond disability, but remains essentially dedicated to design for embodied differences, and more specifically ability and age. And while attention to ability is fundamental for most if not all environments and products, we assert that participation in and use of public environments, geographies and products is a civil right that should be met with design that to the greatest extent is driven by notions of equal opportunity which include but move beyond embodied capacity.

Building on universal access and design principles of Preiser and Ostroff (2001) and the visionaries before them, we therefore advance principles of Civilscape and thus Techscape design in Table 3.

Organizational Change Theory

Universities are complex organizations that have a reciprocal relationship with their knowledge, geographic, economic, political, and social contexts. Historically, universities were seen as institutions organized primarily to generate and

Table 2.

Program	Description
CAST (Center for Applied Special Technology, Wakefield, MA, US)	To expand learning opportunities for all individuals, especially those with disabilities, through the research and development of innovative, technology-based educational resources and strategies.
Do-IT (Disabilities, Opportunities, Internetworking, and Technology, University of Washington, Seattle, WA, U.S.)	DO-IT serves to increase the participation of individuals with disabilities in challenging academic programs and careers. It promotes the use of computer and networking technologies to increase independence, productivity, and participation in education and employment.
Excellence and Equity (E & E) (University of Maine, Orono, ME, US)	Universal Course Design Instructional Strategies E&E is a 3-year federal grant funded by the Office of Postsecondary Education (beginning Oct. 1, 2005, ending September 31, 2008). It is designed to ensure that students with disabilities receive a quality higher education through refinement, implementation, evaluation, and dissemination of the Universal Course Design (UCD) model of professional development for college faculty, administrators, and support personnel.
Center for Universal Design, College of Design, North Carolina State University	We find solutions to specific accessibility needs at various levels of design—for example, whole houses, buildings, spaces or products-and provide design development services for universally usable products, building components and spaces.

Table 3. Principles of civilscape design

Principle		Approach
1.	Equal opportunity for access and use	Design for the full range of participants with attention to the civil rights of diversity bodies, backgrounds, ideas, and preferences
2.	Health and safety	Design to eliminate harm and promote wellbeing
3.	Flexibility	Design for choice in access and use
4.	Intuitive	Design for perceptible and logical use patterns with clear guidelines apprehendable by all who potentially or actually participate
5.	Correctable	Design tolerance for unintended error or consequences
6.	Aesthetically relevant	Design for full range of participant "look and feel" preferences

transmit knowledge (Allen, Bonous-Hammarth, & Teranishi, 2006). However, the advanced capitalism of the 21st century has been a major impetus in shaping university organizational behavior as complex market-based systems that act as corporations, some of which are not consistent with our notion of civilized organizations (Allen et al., 2006). And while there are many organizational theories which are relevant to describing and explaining university communities, we have synthesized two theories, academic capitalism (Slaughter & Rhoades, 2004) and Medina's (2007) unified theory of collective action as most potent in influencing the Civilscape model and its ability to be adopted and espoused at multiple levels of our university.

Academic capitalism suggests that as local or regional (state) support diminishes, public universities in the United States, and perhaps elsewhere, must look to other models to generate fiscal resources. These organizations thus have turned to business practices to reconceptualize their core functions of education, research, and service as products to be marketed and sold. Slaughter and Rhoades (2004) do not necessarily see this organization model as desirable for public universities and while we may agree with them ideologically, we see academic capitalism as a ubiquitous current model of university organizations that is most useful in illuminating points of influence for changing university organizational behavior, and particularly those that are uncivil.

Medina's (2007) politico-economic model of collective social change builds on exchange theories and suggests that collective action is most likely to occur when both the individuals and the collective perceive that collaboration will produce desirable benefits as change is stimulated incrementally.

Because Civilscape and thus Techscape is based on the tenet of participation as a civil right, the use of technology to this end therefore required us to seek to change university culture and practices related to the role of technology in our university. Such a process is time consuming, slow to occur and through the synthetic lenses of the two theoretical approaches, can be accomplished incrementally by demonstrating the potential academic, economic and related benefits that will occur from espousing Civilscape. As we illustrate immediately below, in Techscape we concretely identified how technology as a strategy to expand participation in the university community would provide economic and political benefit to individuals, interest groups, academic and research units, and the university as a whole.

Technology Development, Transfer, and Use in Higher Education

University organizations have not only been leaders in the development of technology, but have increasingly engaged in technology transfer and subsequent use for multiple purposes. The term technology itself has many definitions ranging from simple devices to assist humans to achieve daily activities to complex constructed communication networks. What all definitions have in common are (a) the element of human conceptualization and creation; and (b) the purpose of the creation for assisting or altering environments, activities, and experiences that would not be possible or as efficient without the technology. In this chapter, we define technology as the products, systems, and processes that emerge from a body of knowledge created by systematic inquiry in order assist in goal attainment. We delimit our discussion to entities which are systematically designed for University Techscapes. These include, but are not limited to, digital, electronic, ICT, and composite environments and products as we discuss related to the Techscape element of Civilscape.

In its most omnipotent use, technology transfer has come to mean commercialization of technology. However, we prefer Byrd's (2007) approach. Consist with the Techscape model, Byrd states, "technology transfer involves moving a technology developed for one organization or environment into another." For our purposes the full range of technology transfer, from development to use, is relevant to collaborative learning and advancement of civilized university organizations as we illustrate below. Moreover, given the goal of equality of opportunity for participation, multiple types of technology including, but not limited to, electronic and digital forms have been central to our model.

Campus Inquiry

A brief overview of the study and its findings are presented in Box 1.

We concluded that technology by itself would be insufficient to expand full participation and that dialog, example and perceived benefits to faculty and the university were necessary in order to expand participation (DePoy & Badger, 2004).

Box 1. Campus inquiry summary

To inform strategies and approaches that actualize participatory educational communities, we conducted this empirical inquiry on our university campus. Using a nonexperimental design relying on survey methods to collect data, the following questions were answered:

1. What are the attitudes of faculty and administrators towards the full range of participation of students in higher education?
2. To whom do faculty and administrators assign responsibility for assisting students with diverse learning needs?
3. What ideological approaches to full participation of diverse students in higher education do faculty and administrators espouse?

The survey was sent to all full-time, part-time, and adjunct university faculty who had e-mail accounts on the university server.
For the most-part, faculty attitudes were relatively conservative towards diverse participatory styles. A majority of faculty held students responsible for fitting their learning styles and needs in to existing course designs, bifurcated into courses offered exclusively on campus or exclusively through distance education. If students were unable to attend on-campus classes or use the distance software, all but two respondents indicated that a student should seek eligibility testing and possible services from the campus disability student service unit. Because foreign students were required to attain a minimum proficiency score in English, faculty did not consider languages other than English as relevant to discussions of diverse student learning needs or preferences. Life circumstances such as geographic distances, family, and work obligations were also not considered relevant as diversity variables to which faculty were willing to respond other than through teaching courses through distance education.

o ur main f ocus: tE c Hscap E

Given the large range of technology currently available and the creative potential for developing new technologies or applications of current technologies, the risk of creating "gizmos" for the sake of gizmos and then of prescriptive rather than purposive use is significant. In order to decrease these risks and to organize our thinking and action, the following six theory-based principles are used as guidelines for all Techscape activity.

Expanding Student Access to Learning Opportunities and r esources

In this category, several technological collaborative innovations were implemented. Here we discuss three, two which were successful in attaining the objectives of Civilscape and one which was not.

The first technology to enhance access and "real-time" participation is the use of instant messaging technology on First Class Client, the intranet software used by the university. We selected this technological approach over videoconferencing and other interactive modes because it meets the six principles listed in Table 4. Different from distance education software such as Blackboard, the omnipotence and ease of use of instant messaging renders it an incremental technological advancement that was palatable for students and faculty. Because First Class is already central to university communications it does not require additional learning on the part of both faculty and students.

Second, instant messaging on First Class meets universal access standards, unlike other distance methods such as Blackboard or Web CT which are difficult to use and have access barriers. Similar to many e-mail systems, the First Class Client system used at The University of Maine for faculty and student electronic mail and other communication functions has both voice and text instant messaging. Students are able to select text, voice, or both instant messaging functions to remotely attend on-site classes.

Third, given the rural nature of the state, the large geographic distances that some students must drive, the long season for inclement weather, and the increasing number of students with families and full time jobs, instant messaging is a viable technology-based method that enhances student participation in classes if students are unable to attend every session. Allowing students to use instant messaging voice functions sets the expectation that they will "attend class" and fully participate in academic discourse and class activity even if through virtual means. Students can choose visual text, voice or both media (depending on preference, connectivity, embodied limitations, and preferences) through which to "attend" from any location with Internet access. Finally, because this method is one of multiple

Table 4. Theory-based guidelines for all techscape activity

1.	All technology and application must meet the purposive design of expanding equitable and full participation in the university and its resources;
2.	All technology design must emerge from and stimulate collaboration;
3.	All technology design must meet the basic principles of Civilscape;
4.	Technology application must be incremental;
5.	All technology and use must fit within the mission of the university presented in abridged fashion in Box 2 below; and
6.	All technology adoption and use must have clear, identifiable benefits to individuals, groups, departments, and/or the university organization as a whole

Box 2. Abridged University of Maine mission statement

> The University of Maine has statewide responsibility for those educational, research, and public service programs associated with its designation as Maine's land-grant university and sea-grant college. In the spirit of its land-grant heritage, the university is committed to the creation and dissemination of knowledge to improve the lives of its students and Maine citizens in their full social, economic, and cultural diversity.
>
> The university recognizes the increasingly global context of economic, social, scientific, technological, and political issues, as well as the evolving multicultural dimensions of contemporary society. Through teaching, basic and applied research, and public service activities, The University of Maine contributes to the economic, social and cultural life of Maine citizens. With programs that are national and international in scope, the university is also a major resource for Maine in the increasingly interdependent world community. The university is committed to developing and sustaining a multicultural and pluralistic educational community that encourages the full participation of all of its members. (University of Maine, 2007)

methods of attendance, students can choose how best to attend each session.

The second technological innovation that we have used for two content projects, one in long term care history, policy and organizations, and one on domestic violence, is the creation of interactive books in CD ROM and Web format. Here we discuss the Long Term Care project posted on http://www.ccids.umaine.edu/resources/hrsaltc/index.htm. This extramurally supported project involved writing and translating a textbook on long term care into interactive electronic format that is accessible to text reader. Moreover, different from information that is posted on the Internet only, we developed CD ROM modules as well that can be accessed without Internet connectivity on any computer and with limited knowledge needed to operate the software. In concert with Techscape design principles, the design of the modules is intuitive, simple, flexible, and correctable, as well as aesthetically relevant to students.

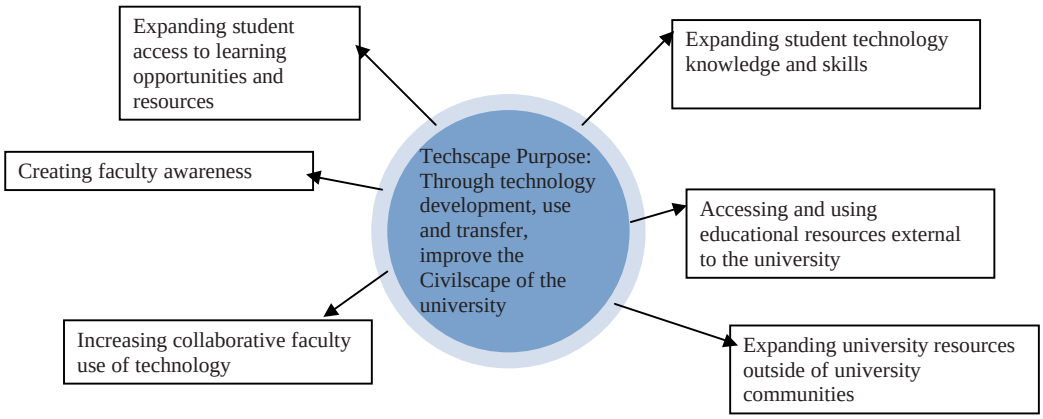
The unsuccessful technology strategy in meeting Civilscape goals was our participation in the Excellence and Equity national grant listed in Table 2. Although this project was theoretically designed to advance Universal Design for Learning or what is referred to as UDL, this well-intended project relied on the development of "tool kits" and information about "gizmos" without application encased in a purposive context. Thus, while the project has been able to provide information on technology relevant to accommodation for some disabling conditions, the purposive use of technology for organizational change to enhance Civilscape goals was not accomplished.

Expanding Student Technology Knowledge and Skills

Central to Civilscape is the education of the "next generation" as an incremental change strategy both within and beyond the university community. We have used numerous strategies to transmit knowledge and skill in the use of technology to advance full and equitable participation in learning and related resources. Here we discuss two successful strategies.

The first is the development and implementation of a formal interdisciplinary curriculum designed as a 24 credit undergraduate concentration that can be taken along with any major in the university (Center for Community Inclusion & Disability Studies, 2007). This curriculum is devoted to theory, research, and application of skills to examining and actualizing equality of access as a civil right. Similar to universal access and design theory, this curriculum began as a disability focused concentration, but along with scholarship and progressive conceptualizations of diversity, has expanded its scope to meet Civilscape goals. Students first learn theory that grounds description and analysis of access, participation, and barriers to both in multiple elements of the environment including but not limited to the physical, social,

Figure 1. Scope of Techscape



sensory, virtual, abstract, economic, intellectual, and expressive environments. They then learn and apply multiple skills to the remediation of barriers. An important part of the learning experience is modeling the Techscape principles as we described above in the previous section. However, students engage in faculty-guided independent projects as well in which they must use technology as at least one barrier resolution. An example of one important project was the collaborative assessment and remediation of participation barriers in the university graduate ceremonies. In this project, students collaborated with the university administration to bring their knowledge and technological skill to expand participation in commencement exercises campus-wide and beyond. Thus, those who could not or preferred not to attend the actual commencement ceremony, through multiple technologies and venues, were able to "attend" graduation in real time or later.

For their capstone presentations, all students presented their projects in formats that meet Techscape principles. In the spring of 2007, students presented in poster format, on CD-ROM, and text format on a computer accompanied by MP3 audio. This presentation method also allowed for translation into multiple languages through existing Web software such as Babelfish.

The second strategy that we utilize is student assistantships on Techscape projects to provide depth of knowledge and skill for students. As example, we recently received support from the American Legacy Foundation for the development of the Tobacco Access Portal, a Web portal to translate Web-based tobacco prevention and cessation information into diverse literacy levels and in a format that is in compliance with accessibility standards mandated in Section 508 of the Rehabilitation Act of the United Sates. The doctoral student working on this project collaborates with the programmer, the web designer, and the usability testers to learn advanced theory and skills as well as resource development skills for future opportunities. The student collaborates on dissemination as well to learn information sharing and access with a full range of audiences.

cr Eating facul ty awar EnEss

Several approaches have been used to create faculty awareness. The needs assessment inquiry presented in Box 1 above was our initial awareness activity. In concert with the principles of "research as information dissemination" (DePoy & Gilson, 2008), recruitment and data collection can be framed for the additional purpose of increasing awareness of issues under empirical scrutiny.

In a second strategy, we have formally collaborated with the Center for Teaching Excellence

on campus to deliver workshops and sessions that both model and disseminate Techscape theory, skills, and outcomes.

To raise awareness of faculty outside of the university, we participate in typical on-site conference and publication dissemination as well as technological dissemination globally.

incr Easing c ollabora tiv E f acul ty us E of tE c HnologY

In addition to the university-wide efforts to increase faculty use of technology, we collaborate with faculty who have been supported by the university to use new technologies such as podcasting, video-conferencing, and other distance strategies to expand the offering of our concentration courses beyond the university matriculants. As noted above, the Tobacco Access Portal project is collaboration among several units at The University of Maine including the School of Policy and International Affairs, The Center for Community Inclusion and Disability Studies, and the Department of Computer Science.

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One important way to expand the resources of the university is to collaborate across academic organizational communities. We have used technology to bring the benefits of this collaboration to our faculty and students. As example, in a recent distinguished lecturer series in which faculty and experts external to the university are brought in, the scholar was unable to travel to campus. From across the United States, through simple videochat technology combined with on-line video streaming and on-site projection, numerous on-site and virtual participants were able to hear this lecture. In addition, the speaker sent her text so that video projection and streaming could be open-captioned.

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Through research and technology transfer, we collaborate to advance Civilscape aims. As an example, we return to the Tobacco Access Portal project. In order to develop, test, and implement the portal, we are collaborating with local literacy centers to recruit testers. We also will provide designated computers for the portal to be housed at the literacy centers as a means to decrease digital inequality.

f utur E t r Ends and c onclusion

In this chapter, we have discussed the theoretical foundation, goals, principles, and exemplars of the Techscape element of Civilscape. Civilscape is a large network of projects and activities aims to expand full participation in our university and its resources. Consistent with our view of the future of civilized university organizations, Techscape illustrates the application of technology to this purposive end and provides guidance for the future of collaborative and fully participatory learning environments.

As demonstrated in Techscape, the use of technology must occur within a purposive, well informed framework. Without this grounding, technology is just another set of consumables. Second, we bring your attention to the necessity of theory-based organizational change. The theoretical foundations of Civilscape provided important guidance for activity and expected outcomes. As example, a critical element of Techscape was concretely identifying how technology is a powerful strategy that benefits those who use it

in a purposive and considered fashion. Numerous individuals in the university community were and continue to be skeptical not only about expansion of participation but about the potential additional effort necessary to use technology to reach this goal. Our analysis of the university through the lens of academic capitalism, however, informed our work and success in encouraging administration to collaborate. Because technology has the potential to tap new student markets, administration saw a fiscal benefit and thus espoused it, providing that doing so was not too costly. Guided again by incrementalism, the use of existing technologies such as the university intranet was an important approach that was not perceived as too expensive in dollars or effort. Moreover, faculty who were reluctant to use technology were more likely to see its benefit if they could expend minimal effort. Collaboration between technological savvy and technologically inexperienced faculty continues to be crucial in Techscape and informs similar efforts and future initiatives, especially within the increasing interdisciplinarity of academic fields.

Another major area of concrete benefit of Techscape that contributed to positive outcomes and that informs future efforts is its potential to attract extramural support. In our state, as in many other geographic areas, technology development and transfer are priorities for funding. Faculty who are not in technology-intensive fields can realize extensive benefits in order to garner funding support by collaborating on projects with faculty who have expertise in technology. The Tobacco Access Portal project provides an excellent example. The collaboration between social science and computer science made it possible for this project to be planned and for a successful application for funding to occur.

In closing, we want to remind you that Techscape is one element of Civilscape. But it has been critical and perhaps has produced the best outcomes of attaining Civilscape goals of any of our initiatives. Technology, particularly that which is used for communication and interaction, is a powerful medium in expanding the civil right of full participation and access to our learning communities and brings important tools to future efforts when carefully considered within a purposive, theory-based framework.

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kEy tErms

Academic Capitalism: University practices that have turned to business to reconceptualize their core functions of education, research, and service as products to be marketed and sold.

Collective Action: The view that action is most likely to occur when both the individuals and the collective perceive that collaboration will produce desirable benefits as change is stimulated incrementally.

Maximum Usability: The ability of the greatest number of people to participate in and use environments and resources respectively.

Technology: The products, systems, and processes that emerge from a body of knowledge created by systematic inquiry in order assist in goal attainment.

Technology Transfer: Moving a technology developed for one organization or environment into another.

Universal Access: The ability of the greatest number of people to reach environments and resources.

Chapter XVI
Scholarly Collaboration Across Time Zones

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abstract

The barriers to global collaboration of yesteryear include country boundaries and time zones. Today, however, in a world where communication is thriving on new technologies, these barriers have been overcome, not only by the technology itself, but also by the collaborators in a desire (and need) to extend knowledge, seize opportunities, and build partnerships. This chapter reports on one such collaboration: a case study where the focus is the writing of a scholarly article between authors from Australia, England, and South Africa. The challenges of different time zones, academic calendars, and managing the collaboration are outlined in this chapter. Findings from the case study suggest that the key elements of success are related to individual and project management techniques, and not the technology per se. The constructivist learning theory, as well as the e-moderation model are supported by this work, and thus extend their application to the academic writing process.

introduction

As an academic, how many times have you listened to a presenter, or read a paper, and thought to yourself that you would like to have a discussion with the presenter or author to develop a research project with them? How often has this actually happened? Have you ever considered why it has, or has not come to fruition?

This chapter reports on one such occasion where the research did eventuate. Lynch, Heinze, and Scott were all presenters at the England (InSITE, 2006) conference in Manchester, England. From informal discussions emerged a formal commitment to collaborate across land, sea, and time to explore and share the approaches and challenges in the delivery of capstone or team projects in their information technology undergraduate degree programs at their respective universities.

This chapter presents the processes undertaken by the academics to write, edit, and present a scholarly article (Lynch, Heinze, & Scott, 2007). It exposes the issues, problems, and challenges encountered during the collaboration, and concludes with several recommendations that could be used when considering collaborating in similar settings.

The chapter is organized in the following manner: First of all, the background to the case study is outlined drawing on the literature on collaboration and information communication technologies, and the way these can be used to facilitate online collaboration. This section is followed by the case study description, which outlines the work undertaken and provides an analysis of the main issues encountered. The chapter then details the academic outcomes and benefits together with suggestions that others may wish to adopt in their online collaborations with academic peers. The key issues are then summarized in the conclusion section of the chapter.

background

The impact of information communication technology (ICT) in higher education has provoked a surge of publications examining online collaborative work. The dominant emphasis has been on students' learning through their engagement with technology, and in general, the application of technology for educational purposes and how these are best incorporated in the curriculum (Collins, 2002; Salmon, 2000). Pedagogy is understood to be the science of teaching, and it is the role of a teacher to be aware of the teaching process to facilitate student learning. Pedagogic research suggests that pedagogic paradigms are shifting from a behaviorist approach towards a constructivist stance (Cullen, Hadjivassiliou, Hamilton, Kelleher, Sommerlad, & Stern, 2002; Shepard, 2000), and that constructivism as it is applied today, is enabled by technologies that facilitate interaction, discourse, and interactive writing (Lapadat, 2002). This enablement is exemplified by the work on Conversational Framework (Laurillard, 1993/2002) and Conversational Theory (Heinze, Procter, & Scott, 2007; Scott, 2001a, 2001b). These publications highlight the development of a conversational dialogue between student and the teacher, and how different types of ICT can facilitate different aspects of the dialogue. The concepts of communities have been renegotiated in the Internet era where virtual communities have become a popular paradigm (Bell, 2003).

Information and Communication Technologies (ICTs)

ICTs can be broadly categorized based on their speed of interaction (with the speed determined according to the time between when a sender sends a communication, to when the receiver receives the communication). An instant (or synchronous) communication is where participants exchange messages in real-time—for example, instant messenger dialogue, and the latter refers to communication which is not real-time (or asynchronous)—for example, an e-mail dialogue.

Web 2.0 and the Semantic Web are the latest generation of technological tools driven by the need for collaboration. Web 2.0 is based on the concept of simple online document editing which allows any user to voice their opinions (Rollett, Lux, Strohmaier, Dosinger, & Tochtermann, 2007). Web 2.0 examples include Wikis, blogs,

and social networking sites such as YouTube™. Semantic Web is based on the vision of Tim Berners-Lee (Berners-Lee, Hendler, & Lassila, 2001), who wished to see the development of software agents capable of trawling the World Wide Web for information, and then sharing and integrating this information into collaborative work groups. Whilst it is difficult to predict the future of technological developments, it is likely that Web 2.0 and the Semantic Web are two technologies which will be combined together for example in the form of semantic Web-logs (Ankolekar, Krötzsch, Tran, & Vrandecic, 2007), which will be the basis for collaborative work.

Collaborative Work and ICTs

Collaborative work refers to the interaction of two or more individuals on a certain task. With the aid of information communication technology, this interaction can be via distance synchronously or asynchronously. Examples of such work usually include the effective harnessing of the benefits of Internet-enabled collaborative work by a number of industries of individuals despite the fact that individuals are geographically disbursed (Wellman, Salaff, Dimitrova, Garton, Gulia, & Haythornthwaite, 1996). The software development environment in particular lends itself to utilizing this method of collaboration (Herbsleb, Moitra, & Technol, 2001).

One of the benefits of using ICTs to enable collaboration is the reduced social presence, therefore allowing collaborators to focus on the task and ignore any other attributes which will be applicable in face-to-face communication. This can facilitate the members in being unrestrained, innovative and direct (Wellman et al., 1996), allowing the opportunity for shy participants to be on the same level as extraverts (Johnson, 2001). Asynchronous online communication is particularly good in enabling social and cognitive construction of meaning, which because of its nature is based around interactive writing (Lapadat, 2002).

Whilst some benefits emerged through the use of the online communication tools, these tools also raised some challenges such as misunderstandings due to reduced communication cues (Heinze & Procter, 2006), and the perception of value for money: "Yet many corporations have invested millions of dollars in top-of-the-line technology, only to be disappointed when there is no commensurate improvement in performance" (Benson-Armer & Hsieh, 1997, p. 18).

One of the most acknowledged problems with collaborative work is the issue of withdrawal or attrition of members (Johnson, 2001). This is also an issue when the work is conducted within a virtual space. Furthermore, participation in a virtual team has other similar problems that are evident in face-to-face settings; these include group membership, organization, approach, and timing aspects (Noël & Robert, 2004). Although Web 2.0 and the Semantic Web are referred to as social networking technologies, elements such as "trust, openness, voluntariness and self-organization" (Rollett et al., 2007, p. 87) are evident.

A number of scholars have shared their views on how to enable effective and efficient collaboration. In particular the e-Moderating model (Salmon, 2004) provides a pragmatic guide on how technological engagement is best facilitated by structuring the process into five stages. The stages are: Access and Motivation, Online Socialization, Information Exchange, Knowledge Construction, and finally, the Development stage. Despite its prescriptive nature (Lisewski & Joyce, 2003), this model has a number of helpful suggestions for anyone embarking on online collaboration. The various stages of this model are supported by subsequent research—for example, facilitation in respect of online communication mechanisms and technical support (Johnson, 2001).

The use of collaborative ICTs, in particular, social networking tools such as blogs, synchronous video/text tools such as Skype™ provide opportunities for interaction and dialogue between the authors that are separated by time and

space. A warning for those who are involved in collaborating over time and space is not new, as highlighted by Dillon:

The role of the technology surely is to support people and to this end designers should not try to control or manipulate collaboration but just concentrate on providing the most transparent media possible and let the naturally occurring process of group working take care of itself (Dillon, 1993, p. 85).

Another theme that supports the operation of collaborative work is to suggest the use of negotiated norms and structure (Wellman et al., 1996). Establishing norms or "online etiquette" is perceived as a useful stage to inform the participants and remind them of the limitations associated with online communication. Although consensus amongst all parties is desirable in an ideal world, this is not always possible (Bell & Heinze, 2004). It is also difficult to prescribe the desired level of control within such online learning interaction. Rigidity might stiffen the development of a dialogue whereas too little structure might result in participants not focusing on the subject matter and emerging themselves in social interaction (Heinze & Procter, 2006). However, it is acknowledged that online social interaction is an important part of enabling dialogue which in turn facilitates knowledge sharing (Heinze & Procter, 2006; Zaitseva, Shalyor, & Whatley, 2005). Heinze and Procter (2006) support the socialization stage of the e-Moderating model: "Knowing each other eases the communication barriers and reduces the fear of posting messages into an open forum" (Heinze & Procter, 2006, p. 236).

The issue of knowing each other also increases the "credibility and trust" (Benson-Armer & Hsieh, 1997) which are important factors to those workers who collaborate with reduced face-to-face contact.

The next section outlines the case study, where its description is grounded in the collaborative writing process literature.

Case Study Description

The case outlined in this chapter stemmed from the authors' involvement in the development and delivery of systems development capstone/team/group projects that are critical and an integral part of an undergraduate Information Technology program.

The three authors met at a conference in June 2006 (InSITE, 2006), where they challenged themselves to collaboratively write an account of the common highlights and different approaches used for the delivery of their capstone or team projects. The authors are academics from different universities, and were geographically and temporally dispersed.

Together with the academics' desire to share their knowledge and experiences, and the advent of digital communication technologies, the opportunity arose to collaborate through harnessing technology.

Academic writing in relation to a specific topic enhances authors' understanding of the subject matter (Shih, 1986). The academic peer-review process which is associated with the majority of books and journals engages the authors in a dialogue. This leads to one perception of scholarly writing as a conversation and has a number of stages (Huff, 1999). These stages are initialization, drafting and reviewing. Collaborative writing is a cyclical process, evolving from initial idea inception in the form of a rough plan, to drafting and revision stages until the authors feel that the documents are ready. The planning, drafting, and revision are generally executed on various levels.

The given case study can be described using the Conversation model (Huff, 1999) and the e-Moderation model (Salmon, 2004). In writing the scholarly paper, the authors aligned—with modification, the writing process, and with the three stages of Huff's (1999) model for conversation. Huff's "Reviewing stage" is referred to as the "Revision stage," and an additional stage

was added—the "Closing stage" due to the requirement to conduct a presentation of the paper at a conference. Elements of the five stages of Salmon's e-Moderating model (Salmon, 2004) are reflected in the stages of the collaboration process. This highlights the versatility of the model for peer collaboration and not only for facilitating the learning of students. Table 1 illustrates how Salmon's e-Moderating model (2004) further refines Huff's stages of communication, and was mapped in this study.

The first stage of initialization or access and motivation was negotiated in a face-to-face contact by the three authors during their participation in the InSITE (2006) conference. The initiation process was then extended to the online environment where e-mail communication was used to focus this collaboration. The Huff drafting stages are broken down further into two sub-stages, that of drafting before the reviewers' comments and then subsequently, addressing the comments, bringing in yet another perspective on the collaboration and including the reviewers in the dialogue. The final stage was concerned with the presentation and submission of the manuscript which allowed the participants to reflect on the whole collaboration process.

The linear description of this collaboration process which was aligned to Huff's and Salmon's models allows the identification of a holistic picture of this process—the e-Collaboration model. The following section will provide a more detailed description of each step.

t he process

Initialization stage. Initialization for the project commenced at Lynch's presentation at the InSITE 2006 conference (Lynch, 2006). A number of academics were interested in the paper and associated topic (captone projects). The authors (Lynch, Heinze, & Scott) all taught in information technology capstone or team projects; though the curriculum or delivery were different, there were similarities, and the benefit of further discussing the issues related with teaching this type of program were evident.

Drafting stage. A conference was targeted, and a submission date identified. A paper was initiated from a skeleton of preliminary ideas. As the paper was about capstone or team projects, the initial structure was open, in that each author took ownership of the section that described "their" course. Once the initial ideas were conceptualized, the collaboration followed a cyclical process, evolving through stages of planning, drafting and revision. After each author constructed a first version of describing his/her individual course, it became evident that more structure was required. The paper was redesigned to include the same subheadings for each course. Within this new structure, the authors could elaborate and provide course specific information, including an account of the major challenges and benefits. The framework for the paper not only highlighted similarities across continents, but also reflected some unique approaches taken by each individual.

Table 1. Matrix showing collaborative approach development—based on Salmon's e-moderation model within Huff's conversation model

Huff (1999)	**Salmon (2004)**	**Lynch, Heinze & Scott approach to e-collaboration**
Initialization	Access and motivation	Initialization: Access and motivation (face-to-face meeting)
Initialization	Online socialization	Initialization: Information gathering (electronic communication via e-mail)
Drafting	Information exchange	Drafting: Knowledge construction (electronic communication via e-mail)
Drafting	Knowledge construction	Revision: (electronic communication via e-mail and Skype™)
Reviewing	Development	Closure: (face-to-face and Skype™ presentation)

Revision stage. As the complexity of the paper was known to increase, version control was initiated early on in the process. Figure 1 illustrates the chronological list of the drafting process. After the review process for the conference was completed, the paper was fast-tracked to a journal (Journal of Information Technology Education), and thus the paper required not only edits according to the conference reviewers, but also additional content and caliber in order to be suitable for a journal publication.

A versioning control system and etiquette "rules" (Wellman et al., 1996) were implemented (see Figure 1); for example, "2007-insite-projects-kl-v1.doc" indicates that the paper was for the 2007 InSITE conference, with a short title of "projects," it was last edited by "kl" signifying Kathy Lynch, and relates to "v1" or Version 1 of the document. There was only one person who could increase the version number—to prevent the issues of duplication, and this person was the lead author. The decision to change the version number was when a significant change was made—or all authors had contributed to the version.

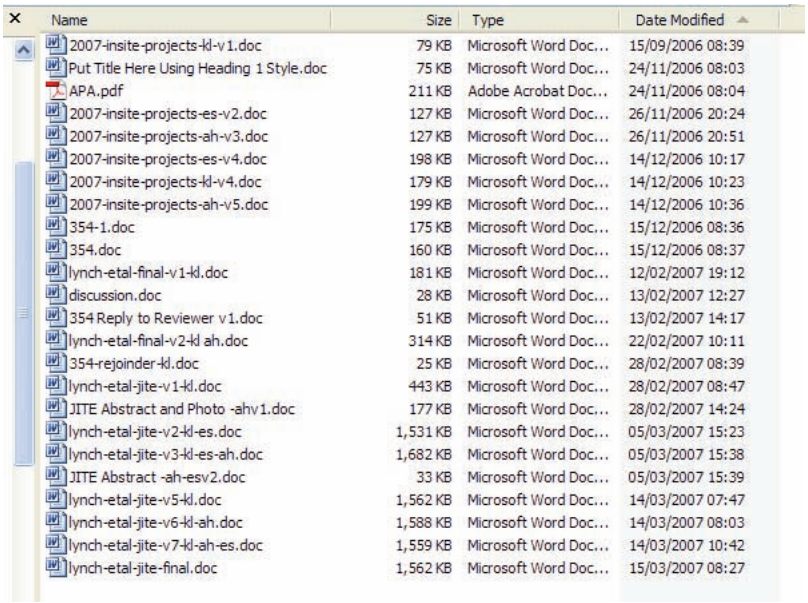
Despite the challenges of passing the written token from one person to another, the authors managed to keep up the conversation by means of the collaborative/scholarly writing process as proposed by Huff (1999). In most cases, all authors were copied in on e-mails, thus assisting individuals to keep track of the communication amongst the group members.

The "Track Changes" functionality within Microsoft Word™ was extensively used. This was accompanied by the use of "Add Comment" within Microsoft Word™, and to a lesser extent, the use of different colors was used to emphasize changes and points that required attention, or for clarity when many Track Changes were present.

During the paper revision stage Skype™ was used for "virtual" face-to-face meetings. These meetings were infrequent during this stage, however the sessions were used to clarify complex sections of the paper, and to design the conference presentation.

The initial Skype™ session between the three authors was not particularly successful due to bandwidth limitations, hardware problems, and

Figure 1. Drafting process, and version control



token passing between the participants. However, with practice, a few "'rules," and supplementary use of the "text/chat" feature, these sessions were very favorably received, not only for the academic discussion, but for their socializing aspect.

Closure stage. The final stage involved developing the presentation for the conference paper (Lynch et al., 2007) at the InSITE 2007 conference in Ljubljana, Slovenia. The presentation slides were designed and developed by the three authors using Skype™, e-mail, and Microsoft PowerPoint™, with Lynch taking the lead. The presentation format was the same for all three institutions, though their own personalities emerged, highlighting some of the differences between the countries. It was a disappointment to discover that the full team would not be participating in the physical face-to-face conference presentation; only Lynch and Heinze were able to attend the conference. Consequently, the conference organizers gave permission and support for the presenters to use Skype™, thus enabling Scott to be a "virtual" presenter for the presentation. Although there were a few technical issues (lag time due to limited bandwidth), the authors felt that the presentation was a success.

Regardless of the differences between the academics and their institutions, one similarity was very evident: the academics' commitment to both the scholarly community and to their students.

There were a number of lessons learned as a consequence of this collaboration. The following sections of this chapter will focus on the academic outcomes, challenges and tips in collaborative writing.

a cad Emic o utcom Es

Within the context of the collaboration detailed in this chapter, several positive learning experiences emerged from the collaboration, these were, professional development, and research opportunities.

Professional Development

The academics had first-hand experience with the challenges associated using ICTs in the development of a "product"; something that they often force their students to do, though not necessarily having broad experience themselves. Added to this are the complexities of collaborating across time zones with implications of conflicting priorities, deadlines, language differences, and working with colleagues whom you knew very little about. Though this was challenging, it was a great opportunity to develop as an academic.

Furthermore, the opportunity to discuss, compare, share and learn from others who have similar challenges is something that should not be underestimated. The discussions that arose during the process generated a cross-cultural view on solutions to delivery issues, and were a bonus to the collaborative writing process. Subsequent discussions not associated directly with the capstone or team project issues—for example, the conundrum of the decline in IT student numbers together with the increase in demand for IT professionals—were welcomed as a global perspective is not always easy to gather or contribute to in a nonthreatening environment.

Research Opportunities

The development of a research project can be related to the researcher's confidence in conducting research themselves, or being a valuable contributor to a research project. Both of these come with experience; this project has not only added to the authors' confidence in contributing to a research project, but confidence to act on ideas, and initiate research projects. Additionally, the development of future collaborative opportunities with the same team or their colleagues, are now a possibility; for example, investigating global systems development projects, joint student capstone/team projects or other student projects.

cH all Eng Es, t ips, a nd rE comm Enda tions

Writing an academic conference paper, planning a presentation, and reworking a conference paper for a journal are not simple tasks for any academic. For the three academics, the geographical distance of 7,000 to 20,000 kilometers, and a time difference of between one to nine hours, were not the only challenges: They each had different levels and fields of formal education, different native languages, involved in different undergraduate university programs, and differences between universities—such as university calendars, courses (Information Systems, and Computing), course deliverables, and operational differences (mixed program of first, second and third year students, to third year only students). These differences were overcome through a consultative and cooperative process. The following section outlines a number of recommendations or tips that could assist others who undertake collaborative writing over geographically and temporally dispersed circumstances. Furthermore, these recommendations could easily be transposed to any collaborative project where the sharing of knowledge, learning, and collaboration are at the foundation of the effort.

Motivation

All parties involved in collaboration, and in particular where there are temporal and spatial differences, need to be motivated to engage with each other. In the case reported in this chapter, the authors were all dealing with similar problems in their own institutions; each realizing that their problems were not unique to their course, students or institution. Each team member needs to be able to see the advantage of working with others, the benefits that will eventuate. In the case of this academic collaboration, each author could see that working with other like-minded academics would benefit the courses in their own institutions bringing new ways of addressing similar issues to the fore; a strong motivator.

Furthermore, all collaborators who are affected by the same problems are arguably "blind" because of their interpretive, and biased views. Motivation is related to priority, the time to work on a collaborative project needs to be allocated if the collaboration is to be productive and realized. Being able to keep a virtual collaboration a high priority is difficult. The authors found that one of the strengths of collaborating across time zones was that time became an advantage. A 24-hour effort could often be exploited because of the time differences—for example, one author would send their draft at the end of their day, and the other author would work on it whilst the first author was asleep.

Milestones and Deadlines

The idea of meeting someone at a conference and perhaps ending up exchanging a couple of e-mails about some thoughts is a reasonable expectation. However, in order to learn more from the interaction, an academic paper writing process allowed channeling the energy and enthusiasm to a structured exchange of information between the three institutions. The deadline for submission was a great help to focus this work even further and the information exchange progressed to knowledge construction and development, therefore underpinning the e-Moderating model of Salmon (2004).

Curiosity

How do people write papers in different countries? It was interesting to learn that last-minute finishing was a problem not only suffered by the students, but also by the academics in the three countries that collaborated. Collaborative writing also facilitated the constructivist social interaction to enrich each collaborator with new knowledge and broadened horizons. The curiosity

of working closely with others; their writing style, language, thought processes, and knowledge are all areas that add to ones academic curiosity and development.

Leadership

An experienced leader is required for any project, and the importance of their role cannot be underestimated. Being able to identify key areas and structure for a paper and playing a major role in ensuring the paper adheres to the necessary quality standards, keeping on track (though being flexible and accommodate members' schedules), is of paramount importance. The well-regarded project management techniques of planning, scheduling, and controlling are just as well-suited to collaborating on an academic paper, as they are to working on an information system development project. Although the structure of the paper evolved, a plan for the paper structure was of great benefit to focus initial work and was then used to accommodate reviewers' comments.

Team Spirit

Team spirit is reflected in DuBrin's (2002) definition of a group as "a collection of people who interact with one another, are working towards a common purpose, and perceive themselves to be a group." Team spirit cannot be forced; it emerges through trust and the worthiness of the cause and develops and deepens. The team spirit during this collaboration was high; respect, trust, and friendships developed.

Commitment

Katzenbach and Smith (1993) define a team as a group that has a high degree of commitment from its members to achieving its goals and given objectives. In academic writing, this commitment needs to be present at the onset of the project, and may need to be reenergized during times of heavy work pressures—which may be at different times for each contributor—and when milestones and deadline are determined.

Overall the constructivist notion of learning as a social process has been highlighted in this chapter. The paper writing process provided common problems and a focus to channel the collaborative enquiry which enriched the experience of the individuals on a number of levels.

c onclusion

This chapter outlined the developments of a successful scholarly collaboration across time and space borders where ICT-supported and enhanced the collaboration. The success can be measured in terms of accepted deliverables to conference and journal publications, hence contributing to knowledge of the academic community. The collaboration is an example and supports Dillon's view (1993) that technology is there to support collaboration but success is entirely dependent on the individuals taking part in the process. It was shown through this case, that using simple tools such as a word processor, e-mail, and instant chat facilities was sufficient to support this process. More and more collaboration is taking place and will continue, gain momentum, and will happen across different times and spaces. The onset of virtual spaces (for example, Second Life), and the explosion of social networking tools (for example, Blogs, and Wikis) can only advance collaboration using electronic means. There are a number of other tools which could be considered for future collaboration, however, the technology alone will not make the collaboration a success. The main themes that contribute to the success of this case study are related to the individuals and their motivation, curiosity, team spirit and commitment, project management techniques such as milestones and deadlines, and good leadership.

It is not only important that students are being prepared to collaborate across time and spatial

boundaries, it is also time for academics to take advantage of new and emerging technologies to advance their research, teaching, and professional development. The case presented here demonstrates the constructivist belief regarding the social learning experience and learning from each other. This is in line with the developments in the Conversational Theory (Heinze et al., 2007), which underpins the need for dialogue to facilitate learning. In our case the dialogue was based on a topic of common interest and had the purpose of a joint publication. The experience provided a development means for academics which highlights how a simple paper writing process can facilitate learning. Because the paper was to be presented as a coherent document, the meanings amongst authors had to be negotiated and this process allowed the shaping of individual's beliefs and understanding.

The case study suggests that the stages of collaborative writing as proposed by Huff (1999) can be further subdivided into the stages proposed by Salmon (2004). These have been furthered refined as by Lynch, Heinze, and Scott as stages in e-collaboration, and are defined as Initialization, Drafting, Revision, and Closure. This increase of stages justifies and takes into account the academic nature of collaborations.

At conferences, or other face-to-face meetings, time can be used for the negotiation of the specific topic, followed by the electronic exchange to facilitate the writing process, providing an audit trail and self documentation of communication and the ideas development. For example, in the case presented here, no meeting minutes or agendas were necessary in this communication since all interaction was self-documented. The final stage of conference presentation was also conducted in a face-to-face environment—albeit virtual, which allowed the participants to reflect and write yet another paper.

The motivation for the collaboration presented in this chapter was based on an enthusiastic desire (and need) to share knowledge and experiences. Despite a rapidly changing environment (Gupta & Wachter, 1998; Novitski, 2001), educational institutions are faced with the challenge to constantly adapt curricula in an attempt to maintain an effective balance between technical expertise, up-to-date business knowledge and collaborative work skills (Lynch & Fisher, 2007) in their programs. The opportunity to share expertise from across the globe to enhance what/how we teach and learn, is common in dissemination, though far less common in the collaboration or construction of knowledge. It is the hope of the authors that their experience will inspire other academics to take advantage of opportunities that arise regardless of where the possible collaborators may be located.

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kEy tErms

Asynchronous Communication: Refers to communication which is not real-time (or asynchronous); for example, an e-mail dialogue.

Capstone Course (or Team Projects, or Industry Project, or Industry Experience Project): The capstone course of any university degree is the integration of all learning gained from courses in the major with other learning from all supplementary courses undertaken to attain the degree (Moore, 2005). "A Capstone course forms the culmination of many learning experiences students encounter during their academic careers" (Lynch et al., 2007).

Collaborative Work: Work that involves more than one individual working towards a common goal.

Constructivism: Pedagogic theory that builds on the ideas of Jean Piaget (1896–1980), John Dewey (1859–1952), and Lev Semenovich Vygotsky (1896–1934). This pedagogy emphasis that learning is a social activity and therefore should be facilitated via a continuous interaction of learner with teacher. The emphasis of learning is to learn problem solving skills in relation to real life (Shepard, 2000).

e-Collaboration: Work that involves more than one individual working towards a common goal through the use of information and communication technologies.

Information Communication Technology (ICT): A broad term encompassing the use of software and hardware to facilitate manipulation and processing of information. Examples of ICT include laptop computer and the Internet.

Pedagogy: Understood to be the science of teaching, concerned with the method used to facilitate student learning.

Synchronous Communication: An instant (or synchronous) communication is where participants exchange messages in real-time; for example instant messenger dialogue via Skype™.

Chapter XVII
Stepping into the Role of Professional Writer

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abstract

A group of National Writing Project teachers from around the nation attended a Professional Writing Retreat in Santa Fe in 2004 and continued their collaboration. This chapter examines the progress of the group's commitment to communicate by electronic means about writing about teaching. Teachers from the experimental group, those who answered the call to examine their continued involvement with the group, provide qualitative research narratives about how each responds as they help one another to step into the role of professional writer. Statistics gathered from both the experimental and a control group of teachers (who attended the same retreat but did not answer the survey) allow the reader to chart the teachers' success in: (a) presenting together about being professional writers, (b) writing together as professional writers, (c) writing individually about teacher-practice, and (d) meeting at the National Writing Project's Annual Meeting in order to continue to support each other's work.

introduction

The authors of this chapter are National Writing Project (NWP) teacher-consultants teachers from various sites in the United States who applied to an advanced institute called the National Writing Project's Professional Writing Retreat A. The four-day workshop focused on providing support for educators to help us publish our work. The retreat was open only to teachers who had attended one of the NWP's Invitational Summer Institutes for teachers. Thus, this professional writing retreat was considered an advanced institute for Writing Project teachers or teacher consultants.

The authors are teachers who participated in the 2004 Professional Writing Retreat A (There is also a retreat B that helps those with finished pieces). Participants were offered a group list-serve so that they could introduce themselves before the retreat and continue professional conversations after the retreat. The 2004 Retreat A group accepted this offer as a valid ongoing opportunity. Several participants have continued to collaborate electronically in order to grow professionally. This chapter will examine the ongoing collaborations after the Professional Writing Retreat A in 2004. To date, in addition to informal opportunities for peers to provide feedback such as revising or editing, there have been seven opportunities for the larger group to work together. The seven formal opportunities included breakfast meetings at the National Writing Project's Annual Meetings in 2004, 2005, 2006, and 2007; a presentation at the National Writing Project's annual meeting in Pittsburgh, PA in 2005; one at the National Council for the Teachers of English (NCTE) Conference in New York City in 2007; and the opportunity to write this chapter collectively. Furthermore, the fact that a sizable group answered each of these calls is part of the serendipitous way in which group members have been able to work together; certainly the electronic conversations are at the heart of the group's success.

In this study we examined the following questions:

1. What percentage of our group reengages for each event that the entire group is invited to participate in?
2. How do group presentations and group writing help encourage each individual teacher as a researcher?

Group members hope to prove to ourselves and to a larger group of Writing Project teachers that an ongoing research connection among reflective practitioners can be energizing. The case documenting that synergistic connection is presented through analysis of survey data from the experimental group (the 47% of 2004 Retreat Group A group that coauthored this chapter), through narrative documentation of the members' synergistic cooperation, and through commentary from experimental group members about what being involved in these collaborations means for us. Finally, statistics are offered on the number of individuals from the experimental group who has been involved in publishing professional writing versus the number from the control group, those who did not collaborate this chapter (53%). Research is both qualitative and quantitative; the National Writing Project encourages narrative reflection, and the writing that we have done about our writing informs this chapter.

Group members designed a reflective instrument to measure further involvement in professional writing by those from 2004 Retreat A group. The intent was to discover if members have continued to write about their practice (i.e., continued to be reflective practitioners) attempted to become professional research writers by submitting their work to professional journals, bulletins, magazines; continued to use other members of the group as collaborative partners; and whether or not collective work is synergistic for them.

background: why the national writing project supports teacher research

The National Writing Project was founded in 1974 at the University of California, Berkeley. NWP now has sites in all 50 states. Its mission is to improve writing in America's schools. They do this through a professional development model that stresses teachers teaching teachers. Its purpose is trifold: (a) to better prepare teachers to integrate the craft of writing into content teaching in their classrooms; (b) to encourage and mentor teachers as they write themselves because the NWP believes that practitioners are the best teachers; and (c) to allow teachers to teach teachers, because—as their national objectives state—"the best teachers of teachers are other teachers."

The National Writing Project is sponsored by a university to serve teachers in that area. Each summer, the Writing Project's site offers a 4–5 week summer institute for teachers. The summer institute focuses on studying best practices in the teaching of writing and engaging participants in writing themselves. Each participant makes an inquiry or demonstration presentation to the group based on some aspect of his or her own teaching practice. Each participant makes an inquiry or demonstration presentation to the group based on some aspect of his or her own teaching practice.

The study of the craft of writing often requires reading works by practitioners such as Calkins (1994); Graves and Hansen (1986); Fletcher (1992); Atwell (1987); and Elbow (1998). As a group, NWP teachers subscribe to a philosophy delineated by Lucy Calkins (1994):

If our teaching is to be an art, we must draw from all we know, feel, and believe in order to create something beautiful. To teach well, we do not need more techniques and strategies as much as we need a vision of what is essential. It is not the number of good ideas that turns our work into art but the selection, balance and design of these ideas (p. 3).

Writing Project teachers often seek the opportunity to learn more about the art of teaching from likeminded practitioners, and the National Writing Project supports teachers' efforts to be ongoing learners, teachers of teachers, and writers about teaching.

Upon successful completion of the institute, often a 6-credit graduate course, the participants become part of both the local and the National Writing Project organization, and are referred to as either fellows or as teacher consultants.

Although the summer institutes form the backbone of the National Writing Project, each site engages in other activities that help improve writing in schools. Ongoing work of the local affiliates includes both the training of teachers through in-service sessions offered by the teacher-consultants about the craft of teaching literacy and organizing opportunities to bring fellows together to engage in creative writing or reflective writing about practice. Sites are very diverse and may sponsor everything from student writing workshops to teacher inquiry groups, helping students become better writers and teachers to become researchers. In short, a local site will provide whatever support that is needed to help students become better writers and for teachers to become better teachers of writing.

Because schools and school districts, particularly since the enactment of the No Child Left Behind legislation, have concentrated heavily on student test scores to measure the progress and the worth of the school district itself, the National Writing Project has emphasized its own distinctly different goal. The NWP's goal is to encourage both teachers and students to be life-long learners rather than high-stakes test-takers or test-prep practitioners. In light of that goal, the NWP continues to encourage local affiliates to offer writing/study opportunities for teachers to engage with writing, and to send teachers from the local level

to national conferences or institutes. One of these opportunities is the Professional Writing Retreat in Santa Fe, where one may prepare one's research writing for publication. The respondents in this study, and authors of this chapter applied for this retreat, and were accepted to participate.

main focus: How our group, THE 2004 RETREAT A TEACHERS, bEgan to collabora tE

The National Writing Project invited teachers from its 197 sites in the United States and territories to apply for Professional Writing Retreat A and B. Out of those who applied, 17 teacher-consultants were invited to attend Retreat A. That group, which turned out to have a serendipitous connection between practitioners, came to Santa Fe in June 2004. Each of the 17 teachers brought a piece that they wanted to write; six and facilitator-organizers were there present to assist. The organizers included four teachers/professors, an editor for the NWP's magazine *The Quarterly,* and an intern with the technical skills to create a group e-mail site so that group members could communicate before and after that particular year's retreat. The 2004 groups (Retreat A in June, and Retreat B in August) were the first groups to have such a list serve set up specifically for their group; Retreat Group A has used ours to great advantage.

Facilitators of previous NWP Professional Writing Retreats had encouraged each year's group to stay in touch with each other. In part, due to the new opportunity for electronic correspondence before the writing retreat began, this group developed a professional camaraderie, but the synergy in this particular group also seems to reside in group members who continue to find opportunities for work together. The group has developed continuity. Repeated reengagement proves the 2004 Retreat A Group to be one that continues to reengage for the purpose of professional writing. This was the first group to request a continuity meeting at the NWP's Annual Meeting, held each November in a major U.S. city, along with the National Council for Teachers of English conference.

Of the 17 2004 Retreat A participants (not including facilitators), a number (35%–51%) have continued to collaborate with one another. At the end of each year's retreat, the facilitators ask for a volunteer committee of retreatants to edit an anthology of sample drafts which is disseminated the following January (publishing committee) *and* they ask a committee to organize future retreats at which that particular group will meet again to work on their professional writings (continuity committee).

All groups are asked to organize an ongoing opportunity for group members to meet and discuss professional writing; 2004 A was the first to ask facilitators and parent organization (NWP) to sponsor a breakfast at the annual meeting. Facilitators asked the NWP to pay for a breakfast, then invited 2004 A group members to attend if they were coming to the Annual Meeting that November in Indianapolis. Seven (41%) attended. Although the group talked about gathering to write in the summer of 2005, what happened instead, was that one group member, Christine Aikens Wolfe, proposed that the group present at the Fall 2005 Annual Meeting of the NWP in Pittsburgh. She suggested that we present a session for interested teachers on the professional writing retreat in Santa Fe which we, as a group, had gained so much from. Via the electronic list-serve that the 2004 Santa Fe group has access to on the NWP's site, the call went out to all 17 teachers.

Two teachers, Cheryl North-Coleman and Toby Emert, suggested instead that the focus be around teachers thinking about the role of a professional writer. Five individuals from the group commented on the proposal as it appeared online, several rewrote the original draft. Members responded positively to each others' rewrites and to new suggestions; this group of five was able to engage in professional give-and-take by

posting the drafts and writing suggestions or corrections in the margin; and by asking questions parenthetically in the text. Soon all agreed to have Toby write the definitive draft. The document was submitted to the NWP; and—though only 35% of proposals are accepted—the 2004 A group members were accepted as presenters. The group agreed that Cheryl would organize those who were willing to present and also that she would make sure that presentations fit the topic. She was able to find six teachers from the retreat who wanted to present, or 35%.

The 2004 A retreat members are a unique group, different from all other groups who had attended Professional Writing Workshops in Santa Fe. This is the only group of participants who ever presented about the advanced institute. Formerly, only organizers had promoted such a professional development opportunity. Taking as a theme, *Stepping into the role of professional writer,* presenters used the forum to encourage other teachers to think of themselves as professional writers, to note what pedagogical writing each presenter was individually involved in, and to encourage session participants to apply to the Santa Fe Professional Writing Retreat, where they would be mentored as researchers/professional writers. Groundbreaking work as colleagues who could support, correct, and encourage one another was established. And it continued.

The proposal to present at NWP (November 2005, Pittsburgh) was lauded by the NWP (both at its inception and at its presentation) as being unique in that participants from an NWP event, not organizers, were the presenters. Six members of the group were official presenters at the Annual Meeting (35%), but three additional group members were in the audience, as were three of the original six facilitators of the 2004 Santa Fe Retreat A. That meant that—of the total group of 17 teacher participants who worked in a collegial fashion in 2004, 53% were part of a presentation which encouraged teachers to engage in reflective practices, to write about such practices, and to send that writing to venues where the knowledge could be shared with other teachers. The fact that 50% of the facilitators from the session supported the presentation, as well as evidence that the national organization recognized the successful continuity of this group.

As part of the presentation, members who had been published (or not) shared their stories. Glorianne Bradshaw and Margaret Simon, elementary teachers in North Dakota and Louisiana respectively, had sent articles written from the drafts composed in Santa Fe to the National Writing Project's magazine *The Quarterly.* Each told her own story about editors responses, what changes were made, and how to back-and-forth process with an editor worked. Toby Emert, who teaches at the college level, told the group of his effort to publish his action research draft based on response strategies of Elbow and Belanoff. He sent the piece to *English Teacher,* but the publication rejected his article on the grounds that the audience should be college professors; they suggested a number of such publications to Toby. The three other presenters read excerpts from their articles (or doctoral studies), and talked about what they intended or hoped to do with their writings.

During the course of the NWP's 2005 Annual Meeting, always held in conjunction with the NCTE's annual convention, the 2004 A group again met for breakfast. This time members organized the breakfast themselves. At the breakfast, it was agreed that individuals would once again attempt to plan a writing retreat for the 2004 A group. Some (17%), had already committed themselves to plan a research writing/reflective writing retreat for their local Writing Project sites. Others wanted to present together again, or to write together. All were eager to support one other as each of us continued to write about pedagogy at our own teaching level, which for this group spanned first grade through college. Members agreed to continue the discussion about further collegial work by e-mail. Though no writing retreat for the group itself came about in 2005, several group members

helped organize professional writing retreats for their local Writing Projects. Members of the group had a breakfast meeting again in November of 2006, at the NWP's Annual Meeting in Nashville. The 2005–2006 academic year was progressing; group members agreed to be on the lookout for collegial efforts for 2007. By spring of 2007, two new opportunities for collaboration were offered on the list-serve for the group, both to be completed by the fall of 2007. The first invitation came from Cheryl North-Coleman, asking that we consider a presentation to the National Council of Teachers of English in the fall; a presentation about reading-writing connections. The second invitation came from Christine Aikens Wolfe, an invitation to write a chapter for a book on electronic cooperation. Members of the group accepted both invitations.

Six teachers initially (35%) agreed to present at the NCTE's 2007 Annual Convention on *Developing critical readers; Engaging every student in the four reader roles.* Group members e-mailed ideas or drafts about parts of the presentation to one another. The methodology established when the group copresented under the direction of Toby Emert at NWP's 2005 (Pittsburgh) Annual Meeting was utilized. The 2007 New York City NCTE convention presentation was under the direction of Cheryl North-Coleman, and the organizing of presentations was under Denise Amos. The presentation was attended by 65 teachers; the number in attendance was a compliment as it was a Friday, 3:45 p.m. time slot.

Two teachers who attended wrote on their evaluations that they had picked the session because it was a Writing Project session, and that they were not disappointed.

At the same time that Cheryl invited group members to copresent at NCTE, Christine invited individuals to cowrite a chapter about the group's synergistic work as fellow teacher-researchers. Eight teachers (47%) responded to Christine's call to be the experimental group in a research study about how the 2004 A group continues to collaborative on writing and presenting about pedagogy.

The synergy of the group continues as each year brings the triple challenge of:

a. Teaching reading and writing at our separate schools,
b. Writing about our heuristic individually (with peer response available via the group e-site), and
c. Finding opportunities to continue collaborative writing and/or presenting together.

The group has developed the ability to allow lead teacher and teacher participants to alternate. Eight teachers (47%) Our collaborative work also rests on the foundation that each teacher is an ongoing reflective practitioner. Continuing individual research is enriched, because each has like-minded colleagues who are willing to critique and supply commentary about the quality of an individual's writing.

Glori Bradshaw has now written and published an article entitled *Connections: Adapting strategies for beginning writers* in the NWP's *The Quarterly***.** Denise Amos has written about *Spelling poems.* Toby Emert, who continues to write about the pedagogy of engaging in writing with his college students, has submitted his article, *Putting our Elbows on the table: Preservice teachers learn to share and respond,* to the *Virginia English Bulletin*, which has agreed to publish it. Toby also presented at NCTE (2007, NYC) with his students. Margaret Simon's article, *Writing with William,* was published in the National Writing Project's magazine *The Quarterly*, *Vol. 27, #1, 2005.* Nancy Desommes presented at NCTE (2007, NCY) on literacy and service learning.

Shelly Unsicker's article, *Do I really want my student's to write from the heart?,* is currently under revision. Potentially, it can be sent to *English Language Arts* magazine. Shari Williams is getting ready to publish her book on high school writ-

ing instruction across the curriculum. Members of the 2004 Retreat A are both encouraging her and helped to critique chapters as she produced them. She is also applying for the Writing Retreat B to help with the editing process. Christine Aikens Wolfe submitted an article entitled *What motivates the primary reader to engage with reading and writing? One reflective teacher's attempt to find out* to the National Writing Project's magazine, *The Quarterly.* It was accepted as a draft, and was set to be published when the NWP ceased to publish *The Quarterly,* deciding instead to concentrate solely on their *Bulletin.* Christine will seek another venue for publication.

Teachers in the control group are those who were not able to participate in the survey. In most cases, this is because attending conferences and planning presentations is a volunteer assignment beyond the enormous amount of work that most classroom teachers already engage in. At the breakfast meeting at NWP's Annual Meeting in 2004 (Indianapolis), Paula Gamlich announced to fellow 2004 retreatants that she had completed a young adult novel, which she is using as part of her classroom curriculum. She found an agent for the book, and is hoping that she finds a publisher. Paula has not, to date, responded to other calls from the group.

Mindy Fattig and Maureen Taylor, who came to the 2004 Santa Fe Professional Writing Retreat to outline chapters for a book, have not met with other retreatants since 2004. However, they RSVP'd regrets for not being able to join the group in November of 2004 because their Writing Project (northern California) was not able to fund a trip that year. They attended an additional NWP Professional Writing Retreat in Santa Fe in 2005 (Retreat B for those with a draft); and their book *Coteaching in the differentiated classroom* will be published in November 2007. Therefore, at least three members of the control group (18% of the entire group) have continued to write for publication. The retreat was unusually successful in helping teachers to think of themselves as professional writers, and the energy of 17%–52% of the group has carried group members to the point where they see themselves and their fellows as successfully "stepping into the role of professional writers."

f utur E t r Ends

Will the eight teachers who have had ongoing contact with one another as professional writers continue to write and to support one another? Will the group continue to explore flexible methods of leadership? Will the core group grow? Do members of the group, either of the experimental group, or of the control group, still support one another by using the writing-support groups established in Santa Fe? As control group members are those who did not answer the survey, answers to some of these questions comes in other forms, such as breakfast meetings and continuing electronic contact.

One experimental group member, Shari Williams, poses a series of future challenges:

"Maybe we should go back to everyone who attended in Santa Fe, and find out how many of them actually stayed connected to their retreat writing groups after the retreat. I believe that some did. We can also ask how their writing benefited from the online writing group, and if that writing was ever published. We might even ask (the NWP) to have access to some of the other summer groups to see if any of them stayed together online as writing groups [...or] we could gather information from other NWP presenters to see if their experiences are like ours, or how online communication benefited them in their preparation. I have been involved in other presentations with other groups that were spread across the country, and we [...] developed our entire presentation online."

Margaret Simon comments about her initial involvement:

"My reputation for teaching writing was beginning to spread in my school, but the retreat gave me additional lessons:
"When I arrived in Santa Fe, I had a completed draft of an article about my experience tutoring a 5th grade student in writing. Through the experience (of the retreat), my own philosophy of teaching writing developed. I articulated this transformation in my article. I worked on my draft at the retreat, using responses from my writing group there. Back at home, I sent the article to the NWP publication The Quarterly, and editor Amy Bauman guided me through the revision and editing process via e-mails. My article was published in the 2005 winter edition of The Quarterly. (At the 2005 NWP presentation), I enjoyed reading part of my published article and sharing with others my experience of the Professional Writing Retreat in Santa Fe. I would love to continue collaborating, because it keeps me focused on the work of writing and the work of teaching writing. It's my support group in a way."

Toby Emert, seen by other members as the lead teacher at our presentation at NWP (Pittsburgh) 2005, describes himself modestly in the following way:

"I helped organize a presentation on the retreat at the 2005 NWP / NCTE convention and have worked with folks on drafting a presentation for the 2007 NCTE workshop. Group members feel and express pleasure in the bond that we have created."

Christine Aikens Wolfe, in commenting on her involvement with the group, states:

"I attended the breakfast at NWP in 2004, helped discuss a retreat possibility for us that did not come about, suggested the idea of a group presentation about our Santa Fe retreat to the group by e-mail in May of 2005, and that did happen. I found out at that time how synergistically our group could function. We shared authority and leadership, and participated as equals in the NWP presentation Stepping into the role of professional writer."

Denise Amos reflects:

"Writing can be lonely work. Lonely, procrastinating work, so the encouragement of an online community is just what a writer needs to progress toward that ideal professionally. When the e-mails start coming in, I can either ignore them, or read them and get back to working on my next project. I prefer to let the group nudge me into working on a draft."

Shelly Unsicker adds these comments:

"Originally, I attended the Professional Writing Retreat hoping to learn how to write about my classroom practice as a teacher researcher. While I'd felt that I was fairly adept at writing, I sat in our circle that first evening feeling insecure and wondering what in the world I had to offer the group. What I experienced over those 4 days, however, changed everything. I began to see myself as both a writer and a competent teacher, which I believe moved me to seek and attain National Board Certification. Having identified with the struggles my students must experience every time I ask them to write a piece of themselves onto paper, I've grown more empathetic. I continue to seek ways to make my classroom a safe community where students feel free to take risks as writers. Since Santa Fe, I've taken on leadership roles at my local site (Oklahoma Writing Project). And I've returned to school. I am pursuing a Master's Degree in English Education and am learning more about teacher research. When will I finally be published? I'm not sure, but I haven't given up. Publishing remains one of my career goals."

Cheryl North-Coleman writes about what brought her to the retreat:

"I was working on my dissertation studying biker writers. I hope to sway the tide of our testing climate with my work [...] I did complete my draft with the help of my writing group and had it published in our anthology. I did not send it off for publication (part of a dissertation)."

When Cheryl returned home, she organized writing retreats for both Maryland and Delaware Writing Projects, as she has continuing ties to both local organizations. She answers all calls from the group to collaborate and has helped to organize the breakfasts each year when the group meets to exchange professional news. This year, she will not only organize the breakfast meeting, she is the lead teacher for the presentation on reading at the NCTE.

Glorianne Bradshaw submits to the group:

*"I applied to the NWP Retreat in Santa Fe because I had an article that I thought was worth publishing. I wanted to be around great writers and learn from them. I wanted time to write and reflect. I wanted feedback for my writing from people who did not know me, who would be honest**….** My research centered around a writer's notebook, at the first grade level. It used text from Arnold Lobel's Frog and Toad and showed students how to utilize these books as models for good writing. After the retreat, I worked online with some members of my sharing group from Santa Fe. My article was published in The Quarterly in winter, 2005."*

c onclusion

The group continues to communicate about its own follow-up writing retreat (which has not happened yet), but individuals have organized breakfast meetings at the NWP Annual Meeting since 2004. Members plan to meet again at each Annual Meeting to share professional successes and progress, and to finalize plans for copresentations. Narratives from experimental group members note that they really value the opportunity to talk in person about individual professional writing and/or creative writing, and to speculate about the next venture or ventures together.

The year 2007 brought two invitations: the NCTE presentation about content area reading and the opportunity to write a chapter together. The group which responded to Cheryl Coleman-North's call drafted a plan. Cheryl polished the document, submitted it to the NCTE and notified us that it had been accepted. Denise Amos agreed to organize the teacher presenters, found six of us, and Cheryl mailed us a CD template of her power point presentation, *Developing critical readers: Engaging every student in the four reader roles*. The other presenters organized their parts to enhance Cheryl's portion. The presentation was well received and well attended. Christine Aikens Wolfe's suggestion that we write a chapter for a book together drew in almost half of the original group (47%). The chapters in the book include group research projects in education, government and business, that alone was of interest to the 2004 A Retreat group members. But that the major topic emphasized working together in synergistic fashion—that most definitely described the 2004 A group.

The experimental group is a group within the original group, the Santa Fe 2004 Professional Writing Retreat A. There is room to grow. Some of the not-as-active-with-the-group colleagues may join for future ventures. Every good idea that one of us gets is posted to the entire cadre of 17 teachers on the list-serve; each opportunity draws those who wish to be a part of that presentation or that opportunity to write together. Having garnered statistics to see how many respond to each invitation; it is satisfying to find that the percentage of members who reengage is at a much higher rate than most NWP continuity efforts. Nation-wide, the NWP projects that continuity events draw 18% of the former group back to reengage. The 2004 Santa Fe Writing Retreat A

Group has drawn 35%–47% of membership back to each of seven opportunities to date. But even better, members report find that they have made not only a statistical difference in each other's lives as professional writers, but a positive efferent difference as well.

rE f Er Enc Es

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kE y tE rms

Continuity Committee: A committee of volunteers from any National Writing Project summer institute, including the Santa Fe Professional Writing Retreat, who agree to draw that group together again to continue work/play/writing about a similar topic.

Efferent: According to Louse Rosenblatt, reader response comes from within the reader. An efferent response is associated with feelings, while an aesthetic response is associated with a reaction to the beauty of the language of a written piece.

Fellow: One of three interchangeable terms used for teachers who attend the initial 4–5 week training by a local branch of the National Writing Project. Fellows (or graduates of that program) are also referred to as teacher consultants or Writing Project teachers.

Heuristic: Applied to arguments and methods of demonstration which are persuasive rather than logically compelling, or which lead a person to find out for himself/herself.

National Writing Project (NWP): A professional development program for teachers, it grew out of a collaborative graduate class between Jim Grey, a professor at UC in the Bay Area, and local teachers enrolled in his course. Because Grey felt that the teachers had as much to offer about the art

of teaching as he did; he encouraged likeminded professorial colleagues to start similar courses around the United States. Around their philosophy grew an organization which continues to give support to the concept of university—public school collaboration.

National Council of Teachers of English (NCTE): A national organization initially of teachers of English, it now serves teachers from kindergarten through college who teach reading/writing. The NCTE offers support to the much smaller NWP by sharing planning for annual conventions, the NCTE's gathering follows (and slightly overlaps) the NWP's.

Pedagogy: The art, practice or profession of teaching; now especially concerning systematized learning, or instruction concerning principals and methods of teaching.

Reflective Practitioner: A teacher who thinks about his/her practice, who also keeps journals, logs, or other records of her/his teaching in order to review those records and consider how or why s/he might change that instruction the following year.

Summer Institute for Teachers (SIT): The 4–5 week introduction to the National Writing Project's way of teaching. Teachers who enroll in this course (which is usually a six graduate course in English or Education) read about their pedagogy, and engage in creative, reflective and professional writing. Teachers also must make a formal presentation to their peers at the SIT about an inquiry that they have about teaching, or demonstrate a lesson that worked well for them so that fellow teachers may comment on their practice.

Teacher Consultant: One of three interchangeable terms used for teachers who attend the initial 4–5 week training by a local branch of the National Writing Project. Teacher consultants (or graduates of an SIT) are also referred to as fellows or Writing Project teachers.

Chapter XVIII
Collective Identity and Learning in a Virtual Team

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abstract

This chapter introduces Media Synchronicity Theory as a means to examine the influence of technology use on the relationship between a multidimensional model of collective identity and its impact on the multidimensional team learning in virtual teams. The study was conducted in an educational setting over an academic semester. Hypotheses testing suggest that the basis for a team's collective identity does impact team learning. The authors believe that a clearer understanding of the underlying relationships will enable academicians to improve their course offerings to provide more realistic representation of existing team tasks, technology use, and work-groups presently found in organizations.

introduction

Due to the increased competitiveness and complexity of today's global business environment, there appears to be two developments that are increasing in popularity. The first trend is the use of collaborative teams that span functional, geographic, temporal, and cultural boundaries (Biggs, 2000; Kanawattanachai & Yoo, 2002). These *virtual* teams enable organizations to leverage their employees' unique skills and experiences regardless of where workers are located. The second trend is a heightened awareness of the importance of fostering learning in organizational settings. Of particular interest with regard to fostering learning is creating an environment that encourages teams to adapt to market changes by altering their current routines (i.e., improving efficiency) or by experimenting with new procedures (i.e., employing innovative ideas). Since Van der Vegt

and Bunderson (2005) found that *learning* teams are more efficient, have higher quality output and superior overall achievement, it is expected that these positive team outcomes might also be associated with teams that must discover new routines or processes to meet team and organizational goals. These types of team outcomes are critical to organizations, since they are fundamental to an organization's success and they are believed by some to be a catalyst that leads to a firm's competitive advantage (Senge, 1990).

These relationships are not the sole domain of for-profit organizations. They can also be found in academic settings. For instance, institutions of higher learning, whose students are more efficient, have high quality standards and who have higher levels of overall achievement, might have a competitive advantage when compared to other academic institutions in terms of attracting high caliber students, securing funding sources for teaching and research, and increasing recruiting from top businesses. These same universities emphasize that their use of advanced technologies will provide students with a world-class education. However, are these students better prepared to function effectively in situations that require widespread use of technology? Furthermore, will these students have the ability to adapt current processes and/or to develop new routines? For several reasons, this is not necessarily true. First, new entrants into the workforce may be ill- prepared to operate successfully within teams that interact primarily through Information and Communications Technology (ICT). Although group projects are commonly used in many college and university courses, their focus has been limited to traditional face-to-face interactions and not on the use of multiple ICTs that are prevalent in today's firms. While this approach may facilitate course delivery, it does little to introduce students to the "new way" of working in modern organizations. Second, the tasks (i.e., student assignments) that are being performed tend to be limited in scope and are designed to facilitate assessing objective outcomes (e.g., presentations, reports, and examinations). Given the current complexity of the marketplace, these tasks may not challenge students to extend themselves beyond rote learning.

To meet this need, some institutions are enhancing their current curricula to include an integration of traditional course material and online technologies. This combined approach is designed to expose students to the two "new realities" of organizational life mentioned above (i.e. working in virtual teams and team learning). In fact, interest in using complex collaborative team activities combined with extensively applying technology within course offerings appears to be rising (Andres, 2006; Clark & Gibb, 2006; Dineen, 2005; Gavidia, Mogollon, & Baena, 2004). For instance, van Genuchten, Vogel, Rutkowski, and Saunders (2005) provide concrete evidence that students and faculty experience positive team processes and outcomes when they are exposed to working with new technologies, complex tasks and individuals having diverse cultural backgrounds. Moreover, research stresses the benefits of technology-mediated collaborative learning. Virtual teams that engage in collaborative learning adapt well to using ICT to facilitate their communication and interaction (Bigelow, 1999), experience increases in the quantity and quality of communication (Arbaugh, 2000), and are exposed to more ideas (Dineen, 2005). Despite the potential benefits of offering courses that emphasize technology and collaborative team learning, scholars have yet to determine answers to some underlying questions. Namely, is it possible for technology-based teams to possess many of the features of a traditional face-to-face team, such as a common sense of purpose or belonging, or a concern for the well-being of the team? And, what, if any, impact does this have on the team's ability or inability to learn? Accordingly, the present study seeks to inform the debate on these new educational offerings by examining the effect of a team's identity on its learning. Furthermore, it seeks to determine how

the various types of technology being used by the team members during their work activities may influence this relationship.

background

The current business environment is a prime example of the impact advances in ICT, such as hardware (e.g., computers and cellular phones) and software applications (e.g., e-mail, chat, and instant messaging), have on work activities are being performed. Because neither physical location nor temporal differences are the hindrances they once were, organizations are increasingly implementing collaborative teams that include individuals that span various functional, geographic, temporal, and cultural boundaries. These "virtual teams" are in contrast to so-called "traditional teams," which are comprised of individuals situated in the same physical location. The goal of these virtual teams is to allow organizations to leverage an individual's unique skills and experiences regardless of where that person is located. As a result of the team's collective knowledge, they are likely to positively impact the quantity and quality of solutions available to the organization (Axtell, Fleck, & Turner, 2004; Lipnack & Stamps, 2000).

tE am virtuality

In order to fully investigate virtual teams and their effectiveness, research must first truly define the concept. As the use of virtual teams has increased, so has our understanding of what exactly a virtual team is. Current literature offers numerous labels and characterizations of virtual teams. One of the more commonly referenced definitions is provided by Townsend, DeMarie, and Hendrickson (1998, p. 17), who classify virtual teams as "groups of geographically and/or organizationally dispersed co-workers that are assembled using a combination of telecommunications and information technologies to accomplish an organizational task." In another definition, Hinds and Bailey (2003) use the label, geographically distributed teams, to name work-groups that reside in different locales (i.e., cities, countries or continents), who work together interdependently to accomplish a task, and who manage their team boundaries. These two examples are just a sampling of the many conceptualizations of virtual teams found in extant research. Other features of virtual teams found in research include: having team members that span multiple organizations (Malhotra & Majchrzak, 2004; Townsend et al., 1998); that are culturally (Jarvenpaa & Leidner, 1999), and functionally diverse (Malhotra & Majchrzak, 2004); that have temporary or permanent life spans (Jarvenpaa & Leidner, 1999); and that are dispersed across time (i.e., work shifts and/or time zones) (Hinds & Bailey, 2003; Jarvenpaa & Leidner, 1999; Malhotra & Majchrzak, 2004).

Much of the early research on virtual teams assumes that face-to-face communication best supports team interaction. This thinking is supported by Short, Williams, and Christie's (1976) social presence theory, as well as the related media richness theory (Daft & Lengel, 1986; Daft, Lengel, Trevino, & Klebe, 1987). Social presence is the extent to which an individual psychologically perceives that others are physically present. It posits that certain media are able to convey an individual's presence and thus are better choices to support the development of interpersonal relationships than are those communication technologies that do not possess these qualities (e.g., face-to-face and video conferencing are suggested to be better communication modalities for relationship-building since they can transmit multiple cues such as intonation and body language).

However, research provides contradictory findings. For instance, Webster and Hackley (1997) found that remote students were not as involved in course discussions and activities. Additionally, they found that as the number of students'

physical locations increased, so did process losses (i.e., misunderstandings, interpersonal conflict, confusion). Conversely, Benbunan-Fich and Hiltz (1996) found that learning teams that rely heavily on ICT reported marginally greater levels of perceived learning than did similar face-to-face teams. Additionally, Ocker and Yaverbaum (1999) found no significant difference between virtual teams and collocated teams in terms of learning and quality. This may be due in part to the conceptualizations of what exactly constitutes a virtual team.

Early research on virtual teams isolated and identified the effects of technology-mediated communication on team processes and outcomes, by initially comparing virtual teams to face-to-face teams. In these instances, they operationalized the former as teams communicating primarily through ICT and the latter as teams meeting *only* face-to-face (Andres, 2002; Chidambaram & Jones, 1993; Ocker, Fjermestad, Hiltz, & Johnson, 1998; Schmidt, Montoya-Weiss, & Massey, 2001; Warkentin, Sayeed & Hightower, 1997). However, purely face-to-face teams are "artificial" scientific creations designed to provide needed controls in laboratory studies. This operationalization was necessary in order to establish distinct comparison groups for data collection and analysis (Kerr & Murthy, 2004; Potter & Balthazard, 2002). Although this research provides some compelling evidence of the benefits of face-to-face interaction, it is not very relevant to today's computing environment in organizations or academics.

Teams that do *not* use technology (i.e., purely face-to-face teams) probably do not exist in any real form in today's current educational or business environment. Teams that are "collocated" (i.e., within the same classroom or floor of the same building) are likely to use e-mail, chat, and other technologies to interact with team members that may, in fact, be sitting a few feet away. Indeed, as team members increase their geographic distance, research proposes that some combination of virtual and face-to-face communication is necessary for the proper functioning of teams. For example, scholars suggest that face-to-face communication can weaken the negative effects working virtually has on a virtual team's ability to handle multiple forms of conflict (Hinds & Bailey, 2003), on developing healthy interpersonal relationships (Kiesler & Cummings, 2002), and on increasing trust among team members (Handy, 1995). Accordingly, this research has moved away from artificial definitions and comparisons between virtual teams and face-to-face teams (Axtell et al., 2004; Martins, Gilson, & Maynard, 2004).

Consistent with Kirkman and Mathieu (2005), the present research proposes that team virtuality consists of three components: the degree that teams use virtual tools to coordinate and communicate; information value; and synchronicity. The first dimension is the reliance on virtual tools and refers to the extent which teams use virtual technologies (i.e., e-mail, video conferencing, chat, document sharing, etc.) to coordinate work activities and to communicate, when compared to face-to-face interaction. The second dimension, informational value, consists of communication and/or data that is valuable to a team's effectiveness, such as the technology's capability to transmit rich information (e.g., nonverbal cues such as facial expressions and body-language) as well as the content of the data itself. At issue is how important that information is to the success of the virtual team. The final dimension is synchronicity which relates to how well the team is able to support simultaneous communication (e.g., face-to-face interactions and technologies, such as video conferencing and instant messaging, accommodate interactive immediate exchanges).

Similar to Griffith, Sawyer, and Neale (2003), and the aforementioned authors, team virtuality is defined as continuous, with teams that use *no* virtual communication and teams that *only* use virtual communication as extremes, and with there being a number of teams that fall somewhere between these end points. Therefore, a team is more virtual when its members rely heavily on

ICT, employ *lean* communication that convey less valuable information (in terms of content and symbol variety), and do not interact with their team members in real-time. For example, a team using e-mail as their primary tool to share a textual description of an engine design can be considered to be more virtual than a team that uses video-conferencing for the same purposes.

This characterization omits proximity as a required factor. This is consistent with Kirkman and Mathieu and in contrast to the other conceptualizations of team virtuality (Chudoba, Wynn, Lu, & Watson-Manheim, 2005; Griffith et al., 2003). Therefore, team members' use of technology to communicate and coordinate is more directly related to their task requirements and less associated with their desire for face-to-face interaction. Teams having members who are located in close proximity are not pre-determined to use technology to a lesser degree than teams whose members are spread out geographically. As mentioned earlier, physical distance does not always lead to increased use of virtual communication. It *may* lead to increased technology use (e.g., being more virtual) but is not a given. Removing physical distance as a core element of team virtuality may offer a conceptually clearer perspective of virtualness. Indeed, Chudoba et al. (2005) empirically support this proposition concerning proximity in their field study at the Intel Corporation when they found that physical distance has no significant impact on team performance.

Additionally, similar to Kirkman and Mathieu, this conceptualization of team virtuality (1) separates time and space effects that are often confounded in the discussion of proximity, and (2) explicitly differentiates technology that is used for communication versus technology used to facilitate work activities. Therefore, it may be the interplay between the dimensions of reliance on virtual tools, informational value and synchronicity that characterizes how virtual a team is.

For the purposes of this research, team virtuality is defined along the three dimensions mentioned: the degree that teams use virtual tools to coordinate and communicate; information value; and synchronicity. This conceptualization allows for the inclusion of teams that may or may not span geographic boundaries within the realm of virtual teams. In the current business environment, this presents a more realistic representation of virtual teams, and is conceptually clearer than other definitions previously offered in the literature. This present study also examines if the impact a team's collective identity has on team learning depends on how virtual a team is.

IE arning

Team learning research examines how teams gather, incorporate, and use information to foster a better understanding of their changing environment. Moreover, it has the potential to offer much to the current knowledge of how virtual teams can become more effective. Research indicates that technology-mediated collaborative learning is comparable to traditional face-to-face instruction. For example, Arbaugh (2000) did not find any significant differences in team learning for students instructed in classrooms versus those that interacted through asynchronous technologies.

The prevailing emerging literature on learning in virtual teams is dominated by qualitative studies and is targeted at theory building. Hence, the present research focuses on developing and empirically testing a model of learning in virtual teams. This research may add clarity to the dialogue on learning in virtual teams, by elaborating on key relationships that may contribute to scholarly research and, in turn, offer practical solutions for academicians and ultimately for business managers.

The work of March (1991) established that organizational learning consists of two dimensions. The kinds of adaptive processes that March found

to be relevant to organizations are what he calls, exploitation and exploration. The operationalization used by March to assess learning suggests that employees who refine processes, improve efficiency, and concentrate on execution practice exploitation, while employees who experiment, take risks and innovate engage in exploration. Prior research (Bunderson & Sutcliffe, 2003; Wong, 2004) extends our current understanding of organizational learning by examining the dimensionality (i.e., exploitation and exploration) of learning in a team setting. Accordingly, these two dimensions are included in the definition of team learning, since they address activities that maximize prevailing competencies as well as investigate new ideas.

Attributes for exploitation include those previously identified in the organizational learning literature, such as the detection and correction of errors within existing policies and procedures; standardization and variance reduction in work activities; the enhancement of current competencies; and a focus on short-term outcomes such that they address shortcomings in performance (i.e., efficiency and productivity). For instance, when teams improve their efficiency, they are able to (1) reduce their overall cost structure, (2) increase the features available in a product without increases in the price, and/or (3) bring products to market quicker than their competitors (Beckman, 2006). Alternatively, exploration includes activities that unearth and examine causal relationships such as questioning, boundary spanning to identify and integrate different perspectives, and fundamental changes in the way teams conduct business. For instance, a team of surgeons that engages other specialists is able to identify possible patients for a new medical procedure and improve postsurgery care because they have a better understanding of issues that incoming patients face, and can better inform postoperative nurses of possible complications and treatment recommendations (Edmondson, 2003). Current research on team learning has yet to take an in-depth examination of these activities in concert. Therefore, team learning processes may be more complex than previously thought.

There has yet to be an in-depth investigation of these learning dimensions in an academic setting. For example, Fjermestad (2004) reviewed multiple studies of the use of ICT (specifically Group Support Systems) and noted that there did not appear to be any differences between teams using technology to interact and face-to-face teams, in terms of how quickly or efficiently they performed their tasks. However, a great number of these studies do not explicitly examine how teams identify and share new ideas.

The present research focuses on how team learning develops within virtual teams, particularly in academic settings. Specifically, it implies that how individuals within a virtual team identify with the group as a whole may impact its ability to learn. In particular, it is suggested that the cognitive and affective dimensions of collective identity are likely to have different impacts on the exploration and exploitation learning dimensions respectively. Therefore, the extent to which the virtual team undertakes exploration and exploitation activities may depend on the basis of the team's collective identity. In addition, the strength of these relationships may be contingent upon the degree of team's virtuality. Next, as shown in Figure 1, the model elaborates on how these variables are apt to impact team learning, as well as moderate this relationship, each in turn.

c oll Ectiv E id Entity

Collective identity answers the question "who are we?" Scholars generally agree that it is a multidimensional concept (Ashmore, Deaux, & McLaughlin-Volpe, 2004; Henry, Arrow, & Carini, 1999; Tajfel & Turner, 1978) comprised of an individual's perception that their self-image is based on the various social groups or categories with which he or she views him or herself as

belonging. Consistent with Tajfel and Turner's (1978) social identity theory (SIT), it may consist of a cognitive and an affective component that enables individuals to distinguish shared similarities and/or differences between themselves and a reference group. Therefore, it is how an individual determines his or her self-concept in relation to the group. Individuals can either evoke their self-concept when they recognize that they share similar values with a social group, or change their beliefs to become more similar to the social group (Pratt, 1998), both of which are cognitive processes. One's collective identity provides a feeling of connectedness or shared substance between an individual and a social group—an affective process. To the extent that similarities are perceived to be jointly held, the individual is more likely to identify with a specific category. This shared mutuality enables improved communication, mutual understanding and a sense of common purpose (Gossett, 2002).

The first variable refers to the affective portion of the virtual team's collective identity. The inclusion of this concept is guided by identity research that reveals that affective attachment to a group enables members to work together as a cohesive entity even if there is significant dislike among the individuals (Brewer & Gardner, 1996; Hogg & Turner, 1985). The identification of this concept as a potentially important cause is guided by identity scholars' findings that collective identity is indeed comprised of multiple dimensions and that the affective facet has unique explanatory power on outcomes (Ashmore et al., 2004; Henry et al., 1999). In particular, the latter studies suggest that social loafing and other effort-withholding activities are negatively related to the affective conceptualization of identity (Shapiro, Furst, Spreitzer, & Glinow, 2002). Given this argument, it is believed it is likely that affective attachment to the group acts as a control mechanism. Team members may fear being ostracized or marginalized from the group and therefore may be inclined to contribute to the team's success. Said another way, the affective component of identity is likely to encourage individuals to provide assistance to the team. This thinking is supported by Tyler and Blader (2001), who found that students' identification with their work group was related to increased cooperation. Although these authors defined identification as a merging of the self and the group (i.e., a cognitive process), a review of their measures indicates that they captured the affective states of participants in assessing their identification with the group. Importantly, in a qualitative examination of information technology (IT) implementation practices within the public sector, Schwarz and Watson (2005) showed that increased identification facilitated "sense making" amongst affected employees.

Hypot HEs Es

A virtual team's collective identity is likely to have a positive effect on its ability to learn in general. Moreover, the two dimensions (i.e., affective and cognitive) stated above are believed to have unique effects on the two dimensions of learning. Specifically, the expectation is that team members' affective attachment to their virtual team will be important for learning that consists of making modifications to existing processes and procedures (i.e., exploitation). It is likely team members may not critically assess others' ideas and processes because they do not wish to damage the team's current dynamics. Accordingly, they are apt to look to prevailing team rules, norms and procedures for solutions to current problems because they may represent a safe way to meet team objectives and are not likely to weaken the affective bond an individual has with the virtual team. For these reasons, it is suggested that:

Hypothesis #1: *Virtual teams will more willingly engage in exploitive learning (i.e., adaptation of current rules and procedures) when team members have higher levels of affective collective identity to their group.*

The second variable refers to the cognitive dimension of a virtual team's collective identity. Consistent with current research, it is suggested that categorization is a central element in collective identity (Ashmore et al., 2004). In fact, it may be *the* foundation of how one comes to see him or herself as part of a group. Categorization is the basis for in-group and out-group distinctions and is the means by which an individual cognitively places him or herself within a social group. Turner and colleagues (Turner, Oakes, Haslam, & McGarty, 1994) suggest that the fewer the perceived differences that exist between an individual and a target social group versus the perceived differences that exist between the same individual and another social group, the greater the fit between the individual and the target social group. Because this process is dynamic and ongoing, individuals continually choose from a variety of reference targets in order to determine their roles and behaviors. The present research proposes that individuals identify in-group similarities and cognitively place themselves within the team. This categorization permits the individual to hold more than one identity simultaneously given the context. For instance, although they did not investigate collective identity, Sole and Edmondson (2002) did make note that virtual team members were able to contribute diverse perspectives and add clarity to complex concepts because they relied on their "local" networks to inform their understanding. These local networks were the result of their physical location, functional responsibilities, and/or professional affiliations (i.e., multiple collective identities). Thus, it is hypothesized that:

Hypothesis #2: *Virtual teams will more willingly engage in explorative learning (i.e., exploration and trial and error) when team members have higher levels of cognitive collective identity to their group.*

Collective identity in general, and the two dimensions, affective and cognitive, in particular, are positively related to team learning (i.e., exploitation and exploration). However, what happens to this relationship as teams employ more ICT (i.e., become more virtual)? The present research suggests that the degree of team virtuality influences the effects of both the affective and cognitive components of a team's collective identity have on team learning. This thinking is consistent with the theorizing of Maruping and Argawal (2004), who posit that virtual teams are able to match their technology use to interpersonal interactions. Specifically, they argue that the association between reduced conflict in virtual teams and team members' satisfaction, team commitment and cohesion is subject to use of specific communication media. For example, teams that are less virtual may be able to develop cohesion and shared understanding of team norms and rituals that are sufficient for team success. For instance, a team that communicates primarily face-to-face meets the definition of a team lower in virtuality. It (1) is able to convey rich or valuable information (i.e., symbol variety as well as content), (2) does not rely heavily on ICT, and (3) operates in real-time. Moreover, while high in immediacy of feedback as well as language variety, face-to-face interaction limits senders and receivers in the number of conversations that they can effectively handle at once. It also limits the capabilities of the team to rehearse or edit material prior to its transmission and, once the content is sent or shared, it is difficult to retrieve for later review. It is posited that this type of communication media will better support the convergence process (i.e., having a shared understanding) when compared to other ICT. This may be particularly important as the team attends to the group's well-being, since it may allow for teams (1) to engage in rituals (i.e., songs, chants, slogans, and wearing branded clothing), (2) to focus on fewer conversations occurring simultaneously (i.e., reducing confusion), and (3)

to give and receive rapid feedback. Together it is believed these will enhance members' affective bond to the team. Therefore, it is proposed that:

Hypothesis #3: *The tendency for virtual teams whose members have higher levels of affective collective identity to be associated with increased exploitive learning will be stronger for teams that use ICTs characterized as: (1) high in feedback, (2) high in symbol variety, (3) low in parallelism, (4) low in rehearsability, and (5) low in reprocessability, versus teams that employ other ICT characteristics.*

Teams that are more virtual proactively address issues find solutions and are able to use ICT to facilitate team interactions, such that they reduce the level of uncertainty associated with certain tasks and can make sense out of the team members' many perspectives. For instance, a team may use e-mail as their primary communication tool. Consistent with our conceptualization of team virtuality, these teams are considered to be higher in virtuality, since e-mail (1) obviously relies heavily on ICT, (2) conveys rich or valuable information, and (3) enables asynchronous or delayed interaction. Additionally, while low in immediacy of feedback as well as language variety, e-mail allows senders and receivers to carry on several conversations at once; to be able to add clarity to those discussions, because the sender can edit his or her message prior to transmission; and once received, the message can be repeatedly retrieved for reference. It is proposed that this type of communication media will better support the conveyance process (i.e., exchanging information) when compared to other ICT. This may be particularly important as the team attends to the group's production, since it may facilitate (1) sharing more information in terms of diversity and quantity, (2) focusing on more conversations occurring simultaneously (i.e., gather more data quickly), (3) limiting feedback so as not to slow the process down, and (4) editing of content for improved clarity. Additionally, this research suggests that this type of communication will contribute to team members' focus on commonalities (perceived and real) in the absence of face-to-face interaction. That is to say that since team members may have difficulty in developing emotional bonds for the team, they may concentrate on other shared similarities such as the team's goals, objectives and tasks. Together it is believed these will enhance members' affective bond to the team. Therefore, it is proposed that:

Hypothesis #4: *The tendency for virtual teams whose members have higher levels of cognitive collective identity to be associated with increased explorative learning will be stronger for teams that use ICTs characterized as: (1) low in feedback, (2) low in symbol variety, (3) high in parallelism, (4) high in rehearsability, and (5) high in reprocessability, versus teams that employ other ICT characteristics.*

data analysis and rEsults

Similar to Lau and Murnighan (2005), the task undertaken was a normal part of their coursework. The semester-long project requires participants to analyze the information systems of a real business of their choosing and to create a competing firm. This task provides multiple opportunities to use analytical skills, diverse thinking, and process improvement. The task has three components: (1) research a business problem and describe the team's understanding of it; (2) analyze the problem and provide three solutions; and (3) implement one of the solutions.

The sample pool for this study consisted of 339 students enrolled in a full-time graduate and undergraduate Management of Information Systems course at a large urban university. Participants were surveyed on two different occasions. The first survey was administered at the beginning of their work on an assigned team project and a

second near the completion of the team project. To test the hypotheses, the proposed patterns were examined across the sample of matched student-pairs (N=110). The intercorrelations among the study variables are shown in Table 2; alpha-coefficients for reliability are shown on the diagonal. As can be seen in Table 2, all reliabilities, with the exception of the cognitive dimension of collective identity (.601) were at the acceptable cutoff of .70 or higher.

Hypothesis-testing strategy

Similar to the procedure advised by Aiken and West (1991) to test the proposed hypotheses, all variables were mean-centered. The procedure that was used for testing multiple interaction-terms in separate equations is similar to the process employed by Lam, Haung, and Snape (2007).

Consistent with Hypothesis 1, students reported significantly more willingness to engage in exploitive learning when they felt higher levels of affective collective identity to their team. To test the hypothesis, exploitation was regressed on affective collective identity. As seen in Table 2, and in support of Hypothesis 1, student teams' exploitative learning was significantly related to affective collective identity ($\beta = 0.36$, $t = 3.499$, $p < .01$, $R^2=0.01$).

Hypothesis 2 was also supported. Students reported significantly more willingness to engage in experimentation when they experienced higher levels of cognitive collective identity to their team. To test the hypothesis, experimentation was regressed on cognitive collective identity. Consistent with the process mentioned above, student classification was again entered as a control variable. As seen in Table 2, student teams' exploration was significantly related to cognitive collective identity ($\beta = 0.38$, $t = 3.505$, $p < .01$, $R^2=0.03$).

As seen in Table 2, and contrary to Hypothesis 3, the constructed regression equation created to test this hypothesis did not find a significant relationship between students' willingness to engage in exploitative learning and their level of affective collective identity, regardless of what type of technology was used in support of team interactions.

Hypothesis 4 was also not supported (see Table 3). The regression equation created to test this hypothesis did not find a significant relationship between students' willingness to engage in experimentation and their level of cognitive collective identity, regardless of what type of technology was used in support of team interactions.

discussion

Our findings lead us to several conclusions. First, and foremost, is confirmation that collective identity is indeed a multidimensional construct consisting of affective (i.e., feelings of pride, like, and enjoyment) and cognitive (i.e., mentally placing oneself within the boundaries of the team) components Second, the empirical investigation of the team outcome confirms the multidimensionality of team learning to include behaviors such as (1) adapting within the existing environment and completing tasks more efficiently, and (2) identifying innovative ideas. A third conclusion guided by the findings is that the former two constructs, (i.e., affective and cognitive collective identity) have unique impacts on the latter two constructs (i.e., exploitation and experimentation). Specifically, teams are more likely to engage in learning that consists of improving efficiency, and adapting to their current environment (i.e., exploitation) when members feel a part of the team or have a team identity based on an affective bond (i.e., pride, liking, happiness, etc.). Lastly, teams are more likely to engage in learning consisting of trial-and-error, innovative thinking, and incorporation of new ideas (i.e., experimentation) when members place themselves cognitively within the team. The related theoretical and practical implications are discussed next.

Although not unique, the conclusion that collective identity is multidimensional is consistent with the findings of numerous authors (Ashmore, Jussim, Wilder, & Heppen, 2001; Bouas & Arrow, 1996; Brewer & Gardner, 1996; Henry et al., 1999). It further explicitly identifies and tests an affective and cognitive basis for identity formation to determine their individual effects on team outcomes, namely, team learning. Moreover, these dimensions have their own particular impact on team outcomes. These findings address a deficiency in the current literature, where associations between multiple identity dimensions tend to be implicitly assumed (Ashmore et al., 2004). Because of the importance current research has placed on the communication and interpretation of emotions, as well as the significance of cognitive perceptions and awareness in technology-mediated interactions (Kahai & Cooper, 2003; Pratt, Fuller, & Northcraft, 2000; Robert & Dennis, 2005), this research focuses on the aforementioned two identity dimensions.

Although organizational learning scholars have long recognized the existence of exploitation and exploration elements (although many different labels are used), the conclusion that team learning is comprised of two separate and identifiable dimensions is not one that leading team learning scholars have explicitly made. Researchers such as Lau and Murnighan (2005), and Gibson and Vermeulen (2003) have not distinguished between learning behaviors associated with efficiency, short-term outcomes, and task execution versus those that are related to questioning, trial and error, and innovation. In fact, a number of studies focus primarily on exploration. For example, Edmondson (1999) determined that team learning included behaviors such as gathering information from as many external sources as possible, reflecting on work activities, testing assumptions, and seeking new information. Each of these findings is consistent with this research's conceptualization of exploration.

He and Wong (2004) suggest that exploitation and exploration are fundamentally different concepts. Additionally, Wong (2004) theorizes that exploitation and exploration[1] promote different team performance dimensions. Consistent with this thinking, the present research believes that this conclusion is significant for future work on team learning across multiple contexts and within virtual teams, in particular. Although Wong explicitly identified the two learning types, she did not focus on investigating which antecedents predict exploitation versus exploration, as does the present research. The findings suggest that, even within teams, the two learning dimensions are, in fact, unique concepts that merit more in-depth inquiry.

Based on the findings, teams will be more likely to engage in activities consistent with exploitation when their team identity is based on how team members feel about their team. Factors that may influence this relationship may be those like politeness and fear. For instance, individuals may be hesitant to provide criticism if they are concerned about damaging relationships or feeling ostracized. Also it is recognized that individuals possess a fundamental sense of belonging to a group based on positive relationships. In fact, the strength of this need is such that it is likely to elicit strong emotions for items that are proxies for the team (e.g., clothing, chants, names, etc.) that individuals possess (Ashmore et al., 2004). To preserve this bond, individuals may be inclined to provide nuanced "critiques" of team members' contributions so as to limit or eliminate the possibility that feelings may be hurt. Accordingly, they may attack current processes and procedures for any deficiencies. Those same processes may also be relied upon to provide solutions. The end result being that no one is personally confronted for their contributions. The teams will tend to focus on improving their efficiency and providing short-term solutions that may be easily implemented. Again, this will reinforce the "good feelings" for the team unit.

Conversely, teams will be more likely to engage in activities consistent with exploration when their team identity is based on an individual team member's awareness of their membership within the team. Factors that may influence this relationship may be the type and quantity of external links the team possesses. The present research's findings suggest that these "loose ties" enable student teams to engage more diverse sources of information, which encourages new ideas and innovation. The theoretical implications of this research indicate that the impact particular antecedents (in this case, collective identity) have on team learning is not as simple as previously believed. This is due to the realization that both collective identity and team learning consist of multiple dimensions. Furthermore, it recognizes that the relationship is affected by not only what type of learning is undertaken, but also when teams will be more apt to engage in those specific behaviors. There is presently very little research that has taken such a nuanced viewpoint.

In addition to the theoretical contributions offered, there are several practical implications as well. First, faculty should determine what type of learning they wish their students to undertake. If professors' goals are to encourage student teams to focus on short-term tasks, and perform those tasks quickly with a high degree of quality, then the faculty needs to focus on how they can foster the affective component of a team's collective identity. This may be accomplished through team building exercises that evoke pride, happiness, and liking. For example, the first few meetings of the team might be dedicated to emphasizing social bonds with the team. It may also be worthwhile to provide the teams with some simple, fun competitions that can provide a sense of accomplishment. The net result being that teams will increasingly form affective bonds that are likely to result in increased team efficiency.

For faculty that wishes to encourage experimentation, they will need to encourage students to place themselves with the team mentally. They will need to consider the team when making decisions related to its success. At the onset of team activities, focusing on the task at hand, as well as the unique skill sets individuals bring to the process, is likely to facilitate team members being comfortable questioning each other and reflecting on information gathered. In summary, scholars, as well as university professors, may benefit by thinking about collective identity in two forms and in identifying actions that are likely to increase both exploitation and exploration.

Limitations of the Study

Although this study's contributions are many, it is not without limitations. First, all of the variables were assessed with self-report data. This research has followed the recent suggestions of Podsakoff, MacKenzie, Lee, and Podsakoff (2003), by designing the study in order to avoid common-method variance. In particular, measures are separated on the questionnaire, a number of questionnaire items are reverse-scored, and participants are informed that their responses would be kept confidential. A second limitation is the number of responses received during the study. However, a small sample size does not imply that the findings are not of theoretical or practical importance. Past studies have reported sample sizes similar to the present research (Clark & Gibb, 2006; Paul, Seetharaman, Samarah, & Mykytyn, 2004). A third limitation of this study is its inability to draw conclusions concerning causality due to the cross-sectional nature of the data. Moreover, one might theorize a different causal order among the variables shown in Figure 1. For example, it is possible that technology use acts as a mechanism through which a team's collective identity affects its capability to learn.

Future research that is longitudinal in nature and able to measure (via multiple sources) the variables examined in this study would improve the ability to draw causal conclusions. Addition-

ally, the inclusion of some qualitative analysis may add some insight (i.e., performing a content analysis on stored communication logs) into the use of technology and its impact on the variables of interest.

c onclusion

The importance of enhancing understanding of this topic is driven by the continued increase in the challenges facing organizations and learning institutions and at the same time an exponential decrease in the amount of time to meet these challenges. As the use of virtual teams rises, uncovering the nuances of team processes and their impact on team outcomes becomes ever more urgent. Hopefully, this study's findings will provoke future studies to refine our understanding about how a virtual team's collective identity impacts team learning.

rE f Er Enc Es

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Table 1. Descriptive statistics, reliabilities, and correlations

Variable		Mean	s.d.	1	2	3	4	5	6	7	8	9
1.	Affective collective identity	5.03	1.15	(.79)								
2.	Cognitive collective identity	5.02	1.02	0.68**	(.60)							
3.	Synchronicity	5.30	0.95	0.31**	0.37**	(..60)						
4.	Face-to-face	5.45	1.19	0.42**	0.24*	0.31**	(.82)					
5.	E-mail	4.40	1.33	0.04	0.02	0.47**	0.03	(..71)				
6.	Application Sharing	3.52	2.29	0.20*	0.13	0.50**	0.12	0.64**	(.93)			
7.	Instant Messaging	3.88	1.83	0.11	-0.03	0.33**	0.06	0.53**	0.71**	(.85)		
8.	Exploitation	5.31	1.12	0.29**	0.36**	0.17	0.30**	0.03	0.02	-0.01	(.59)	
9.	Exploration	4.98	1.38	0.31**	0.37**	0.09	0.31**	0.01	0.05	0.22	0.80**	(.75)

*Note: Internal reliabilities (coefficient alphas) are given in parentheses on the diagonal. * p < .05 **p<.01*

Table 2. Results of hierarchical regression analysis effects of affective collective identity and synchronicity on exploitation

	Model 1			Model 2		
	β			β		
Class	-0.108		(.12)	-0.119		(.13)
Major	-0.008		(.02)	-0.034		(.10)
Sex	0.163		(.18)	0.082		(.10)
Age	0.002		(.03)	0.008		(.12)
Ethnicity	0.017		(.06)	0.026		(.10)
Affective Collective Identity	0.348	***	(.09)	0.364	***	(.10)
Synchronicity	-0.049		(.07)	-0.066		(.10)
Affective Collective Identity X Synchronicity	-0.047		(.06)	-0.071		(.10)
R2	.07			.08		
ΔR2				.01		

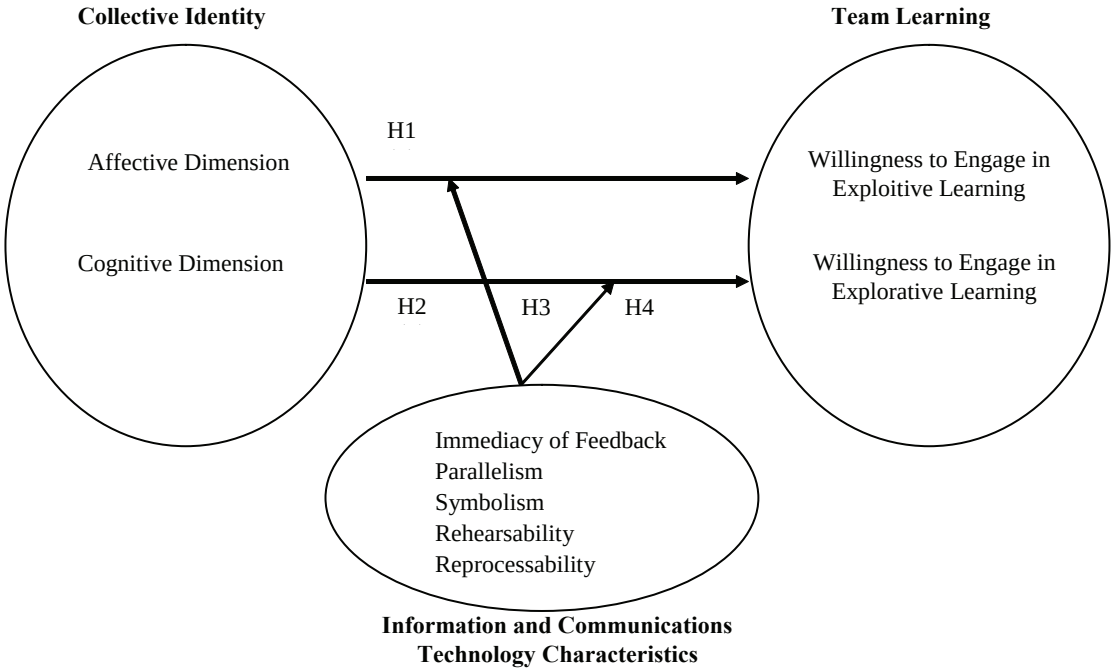
*Note: * p < .05 **p< .01 ***p<.001*

Table 3. Results of hierarchical regression analysis effects of cognitive collective identity and synchronicity on exploration

	Model 1			Model 2		
	β			β		
Class	-0.183		(.14)	-0.164		(.13)
Major	-0.012	*	(.03)	-0.043	*	(.10)
Sex	-0.085	*	(.24)	-0.035		(.10)
Age	0.004	**	(.04)	0.013	**	(.12)
Ethnicity	-0.075		(.08)	-0.095		(.10)
Cognitive Collective Identity	0.453	***	(.13)	0.378	***	(.11)
Synchronicity	-0.072		(.09)	-0.078		(.10)
Cognitive Collective Identity X Synchronicity	-0.019		(.08)	-0.022		(.10)
R2	.20			.14		
ΔR2				.03		

*Note: * p < .05 **p< .01 ***p<.001*

Figure 1. Proposed model of the influence of ICT on the relationship between affective and cognitive identity, and exploitation and exploration



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kEy tErms

Affective Dimension of Collective Identity: Provides a feeling of connectedness or shared substance between an individual and a social group.

Cognitive Dimension of Collective Identity: Individuals can either evoke their self-concept when they appreciate they share similar values with a social group, or change their beliefs to become more similar to the social group (Pratt, 1998). This categorization is the basis for in-group and out-group distinctions, and is the means by which an individual cognitively places him or herself within a social group.

Collective Identity: Answers the question "who are we?" Scholars generally agree that it is a multidimensional concept (Ashmore et al., 2004) comprised of an individual's perception that their self-image is based on the various social groups or categories with which he or she views him or herself as belonging.

Exploitation: Teams that refine processes, improve efficiency, and concentrate on execution (March, 1991).

Exploration: Teams that experiment, take risks, and innovate (March, 1991).

Media Synchronicity: Describes the extent to which particular communications media engender a sense that all participants are working on the same content or activity at the same time (Dennis & Valacich, 1999; Dennis, Valacich, Speier, & Morris, 1998).

Team Virtuality: Consists of three components: the degree that teams use virtual tools to coordinate and communicate; information value; and synchronicity (Kirkman & Mathieu, 2005). The first dimension is the reliance on virtual tools, and refers to the extent which teams use virtual technologies (i.e., e-mail, video conferencing, chat, document sharing, etc.) to coordinate work activities and to communicate when compared to face-to-face interaction. The second dimension, informational value, consists of communication and/or data that is valuable to a team's effectiveness such as the technology's capability to transmit rich information (e.g., nonverbal cues such as facial expressions and body-language) as well as the content of the data itself. At issue is how important that information is to the success of the virtual team. The final dimension is synchronicity, which concerns how well the team is able to support simultaneous communication (e.g., face-to-face interactions and technologies such as video conferencing and instant messaging accommodate interactive immediate exchanges).

Endnot E

1 Wong (2004) characterizes local learning as a refinement of processes and an alignment of collective action (i.e., exploitation). Conversely, distal learning is associated with development of new knowledge and ideas (i.e., exploration).

Chapter XIX
E-Social Constructivism and Collaborative E-Learning

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abstract

Social constructivism is an established educational theory based on the principle that learners and teachers co-construct knowledge through social processes. This chapter proposes an updated theory, e-social constructivism, that takes into account the milieu of electronic communications in which e-learning occurs. Thinkers such as Dewey, Piaget, Vygotsky, and Bruner, who laid the theoretical foundations of social constructivism, wrote in a time when face-to-face interactions were the basis for instruction. The works of these writers are reviewed in this chapter. Together with the results of the author's phenomenological study of collaborative e-learning, they form the basis of e-social constructivist theory. The author uses grounded theory and situational analysis to derive and support e-social constructivist theory. This chapter discusses the implication of that theory for research, teaching and instructional design.

introduction

In online classes, interaction between learners and instructors occurs electronically. Online classes may expect learners to interact through discussions involving the whole class, in small groups, or in pairs. When assignments are designed for completion by collaborative teams, the objective is for peers to learn from and with each other. This instructional approach, called *collaborative e-learning*, is defined as: "Constructing knowledge, negotiating meanings and/or solving problems through mutual engagement of two or more learners in a coordinated effort using Internet and electronic communications"(Salmons, 2008, p. 131).

The rationale for including highly interactive collaborative assignments is usually supported by references to the theory of social constructivism. A core notion of constructivism is that knowledge has a subjective dimension because people construct meaning based on their relationships with the world. Each individual learner imposes meaning on his or her experience. A teacher cannot impose meaning on learners. Social constructivism focuses on the social phenomena that occur when conceptual schemes are transmitted by means of language. From a social constructivist's view, knowledge is not simply constructed, it is co-constructed. Constructivism is considered antithetical to positivism or objectivism, the theoretical position that explanations must be empirically verifiable and knowledge exists independent of our own perceptions of it (Schutt, 2006). Positivist world views translate into instructional theory based on the assumption that the instructor transmits knowledge through direct instruction (Arbaugh & Benbunan-Fich, 2006).

Theories of social constructivism have their roots in the thinking of Dewey, Piaget, and Vygotsky and Bruner. These theorists described social learning that took place face-to-face in classrooms with children. To what extent do their theories support and explain social learning in online classrooms at the college level and with adult learners? What new principles are needed? The author proposes e-social constructivism as a framework for answering these questions.

mEt Hodology

Employing phenomenological, grounded theory and situational analysis methods, this chapter meshes analysis of two sets of data. One set of data is derived from a theoretical sample of literature. A second set of data is drawn from in-depth interviews the author conducted with a purposeful sample of experienced online educators.

Phenomenological research methods provide a way to investigate human experience through the perceptions of research participants. Theorist Husserl distinguished between "noema," the phenomenon which is experienced and "noesis," the act of experiencing the phenomenon (Husserl, 1931) In the author's study, phenomenological research methodology provided a structured approach for inquiry into the perceptions of success factors for instruction using collaborative e-learning. The four basic steps of phenomenological research described by Moustakas (1994) provided a methodological framework for the study. The author used in-depth dialogue with research participants at each of the four stages of the process: preparing to collect data, collecting data through in-depth interviews, analyzing data, and reporting outcomes. The study investigated noesis, the experiences of teaching with collaborative methods online, and noema, the organization and design of the learning activities participants used to promote collaboration.

Grounded theory complements phenomenological research. To apply this theory, researchers build on the understanding of individuals' experiences derived through phenomenological methods to generate theoretical principles (Creswell, 2007; Straus, 1987). They look at categories discovered in the data and construct explanatory theoretical frameworks, which provide abstract, conceptual understandings of the studied phenomena. Situational analysis is a style of grounded theory. Situational analysis looks at the social *situation* while grounded theory looks at social *process.* Situational analysts diagram elements in the research *situation* to capture the complexities and show relationships in the data. Theory is thus "grounded" in the data from participants who have experienced the phenomenon Grounded theory can help explain practice or provide a framework for further research and more formal theory development.

Analysis of both sets of data was organized in three broad steps: data management, descriptive accounts, and explanatory accounts. At the descriptive accounts stage the researcher worked with the ordered data to identify key dimensions, to map the range of diversity of each phenomenon and to develop categories. The researcher used

inductive reasoning to look for and compare patterns and associations in the data, and to locate linkages between sets of phenomena. Situational analysis maps were used to compare online and face-to-face learning situations. The explanatory account is the researcher's interpretations of the significance, implications, and theoretical conceptions of the findings.

dEscriptiv E accOunt summar y: f rom t HE l it Era tur E

Contemporary literature in education and instructional design draws on constructivist theory to support active, rather than receptive, models of teaching and learning. When learning activities expect *individuals* to investigate, discover, and construct new meanings they actualize cognitive constructivist principles. When learning activities expect *groups* of students to exchange and explore ideas together, they embody social constructivist principles. The following sections briefly review the theoretical contributions of foundational thinkers in the field of constructivism. Principles that apply to the theory of e-social constructivism are highlighted.

John Dewey (1859–1952): Progressive Education

John Dewey's work sets the stage for inquiry into social constructivism. John Dewey wrote at the advent of the industrial age, and observed the potential of the railroad and telegraph to "eliminate distance between peoples and classes previously hemmed off from one another" (Dewey, 1916, p. 85). He predicted that new forms of educative community would emerge because new connections would be made between people who previously had limited access to one another. "Persons do not become a society by living in physical proximity […] A book or a letter may institute a more intimate association between human beings separated thousands of miles from each other than exists between dwellers under the same roof" (Dewey, 1916, p. 4). Dewey foresaw the potential, as well as the challenges new communications would bring to established ways of thinking and learning.

Dewey created a theory that links education with experience because he believed that learning occurs by "constant reorganizing or reconstructing of experience which adds to the meaning of experience, and which increases ability to direct the course of subsequent experience" (Dewey, 1916, p. 76). Dewey's theory is based on the premise that learning is a social function, with a central principle of *interaction*. He described interaction between the student and teacher, between the student and the *situation*, and among students (Dewey, 1916, 1938). Dewey recommended that learners actively participate in learning situations outside of the classroom, equating the community to the laboratory—a place to experiment (Dewey, 1938).

Dewey was a philosopher who was concerned with education within the larger contexts of participatory democracy. He believed that to be fulfilled and successful contributors to a complex world, students need an education that supports development of creativity, critical thinking, and problem-solving skills.

Jean Piaget (1896–1980): Sociocognitive Constructivism

Jean Piaget was a pioneer in child development. He was especially concerned with children's development of logical thinking capabilities (Piaget, 1952). Piaget's work is cited as a foundation for a thread of constructivism called sociocognitive or cognitive constructivism.

When students learn, according to sociocognitive constructivism, they create, adapt and refine knowledge (Piaget, 1971). They create knowledge structures and mental models through experience and observation (Tuominen & Savolainen,

2004). This perspective drew on Piaget's theory of cognitive development. Piaget's theory proposed that teaching knowledge learners can understand and use goes beyond just transmitting information. Instead, humans must construct their own knowledge. Individuals build their knowledge through experiences that they can abstract into conceptual frameworks or *schema* of the world (Maraon, Benarroch, & Gaomez, 2000; Tuominen & Savolainen, 2004).

The teacher's task is to help students move from their inaccurate ideas and schemas toward conceptions more in consonance with what has been validated by disciplinary communities (Windschitl, 2002). While Sociocognitive Constructivism is primarily concerned with the individual's learning, Piaget saw peer interactions as crucial to a child's affective development and construction of social and moral feelings, values, and social and intellectual competence (DeVries, 1997). Piaget and subsequent sociocognitive researchers typically based their research on comparisons between pairs of child subjects of the same age or developmental level.

Lev Vygotsky (1896–1934): Sociocultural Constructivism

Sociocultural Constructivism views knowledge as primarily a cultural product and learning as a causal relationship between social interaction and individual cognitive change (Dillenbourg, Baker, Blaye, & O'Malley, 1996; Vygotsky, 1978). Vygotsky is frequently cited as the foundational thinker for sociocultural constructivism. He argued that development and learning involve the interplay of interpsychological and intrapsychological dimensions. He characterized these dimensions as functions of language with social speech used to communicate with others and inner speech used to reflect and think.

Vygotsky 's conception of a *zone of proximal development* (ZPD) describes the distance between what one can do alone and what can be accomplished in collaboration with others who are more capable (Vygotsky, 1978). This is also called "appropriation" because a learner "appropriates" strategies used by a teacher, parent or more experienced learner. When one learner is more knowledgeable than the other, it is expected that the latter learns from the former. However, researchers have discovered that when students work together learning extends to the more able peer, who also benefits from the interaction.

The teacher's task is to offer meaningful, "whole" activities, constructive tasks or problem-solving situations, where more knowledgeable learners can assist others. Constructive tasks, such as conducting scientific inquiries, solving mathematical problems, and creating and interpreting literary texts, are contrasted with decontextualized skill-building (Windschitl, 2002).

Jerome Bruner: Discovery and Spiral Learning

Bruner outlined three steps of the learning process: acquisition of new information, transformation of the new information to fit new tasks, and evaluation, which takes place when learners check whether the new information is adequate to the task. He did not see these as discrete steps, but as part of a spiral, where learning continues to build and evolve through interactions with new ideas and people (Bruner, 1966, 1977). The concept of spiral curriculum inspired the practice called *scaffolding*. Scaffolding is described by Wood, Bruner, and Ross as "...controlling those elements of the task that are initially beyond the learners capability thus permitting him to concentrate upon and complete only those elements that are within his range of competence" (Wood, Bruner, & Ross, 1976, p. 90).

Scaffolding is most effective when learners and educators iteratively communicate their growing understandings. With respect to collaborative learning, at least two classes of scaffolds can be distinguished: (a) scaffolds that provide support on a content-related or conceptual level, and (b) scaffolds that provide support related to the interactive processes between the collaborators.

Social Constructivism: Contemporary Interpretations

The concept of social models of teaching and learning has generated many interpretations. A few summarized below.

- *Social learning theory* explains human behavior in terms of continuous reciprocal interaction between cognitive, behavioral, and environmental influences. Albert Bandura termed this interaction "reciprocal determinism." He formulated a four stage process: (1) Attention: the individual notices something in the environment; (2) Retention: the individual remembers what was noticed; (3) Reproduction: the individual produces an action that is a copy of what was noticed; and (4) Motivation: the environment delivers a consequence that changes the probability the behavior will be repeated through reinforcement or punishment (Bandura, 1977, 1986).

  The basic principles proposed by Bandura are that people learn by observing others, and that learning can occur without an observable change in behavior. Cognition plays a role in learning, with attention as the critical factor. Modeling teaches new behaviors, may influence the frequency of previously learned behaviors and may also encourage previously forbidden beahviors. The model may be a "live model," the actual person, or a "symbolic model" portrayed in print or media.
- *Exogenous, Dialectical, and Endogenous Constructivism* exist on a continuum, according to a model offered by Moshman (Moshman & Geil, 1998). *Exogenous Constructivism* emphasizes "external" knowledge is best taught through direct instruction, in conjunction with exercises requiring learners to be cognitively active. *Dialectical Constructivism* proposes that learning occurs through realistic experience, but that learners require *scaffolding* provided by teachers or experts as well as collaboration with peers. *Endogenous Constructivism* emphasizes the individual nature of each learner's knowledge construction process, and suggests that the role of the teacher should be to act as a facilitator in providing experiences that are likely to result in challenges to learners' existing models.
- *Ideas-Based Social Constructivism* changes the focus from learning through practical problem-solving to direct encounters with ideas. Prawat suggests that curriculum be thought of as a matrix of "big ideas." Teachers serve as "managers or orchestrators" who work alongside students as they explore ideas together (Prawat, 1993).
- *Sociotransformative Constructivism* merges multicultural education with social constructivism, providing an "orientation to teaching and learning that pays close attention to how issues of power, gender, and equity influence not only what subject matter (curriculum) is covered but also how it is taught and to whom" (Rodriguez & Berryman, 2002, p. 1019). These theorists point to the concept of *agency* that bridges knowledge and transformative action. They believe that agency can lead to a deeper understanding of the subject matter and to the application of newly gained knowledge in socially relevant ways (Rodriguez & Berryman, 2002; Zozakiewicz & Rodriguez, 2007).
- *Radical Constructivism* is "a theory of rational knowing" championed by Ernst Von Glasersfeld. Von Glasersfeld wrote:

  Radical constructivism holds that the only instruction or information a knower can possibly receive from 'nature' or 'reality' is negative. In other words, the world beyond our experiential interface may show us what concepts, theories and actions are

not viable, but it cannot instruct us what to think (Glasersfeld, 1996).

Radical constructivists believe teachers or facilitators should provide limited support, and learners should construct their own mental models within the environment that exemplifies the topics being studied (Dalgarno, 2001).

Summary of Social Constructivist Theories

The theorists cited above explored a wide range of pedagogic and philosophical questions. This section analyses positions expressed by these writers with respect to their applicability to an instructional theory of e-social constructivism.

Positional maps are a tool used in situational analysis to visualize major positions taken in the data (Clarke, 2005). Figure 1 illustrates relationships among theories reviewed in this chapter, with respect to the two dimensions: learning style and instructional style. This map provides a reference for understanding e-social learning theory in relation to earlier theories.

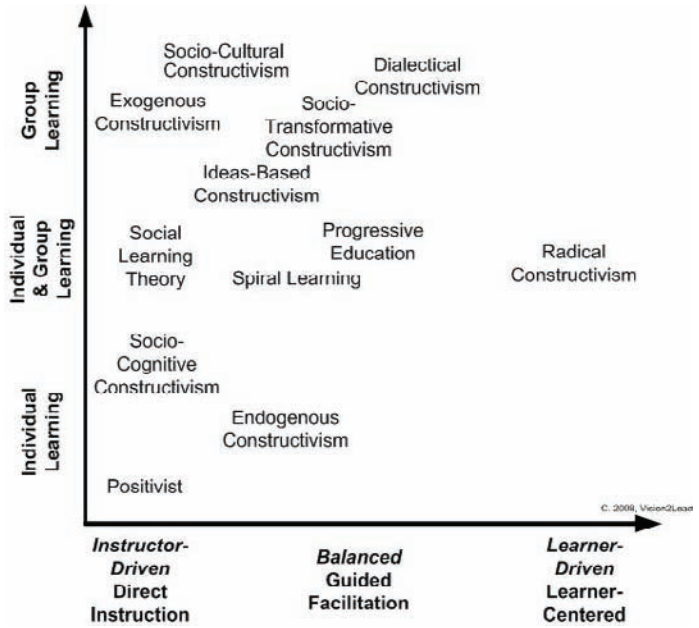
The vertical axis represents a continuum from the individual to the group as the focus of learning.

- In the first position, the focus is on the individual's learning experience.
- In the middle position, the individual's learning is catalyzed by the social process with the group.
- In the third position, the group is the focus with learning through interactions with peers and instructors.

The horizontal axis shows a continuum of instructional styles from instructor to learner-driven.

- In the first position, an instructor organizes and sequences content to convey information through direct instruction.
- In the middle position, an instructor facilitates learning by organizing and scaffolding

Figure 1. Constructivist positions



assignments. The instructor shares knowledge, clarifies expectations and parameters, and keeps learners on topic and on task. The instructor is flexible and provides guidance as needed.

- In the third position, an instructor provides minimal guidance. Learners discover, contribute or generate knowledge independently.

dEscriptiv E anal ysis: f rom t HE int Er vi Ews

In the author's pheomenological study of collaborative e-learning, participants were interviewed. The participants were instructors who taught various subjects using collaborative e-learning activities. Research participants self-identified as committed to constructivist epistomological views and pedagogies. While specific constructivist theories were not discussed, they generally reported a desire to teach in a "learner-centered" way. The interview questions were designed to elicit perspectives about instructional strategies the instructors used. They considered "success" in terms of sustained learner engagement throughout all stages of the activity, learners' ability to participate and contribute to the activity, as well as achievement of curricular objectives.

Three broad categories in the data from the study relate to the current analysis: (1) knowledge and skills needed to teach online with collaborative methods; (2) instructor commitment to collaboration; and (3) instructional milieu.

Knowledge and Skills Needed to Teach Online with Collaborative Methods

Research participants identified kinds of knowledge and skills they felt are essential for educators who teach using online collaborative methods. Throughout this section, quoted material is from research participants' responses unless otherwise noted. Responses were categorized into four areas:

- *Understand the new paradigm*. To be effective in designing and guiding collaborative learning, instructors need updated practical and theoretical understandings about teaching and learning. A research participant observed, "In order for faculty and students to succeed, [they] need to get the sense of working in [a] different paradigm. [There is a] need for bridging theory and application."
- *Be an advocate:* Instructors need to be able to advocate the benefits of collaborative e-learning and overcome resistance and other barriers. A research participant asserted, "[the instructor] must be the enabler to get the collaboration done, the 'driver' to push the things."
- *Model collaborative behaviors.* The best way that instructors drive productive collaborative behaviors is by modeling them. A research participant said, "I make sure I am modeling openness and experimentation, being an equal learner with others in the class."
- *Have skills in online communication and facilitation.* Research participants spoke at length about what they considered the most essential skills: online communication and facilitation. Given the potential for dispersed class members to feel isolated, a research participant observed that, while in a face-to face lecture it is not necessary for instructors to know learners, in an online class, they interact one-on-one. Another research participant described the importance of using people skills online: being sensitive, patient and able to "show[ing] concern and guidance as needed, with a nurturing style."

Instructor Commitment to Online Collaboration

Research participants believed it is critically important for online instructors to be committed to collaborative methods and prepared to take varied individual and group actions to facilitate collaborative activities in online classes. All respondents made the point that, for online collaboration to successfully occur, the instructor must be prepared to take an active role. Laying the groundwork for interaction between instructor and learners as well as among learners requires careful attention. They described three key responsibilities for instructors:

- *Designing, planning and structuring learning activities.* Study participants emphasized the value of well-planned learning activities. While in some cases the assignments are already in place as part of an online class design, instructional choices remain.

  Research participants emphasized that successful collaboration happens when online learners trust each other *and* trust the process. This generalization is widely supported in the research literature on the subject. Learners, who may lack previous experience with virtual collaboration, want to know that the expectations, allocation of tasks in the collaborative group and assessments of shared outcomes are fair. They want assurance that instructor's assistance is readily available if the process is not working.

  Several research participants pointed out that when the work is structured into stages, learners focus on the task and course content without being overwhelmed by the process. Participants recommended that the instructor direct the approach in the early stages of collaboration and increasingly put responsibility into learners' hands. The instructor begins by assessing learners' readiness for collaboration and makes choices about how, when and to what extent responsibility can shift to the learners. The instructor can gradually "allow learners to build on or suggest options so learners co-create the next steps."

  Instructors "provide a framework so students can focus on the task. Define clearly the time limits, geographic or conceptual limits of the task." The instructor should work to "move students toward being autonomous and self-organized but, initially, show them how to participate." Research participants were in consensus that expectations and specific instructional guidelines help learners understand how to move from one stage of the collaborative process to another.
- *Being a learning coach.* As instructors, research participants encourage critical thinking about learning, meta-thinking or meta-learning and reflection. A research participant pointed out that online instructors need to "be present but not present," to allow groups to solve their own problems and intervene only when the group cannot resolve a difficulty. Another participant made a similar suggestion: "when there is discomfort, be silent, be there and listen. Listen before intervening." In addition to group coaching, several research participants suggested that private coaching or one-to-one communication with a learner is appropriate when the collaborative process is stuck. A learner may benefit from the instructor's individual attention if that learner falls behind or surges ahead. In either case, such learners can jeopardize the success of the team. A participant depicted the circumstance where a highly motivated, capable learner works independently to complete an entire task, thereby disempowering the collaborative group and undercutting shared agreements and timelines. On the other end of the spectrum is the passive

lurker, someone who is not pulling his or her weight. Instructors should intervene to explain relevant points about the collaborative process and motivate the learner to fulfill his or her responsibility to the team, and/or encourage the team to review work agreements for completing the project. In such situations timely involvement of the instructor can help the group avoid getting sidetracked by group process.

- *Developing learners' collaboration skills.* A participant made the collaborative process part of the lesson: "it is extremely important to discuss nature and value of collaboration before embarking." Several participants assigned regular and frequent partner work, then built up to the small group so learners get a taste of success. They provide suggestions for different roles people can take in teams and let learners choose, and allow learners to build on or suggest options so learners cocreate activities.

In summary, at each stage of the instructional process research participants took active, responsive roles to help learners structure, organize and complete the collaborative activity. In the process, they sought to build learners' skills in online collaboration while learners worked to achieve curricular goals.

Instructional Milieu

When asked, "Why do you think the collaborative e-learning was a success?" research participants discussed issues of trust and safety as the most important factors. Research participants described a safe learning environment as one where learners can take risks, "have wild ideas, be creative and innovative." A research participant suggested that instructors need to: "reduce stakes for participation to the point that people do not perceive a high risk for failure or perceive that not succeeding to the highest degree is a learning opportunity, with no comebacks or humiliating criticism." One participant stressed the importance of making mistakes in the class to avoid making them in professional life later on, when they could be very costly. This participant told learners that making such mistakes was a course expectation from the outset.

Explanatory analysis: comparing categories from research and literature

John Dewey talked about learning as interaction involving students, teachers, content, and situation. Later Joseph Schwab used the term *commonplaces* to describe these four interrelated factors (Schwab, 1983). The first three commonplaces receive similar consideration in the literature and in the results of the author's research. The fourth commonplace, *situation,* differentiates the literature written to describe instruction in the face-to-face classroom from the perceptions of those who teach in online milieu. The theoretical literature made only passing reference to the situation, whereas online instructors described it as critically important.

In situational analysis, researchers chart elements for comparison in an *abstract situational map* (Clarke, 2005). This type of map lays out the major human and nonhuman elements in the research situation. The following figure highlights elements that influence the instructor's role in collaborative e-learning.

Research participants discussed several ways that online milieu influence collaborative e-learning. They highlighted three points with important implications for online settings: trust and safety, *transactional distance,* and skills and equipment.

Issues of trust and safety were at the top of every research participant's list. Research participants described a safe learning environment as one where learners can build relationships and gain the trust needed to share ideas and learn

Table 1. Educational milieu as "situation"

Online		Face-to-Face	
Individual Human Elements • Instructors • Learners • Instructional designers, Instructional technologists • Technical support staff	*Nonhuman Elements* • Learning management system • Other technologies (intranet portal, podcasts, online meeting space, virtual worlds) • World Wide Web	*Individual Human Elements* • Instructors • Learners	*Nonhuman Elements* • Classroom • Field or community service settings
Collective Human Elements • Class • Small groups or teams	*Implicated/Silent Actors* • Availability of computer hardware and software • Access to Internet • ICT skills to use tools • Instructor's background and pedagogical views	*Collective Human Elements* • Class • Small groups or teams	*Implicated/Silent Actors* • Instructor's background and pedagogical views
Discursive Constructions of Individual and/or Collective Human Actors • Course content posted in online classroom • Instructor presence • One-to-many communications from instructor to learner • One-to-one communications between instructors and learners • Written communications	*Discursive Constructions of Nonhuman Actors* • Linear discussion format of asynchronous online classrooms • Team threads or folders • E-mail • Archives of discussions and shared documents	*Discursive Constructions of Individual and/or Collective Human Actors* • Content provided by direct instruction • One-to-many communications from instructor to learner • One-to-one communications between instructors and learners • Verbal, nonverbal and written communications	*Discursive Constructions of Nonhuman Actors* • Team meetings in classroom or informal campus spaces

Online		Face-to-Face	
Political Elements • Others select learning platform, team features • Level of institutional/ curricular support for collaborative or individual work • Course may be developed by individual(s) other than instructor	*Sociocultural Elements* • Cultural attitudes towards individual achievement versus collective achievement • Accountability: accreditation, institutional standards	*Political Elements* • Level of institutional/ curricular support for collaborative or individual work	*Sociocultural Elements* • Cultural attitudes towards individual achievement versus collective achievement • Accountability: accreditation, institutional standards
Temporal Elements • Transactional distance between initial message and response • Learners and instructors log in at any time	*Spatial Elements* • Geographic dispersion of human elements	*Temporal Elements* • Class meets at same time each day/week	*Spatial Elements* • Physical presence of human elements

together. Research participants believe that the instructor has an important role in creating this kind of atmosphere. They described the use of the constructivist principle of scaffolding, where learning activities build progressively to "gently walk learners" into the collaborative activities. They discussed starting with "low risk activities that encourage a sense of group" by inviting everyone to participate. No grades are given for these foundational activities. In contrast, trust and safety issues were not referenced in previous theoretical literature.

Another aspect of online communications relevant to the collaborative process is transactional distance. The term *transactional distance* describes the gap in time between comment and response in discussions that occur asynchronously, not simultaneously. Online interaction differs from face-to-face conversation because nonverbal cues are absent. Researchers discuss the importance of creating presence (Rourke, Garrison, Anderson, & Archer, 2000) and immediacy (Conaway, Easton, & Schmidt, 2005) to overcome the isolation learners may feel. Instructors demonstrate social presence to make sure learners are engaged in the interactive process. They demonstrate cognitive presence by providing explanations, guidance, and resources to ensure learners are finding, comprehending and analyzing class content. When multimedia synchronous meeting tools and immersive environments are used to bring online classes and instructors together, learners may report fewer problems with isolation and transactional distance may decrease.

A third difference in the online environment is that special skills, hardware and software are needed to enter the virtual classroom and participate. This fundamental question of access was discussed by research participants, but not in the literature. (The literature reviewed was written before "access" for children with disabilities had become a consideration—or a mandate.)

Findings from this study suggest that online instructors need to support development of trusting relationships, demonstrate presence to prevent isolation that would keep learners from engaging in social learning exchanges, help learners either develop skills or find technical support services necessary for online participation, and guide them toward intellectual exchange and growth. An important conclusion based on this is that a radical hands-off interpretation of constructivism would not offer optimal instructional presence necessary to support collaborative e-learning activities.

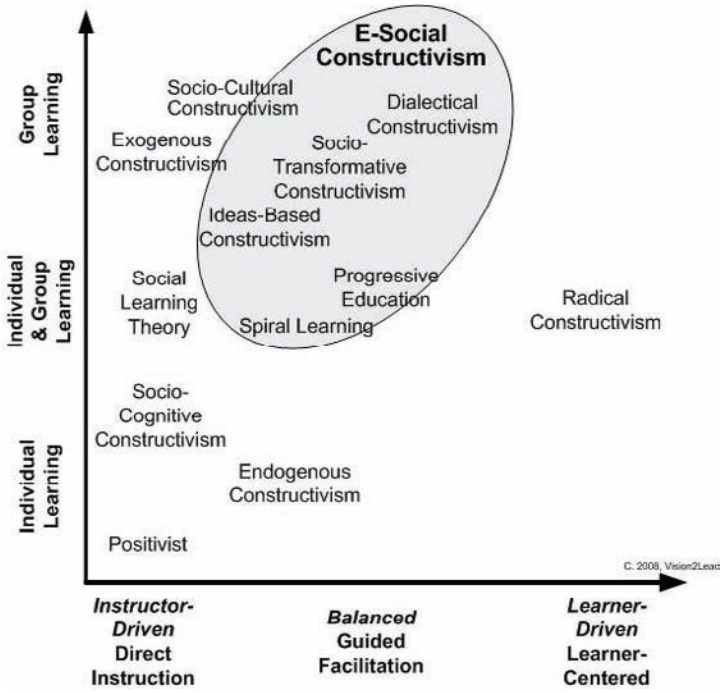
a tHE or y of E-s ocial c onstructivism

Based on the comparison of categories in the theoretical literature and the practical experiences described in the interview data, I propose e-social constructivism as an updated educational theory. Since this theory aims to contribute toward improvement of teaching and learning, it can be described as an *instructional theory.* Educational theories can be classified as either learning theories or instructional theories. According to Jerome Bruner, theories of learning are descriptive, while a theory of instruction is prescriptive (Morrison, Ross, & Kemp, 2004). Learning theories describe, after the fact, how people learn. A theory of instruction recommends the most effective way of designing and conducting instructional activities so learners acquire the knowledge or skill (Morrison et al., 2004). A theory of instruction is concerned with *improving* rather than describing learning.

In the following figure, the *theory of e-social constructivism* is placed in a central position. This position represents a balanced, guided facilitation role for instructors and a balance of individual and social learning. The theory acknowledges the interplay of individual and social constructions of knowledge, the need for internalized speech and reflection, and individual and collective contributions in the collaborative process.

This *e-social constructivism* theory recognizes the unique set of opportunities and limitations of the online social and learning milieu. While learn-

Figure 2.



er-centered, this theory recommends important roles for educators who endeavor to teach online with collaborative methods. Kouzes and Posner point out that, "As paradoxical as it might seem, leadership is more essential—not less—when collaboration is required" (p. 243). The same might be said in the educational context, where more instructional presence is needed for collaborative, in contrast to individual, online assignments. Thoughtful attention to structure, purpose, and guidance can result in collaborative e-learning that truly engages learners in construction of new meanings.

principl Es of E-s ocial c onstructivism

Learning occurs through meaningful interaction with content, content experts (who may include instructors, authorities or skilled practitioners) and peers. Learning is supported in online milieu that are conducive to social exchange and to exploration by both individuals and groups. The collaborative process and the subject matter that is the focus of collaborative activity both provide important context as learners construct meaning from their activities.

Through collaborative e-learning activities, learners acquire new knowledge together with partners, exchange and appropriate knowledge through peer exchange, and/or create new, innovative knowledge, skills and solutions. Instructors should acknowledge that learners' prior experiences and cultural, institutional, and historical contexts influence individual and team accomplishment.

If online courses are designed with social, collaborative activates, instructors must help learners avoid isolation and separation from the interactive process. Using the principles of scaffolding, instructors provide support and information learners need to interact successfully in online milieu. Instructors' social and cognitive presence is essential to the success of learners and learning teams.

Instructors should encourage learners to develop and use information and communications technology (ICT), competencies by integrating opportunities to develop progressively more complex online research, collaboration, and communication skills.

c onclusion

This chapter presented a grounded theory and situational analysis of two sources: theoretical concepts from the literature and perceptions of educators who participated in a phenomenological study of collaborative e-learning. After comparing positions of various theorists with tested, practical ideas reported by constructivist online instructors, those ideas and positions most applicable to collaborative e-learning were integrated into a theory of e-social constructivism. *E-social constructivism* principles integrate applicable ideas from previous theories with considerations specific to the online learning milieu. I hypothesize that designing, planning and teaching with collaborative e-learning activities based on principles of e-social constructivism will measurably improve learning outcomes as well as learner engagement and satisfaction.

The present version of this theory may serve as a framework for those who create and facilitate learners in collaborative e-learning activities. However, I hope that the *e-social constructivism* theory will evolve with future research, discussion and thinking by other researchers and instructors. The theory will also evolve with the integration of more multimedia, synchronous tools into online learning—which may erase some of the distinctions between online and face-to-face learning situations. Like other constructivist theories that came before, I hope it will motivate educators and researchers to create new directions and advance the field.

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kE y tE rms

Appropriation: A kind of peer learning that occurs when a learner "appropriates" strategies used by a stronger or more experienced learner.

Collaborative E-Learning: Constructing knowledge, negotiating meanings, and/or solving problems through mutual engagement of two or more learners in a coordinated effort using Internet and electronic communications.

Collaboration Software: Collaboration software may operate either synchronously, allowing all users to participate simultaneously, or a synchronously, allowing users to participate at any time. Synchronous tools allow collaborative partners to meet and discuss projects, give presentations, view and edit documents in real time, or share applications. Synchronous collaboration tools include videoconferencing, online meeting platforms, shared whiteboard, Voice Over Internet, voting, chat or messaging, and immersive 3-D environments. Asynchronous tools allow collaborative partners to exchange materials, contact lists, or to access shared files or resources, libraries or archives. Asynchronous collaboration tools include e-mail, Wikis, blogs, shared calendars, polling, track changes, and document exchange.

Constructivism: Constructivism both an epistomological view and an instructional method. A core notion of constructivism is that individuals live in the world of their subjective experiences—a world where they construct their own meanings.

E-Learning: An educational activity or course conducted in an electronic learning milieu, using Internet communication technologies for delivery of instruction, curricular materials and learning activities. In this study, e-learning refers to instructor-lead academic courses which may be offered partially or entirely online.

Interaction: Reciprocal actions, effects or influences; the effect of one variable on another variable (Soanes & Stevenson, 2004). Between individuals, interaction entails acting in such a way to have an effect on each other; or a mutually affecting experience. Whether online or face-to-face, interaction typically involves communication between individuals.

Social Constructivism: An educational theory based on the principle that learners and teachers coconstruct knowledge through social processes.

Teaching with Collaborative Methods: Organizing learning activities and creating an environment where collaborative e-learning occurs, and assessing the success of outcomes.

Threaded Discussion: Threaded discussion (or discussion forum) is a form of asynchronous discussion where original comments and responses are organized by topic. Threaded discussion occurs when one user posts a message that is visible to other users, who respond in their owntime. A "thread" is formed when the software groups users' comments hierarchically under the original post. Threaded discussions create a linear format with continuity of comments on topic.

Transactional Distance: Transactional distance describes the gap in time between comment and response in discussions that occur asynchronously, not simultaneously.

Zone of Proximal Development (ZPD): Zone of Proximal Development (ZPD describes the distance between what one can do alone and what can be accomplished in collaboration with others who are more capable (Vygotsky, 1978).

Chapter XX
Social and Distributed Cognition in Collaborative Learning Contexts

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abstract

Technological artifacts such as computers and mobile electronic devices have dramatically increased our learning interactions with machines. Coupled with the increasingly different forms of collaborative learning situations, our contemporary learning environments have become more complex and interconnected in today's information age. How do we understand the learning and collaborative processes in such environments? How do members receive, analyze, synthesize, and propagate information in crowded systems? How do we investigate the collaborative processes in an increasingly sophisticated learning environment? What is collaboration in the current technological age? This chapter, using the conceptual framework of distributed and social cognition, will seek to answer these questions. It will describe the current perspectives on social and distributed cognition in the context of learning, and examine how these theories can inform the processes of collaborative learning with computers. The chapter will conclude with implications to our learning environments today.

introduction

At the heart of educational psychology, is the search for a deeper and broader understanding on how learners acquire knowledge that is realistic and ecologically valid. The pervasiveness of, and increasing reliance on, electronic devices is challenging and transforming the way learners obtain, store and share information. Collaborative learning has also taken new levels of meaning and practice with these ubiquitous digital devices. Snapshots of typical learning situations see a learner accessing a personal digital assistant while listening to a lecture; another sees

a learner sending text messages or surfing the Internet while talking to a peer. Collaborative learning is no longer content with just face-to-face group discussion confined within four walls or supported by the computer only. Contemporary collaborative learning environments are becoming more complex.

Evidently, today's collaborative learning environments are vastly different from the past and there is a need to understand them for classroom design, as well as to enrich educational psychology. How do we understand the learning processes and cognitive activity in such environments? How do learners collaborate in an ever crowded cognitive system? Is there a theoretical framework where we can begin to appreciate and study this increasingly sophisticated learning environment? How do the current perspectives on social cognition and educational psychology inform us in our understanding of this phenomenon? This chapter will attempt to answer these questions by discussing the current perspectives on social cognition, describing distributed cognition as a framework and drawing some implications for studying today's learning environments.

wHat arE lE arning ENVIRONMENTS LIKE TODAY?

The continuing emergence of more sophisticated technology is radically challenging and changing the way students think and learn. The reliance on increasingly powerful computational artifacts has made technology ubiquitous in most classrooms and student life. This sophistication has also been taken to higher levels with the increasing availability of all types of digital information and the myriad of networked and integrated infrastructures. Our Internet and information age has given us tools and resources for engaging in learning that we never had before.

Take any typical learning situation in developed countries. In classrooms or outside schools, you will invariably see students using handheld electronic devices to enter data or check information. They can text message, surf the Internet and "google" what the teacher is saying in class. In study rooms, cafeteria, or homes, students engaging in learning will be seen using cell phones, laptops and other electronic devices. An example of today's (and tomorrow's) learning environments is the Technology Enabled Active Learning (TEAL) project at MIT (Dori, Belcher, Bessette, Danziger, McKinney, & Hult, 2003), where a studio-based learning session takes place with students engaging in and solving projects. The classroom scene is full of students discussing in groups, consulting their computer laptops, running tests with electronic equipment and communicating through electronic devices. The teacher roves from table to table, offering feedback and asking questions. Increasingly integral to these learning environments are collaborative activities involving synchronous (occurring at the same time) and asynchronous (not occurring at the same time) communication to mediate learning and knowledge building. We see students consulting each other in class groups, through e-mails, forums, and blog discussions. Learning projects and papers are written with feedback and proofreading from others. More sophisticated learning environments such as online learning, virtual learning and learning with artificial intelligence (AI) are enabling different forms of collaboration. The Internet and digital age have made our generation characteristic of sharing and learning from one another. Solo learning is increasingly difficult to accomplish in today's commonplace tasks.

wHat arE tHE Educa tional issu Es f acing o ur d igit al AGE?

Several issues confront our current understanding of learning environments. First, the multiple

interactions of human and electronic devices are posing challenges to the traditional scientific method of investigation. These interactions are raising questions about the reductionist approach and ecological validity. They are also questioning how we analyze, identify and exclude variables in this complex learning process. Most empirical studies deal with the unit of analysis comprising of a single discrete task analysis without external aids (Williamson, 2004). This reductionist approach to experiments may illuminate the single cause cognitive relationships, but in reality, contemporary settings are more complex. Perret-Clermont, Perret, and Bell (1991) are right to say that "the causality of social and cognitive processes (in a system) is, at the very least, circular and is perhaps even more complex" (p. 50). For any single effect, there are multiple causes and influences.

Second, the advent of social cognition into cognitive psychology has introduced many other considerations such as social aspect (Vygotsky, 1981), culture (Bruner, 2005), and emotions (Hatano, Okada, & Tanabe, 2001) in the study of affect and cognition. However, most of them are studied as a singular influence, rather than in a holistic or interdisciplinary manner. Rarely do we see a consideration of two or more influences at the same time in a study. While there are attempts, such as Newell (1994), to study cognition as a unified whole, Newell still regards the mind as a unit, in spite of "enlarging" it to a whole in seeking explanations for experiences and multiple influences to cognition. Is there a larger perspective of cognition or a bigger paradigm to study multiple influences to cognition?

Third, the increased complexity of collaborative activity serves as a basis from which to question the preoccupation with the individual as the unit of analysis. Also, where are the boundaries and what is included in the collaborative activity? In the study of collaborative workplaces, Kling (1991) is concerned with the problem created by the loaded concept of "collaboration" in computer supported collaborative work (CSCW). The complexity and associated issues of conflict and interpersonal dynamics was proving too much of a minefield to study. The crux of collaboration is the joint activity of "coordination, cooperation and communication" (Engelstrom, 1992, p. 64). The joint activities and interplay of the coordinating (organizing), cooperation (sharing), and communication (discourse) of knowledge, present challenging mental representations which have yet to be accounted. Members not only share the objects in the cognitive system, but cocreate a shared script of joint activities. This knowledge building (Stahl, 2002) in terms of integrating, synthesizing and creating of knowledge needs accountability. Englestrom (1992) sees communication as the higher form of collaboration and the mediated activity as the key. Do we also include this mediation in our study of cognition in a social setting? Is there a theory on cognition to help educators understand these interactive and mediated joint activities in a seemingly difficult study of a collaborative setting?

Fourth, this digital phenomenon requires a framework to provide a coherent and comprehensive paradigm to make sense of the complexity. The emergence in the 1990s of CSCW and subsequently computer supported collaborative learning (CSCL) as paradigms addressing the emergence of computer use in the workplace and classroom served the needs of that time. The interest in collaborative activity began in workplaces (CSCW) and extended into educational settings (CSCL). Where CSCW is concerned with how groups collaborate in performing tasks, CSCL looks at how groups learn in educational settings. However, as Lipponen (2002) questioned the state of CSCL in 2002 as a paradigm, this chapter is asking the same question in the light of proliferation of other electronic devices, besides computers, that aid learning. While collaborative learning in CSCL recognizes the interdisciplinary approach to such studies and several frameworks have been proposed to provide a comprehensive account of the learning contexts, none exists to

incorporate the pervasive use of digital devices. Designs on not only the technology in support of learning, but the learning environment and the artifacts in the cognitive system, would yield more in terms of our understanding of learning in today's classrooms.

wHat do curr Ent PERSPECTIVES TELL US?

Cognitive science has kept strictly focused on the brain and its law of singular causes (Popper, 1999) while ignoring other social and cultural factors (Gardner, 1985). At the turn of the 20th century, the challenge and confluence of ideas in the epistemology of cognitive science and cognitive psychology changed the functionalist view of cognitive scientists towards cognition. The notion of "causation" was even challenged, and replaced by "relation" (Mach, 1976), which in turn led to qualitative causally interpreted Bayesian nets (Williamson, 2004) and the introduction of the notion of "probability" (Popper, 1959). The positivistic reductionism of the sciences was also challenged as the only means to understand the world (Putnam, 1981). In the 1970s, the introduction of "deterministic chaos" (Goodwin, 2003) into scientific studies began to acknowledge the recognition of the indeterminateness of scientific and objectivity of values.

At the same time, there was a movement to view cognition beyond the confines of the skull (Clark, 2002; Salomon, 1993). The analogous comparison of the brain to the computer, led to studies into the computational representations of how the mind works (Turing, 1950). This computational approach recognized that mental phenomena arose from the operation of multiple distinct processes rather than a single undifferentiated one. Connectionists, who are also concerned about learning, such as Rumelhart and McClelland (1986), used the "Parallel Distributed Processing" model to study cognition that is distributed in a network of computers, believing it to be similar to the neural networks of the brain. This was one important early work that explored the distribution of cognition. Connectionists focus on learning from environmental stimuli and storing this information in a form of connections between computers (neurons). This was an early attempt to see cognition as occurring outside the skull.

In cognitive psychology, the influences of human and social sciences, in particular, anthropology and sociology have been instrumental in the emergence of social cognition in the late 1960s. This is now the dominant model and approach in mainstream social psychology. While the cognitive aspect of learning focuses on the effects of external stimuli on individual cognition, the social aspect of learning looks at social relationships that influence human cognition. The external stimuli included interactions with other humans but it was the effects of the influences that were being studied rather than the relationships. Social cognition, on the other hand, considers the social aspects and roles of the individuals: how people process social information, the encoding, storage, retrieval, and application. The advent of social cognition and its related movements has challenged and freed cognitive studies, shifting it from outcome-oriented to process-oriented (Fiske & Taylor, 1991), recognizing cognition and learning as socially influenced. An antithesis to cognitive processes, social cognition advocates continue the debate till this day about how learning is to be studied. This resulted in most researchers' focus on either the cognitive or social processes in studying learning and cognition, such as systems supported by computers (Kreijns, Kirschner, & Jochems, 2003). It would appear that Perret-Clermont et al. (1991) are right to allude that research paradigms stressing on what is social and what is cognitive will fail because "the causality of social and cognitive processes is [. . .] perhaps even more complex" (p. 50).

Social cognition began influencing educational psychology and ushered in the current

constructivist learning theory. The rise of social constructivism via Vygotsky's social development theory and the emerging social and cultural theory of language and thought forced reconsideration about how people learn in educational psychology (Wood, 1998, p. 39). Within a sociocultural constructivist framework, the notion of learning is seen as a coconstruction of knowledge between individuals. Seen as dialogical interaction of a community, the social cognition in education can range from a simple joint learning activity between two individuals to an extended and complex network of multiparty interaction of knowledge building. Through collaboration, learning now extends to participation in a community of learners (Brown & Campione, 1990) and community of practices (Wenger, 1999).

Thus, the dissatisfaction with the reductionist thought, singular cause method, and the belief that cognition resides only in the head, led to the developments in social cognition spawning several popular movements: situated cognition (also known as situated learning) (Lave & Wenger, 1991), activity theory (Leont'ev, 1978), embodied cognition (Varela, Thompson, & Rosch, 1992), distributed cognition (Hutchins, 1995), and the recent enactivism (Cowart, 2004). While each of the movements attend to the concerns peculiar to their areas, there appears to be none that offer a comprehensive framework, embracing both the cognitive and social processes, such as the theory of distributed cognition that we shall now turn to.

wHat is distribut Ed COGNITION?

Consensus and acceptance of distributed cognition is still inconclusive (Salomon, 1993). However, as evident in the growing literature, distributed cognition is becoming a recognized theory. The definition of distributed cognition varies from the radical view to a loose position. Hutchins' (1995) distributed cognition theory is a study of cognition distributed across individuals and artifacts in a social-cultural and technical system as defined by the members and artifacts in a context. He challenged cognitive science's traditional preoccupation with the individual and the brain as the boundary of the unit of analysis. As such, he also challenges the "range of mechanisms" (Hutchins, 1995, p. 373) that participates in the cognitive process. For Hutchins, the study of cognition erred in confining the study within the skull of the individual and ignoring the context and the individual's interaction with others and artifacts. External elements should not be only treated as stimuli or aids to cognition but rather as equal partners in exhibiting, distributing and creating cognition. Any study into cognition should include all the elements that are directly, and even indirectly, working towards the accomplishment of a cognitive activity instead of the singularity approach. An individual's memory by itself is insufficient to understand how a memory system works (Hollan, Hutchins, & Kirsh, 2000), citing the rich and complex cognitive interactions in a cockpit or a ship's bridge involving the manipulation of artifacts. Pea (1993, p. 69) refers this as "off-loading"—when humans rely on artifacts to help them remember or compute cognitive tasks. The classic description of how a person requires an external representation by writing the multiplication on a piece of paper when called upon to solve a mathematical problem, is evidential to the use of the artifact (pen and paper) to facilitate the multiplication process which was mentally difficult to do.

Engeström (1992) also argues that computer supported collaborative work (CSCW) suffered from the Cartesian focus on the mind as the unit of analysis while relegating the collaboration to efforts to harmonize with the individual. Sociocultural aspects should be included in the study of CSCL (Kling, 1991; Reason, 1990). Reason (1990) differentiates latent human error from active error, attributing the former to the collective and

suggests studying the group's interrelationships to help understand thinking better. Similarly, Cole (1991) sees cognition as a jointly and socially mediated activity. Perkins' (1993, pp. 93–95) views knowledge as "represented," "retrieved," and "constructed" jointly by the "person plus." This is a radical departure from the traditional view of cognition. Currently, there is a growing consensus that the concept of intelligence should not be confined as a property of the mind (Pea, 1993).

The unit of analysis consists of human agents and nonhuman artifacts in the environment and the unit varies with each different context (Hutchins, 1995). This focuses on whole environments as a unit of analysis. So, instead of "keeping" cognition inside the skull, cognition is now seen as external and being distributed in order to accomplish the cognitive task at hand. Lave (1988) and Saxe (1988) observe behavior and cognition in a social (or/and technological) context in their work. Hollan et al. (2000) opine that cognition can be effectively observed as occurring in a distributed manner. Some may argue that cognition is nonsymbolic (Dreyfus & Dreyfus, 1986) and therefore cannot be studied. While others like Glaser and Chi (1988) believe that thinking is represented and can be studied.

DISTRIBUTED OR NOT?

Distribution is the spreading or circulating of things over an area as opposed to a single locus. Distribution considers the sharing, transformation and propagation of any form of information processing in the system. Hutchins (1995) postulates that the cognition process is distributed across members and artifacts of a social group involving coordination between internal and external structures. The locus of cognition is no longer centered on *one* individual. Rather, there are several loci of cognition in a system, each one contributing to the distribution as well as processing the cognitive activity. Cognition is also distributed across time with the earlier events affecting later ones. This means that the manner of distribution is time sensitive. The timing and aging of the cognition affects the cognitive process and system. The cognitive system is also seen as a whole rather than its discrete parts and the boundaries of the unit of analysis are now extended. Halverson (2002) sees distributed cognition focusing on the organization and operation of the cognitive system where its mechanisms make up the cognitive process and seek cognitive accomplishment. Pea regards intelligence as distributed (Pea, 1993, p. 50) to the artifacts alleviating the tedious and burdensome cognitive tasks that humans have to undertake. For him, computer tools and programs are the natural artifacts enabling distributed intelligence to occur and it is preferable for humans to partner them than go solo in any given cognitive task.

As a cognitive science anthropologist, Hutchins (1995) sees all cognition as being distributed to both individuals and artifacts. Salomon (1993), a psychologist and an educator, is more guarded and acknowledged that cognition was distributed but keeps the individual cognition as separate while operating together with others in the system. Fearing that distributed cognition may be seen as the only explanation that ignores the other aspects, Salomon (1993) is careful not to attribute cognitive powers to nonhuman artifacts. Because of the overemphasis on "what's outside" the brain, he feels the extreme position was truncated conceptually. While espousing the overall concept of distributed cognition, he points out that not all cognition is distributed and suggested the middle road: recognizing some distribution of cognition while affirming the individual plays a significant cognitive role in the system. Salomon (1993) maintains that in any given distributed system, there are "sources" of cognition (p. 111) which he attributes to human minds. So, for Salomon (1993), he also sees the interconnectedness between what was distributed versus the internal solo cognition (p. 113) of the individuals.

However, following Vygotsky's notion of internalization, "any higher mental function necessarily goes through an external stage in its development because it is initially a social function" (1981, p. 162), cognition can be viewed as distributed because of its social origins. Individual cognition is even argued to be socially mediated where the individual thought (and action) is shaped by the social context of social relationships, self identities and group associations (Clancey, 1997). For cognition to be functionally meaningful, it has to be socially mediated whether by the individual or by others. The classic example of using a pen and paper to externally represent the cognition process during solving a complex math problem clearly suggests solo cognition is distributed between the mind and external representations. In a more complicated cognitive context like negotiating a ship into a harbor, there are some subsystems of cognitive activity where solo cognition exists, which may seem to be not distributed, such as an in-situ reflection. However, even personal reflection or any other forms of solo cognition are a result, and also a consequence, of a social interaction. Subsequently, the cognition is manifested later in the distribution; even though it was not distributed initially.

Cognition can be categorized from a range of lower-order to higher-order: from comprehension, recall to analysis, synthesis and problem solving. Pea (1993) argues that higher-order thinking belongs to solo thinking and cannot be distributed. Perkins (1993), like Pea, feels too that higher-order knowledge cannot be distributed. They argue that such complex activity occurs in the head and what is distributed is knowledge resulting from that activity. However, if the system is considered as a *whole* unit of analysis, consisting of the different sources of cognition (humans, artifacts and environment), then the cognitive system as a whole is capable of higher order cognition and can be considered as such. The distribution of cognition is within this whole system and any higher-order thinking would occur *within* the system. In reality, higher-order thinking begins with lower-order thinking and as the organizing, integrating and synthesizing (higher-order thinking) of knowledge begins, the social and mental representations are distributed. This organized knowledge may be observed as visually presented or verbally described. Although this may sound like a technical justification for higher-order cognition to be seen as distributed, the fact remains that cognition, whether it is higher or lower-order is distributed.

One of the foreseeable difficulties (but a liberating aspect) in studying distributed cognition is the indeterminateness of the system boundaries. Unlike the traditional cognitive studies where the constructs are clearly stated, ethnographic studies into cognitive behavior and patterns allow undetermined influences to be considered during the study, including new and emerging influences that interact with previous ones in the cognitive system. These recursive and emerging influences on cognition can be very exciting. While this is the nature of the study and characteristic of the analysis, the questions of limit and termination of the cognitive activity are left open. Theoretically, the cognitive system and process is limited by the cognitive task and time taken to accomplish the task, but the extended boundaries that contributed to the task and duration may be difficult to ascertain, due to the dynamic nature of the distribution. Giere (2002) went, as far as to consider the coalmines in Montana as the boundary of the distribution of his science laboratory task. But certainly, any objective researcher will not risk such an irrational stretching of the theory to its limits.

COLLABORATING ALL THE TIME?

Collaborative learning is a process of interaction of knowledge and the joint working of two or more people in an intellectual undertaking of a task or goal. Forms of collaboration range

from common task completion, joint decision making to complex problem solving. Implicit in its understanding is the interaction of human members. However, collaboration can also include other intelligent entities. These other intelligent entities may come in the form of computers or highly sophisticated AI machines like robots. If the focus of collaboration is in the "joint working" aspect, then would it not be too preposterous to say that humans might collaborate with a robot or even a computer? To stretch this further, we may even be working jointly with less intelligent (but nonetheless intelligent) artifacts such as a personal digital assistant or a cell phone. Take an intellectual endeavor, for example, writing a paper. To write a paper in today's context, I will have to use a computer writing software program. The program is "intelligent" as it picks out my spelling and grammatical errors. And if I need to refer to types of format and style, it offers an array of choices. It has indeed "worked jointly" with me on my paper, although not exactly in the conceptual domain. Certainly, if I used the computer to surf the Internet for ideas and discussions on the topic I am writing, it would certainly have contributed, as a conduit, to my intellectual endeavor. Clearly, I am not equating a computer to a human, but increasingly, technology is advancing at a rate that in the near future, we may consult fairly intelligent devices for original thoughts.

cognitiv E artif acts ar E SOURCES OF COGNITION?

In the framework of distributed cognition, artifacts are considered cognitive. This may be a radical idea to some but it may not be a far fetched notion. Take the common practice of using a personal digital assistant (PDA) to aid our memory by storing the information into its database. Did the PDA help our memory? Did it amplify our recall ability such that we are able to remember it the next time? Although it did not really change our memory, it organized the information we entered in the system so that we can retrieve it at an incredible speed, which humans are cognitively incapable of. The artifact was involved in the cognitive function of organizing the information in a way that we can search for it easily and quickly. So, the artifact performed a cognitive task: "organizing" the input data, and "searching and gathering" the required data. Technological devices that aid our memory and computation are known as cognitive artifacts (Norman, 1993).

A distinction needs to be made between cognition and semantics. Searle (1980), using the classic Chinese room experiment where a non-Chinese speaker had to use a rule book to construct a response to a question in Chinese, argues that the machine does not have the semantics of symbols it is manipulating compared to the human mind. So, the machine may act as if it is "thinking," but in reality, it had no clue to the semantic meaning even though it is able to successfully construct a "meaningful" answer to the response. The argument is that the system therefore does not understand the meaning attached to the symbols but merely processes it due to its programming. Searle (1980), therefore, argues that semantic cognition is not distributed between artifacts and humans. So the issue is, does the system really learn as compared to the human mind? In considering distributed cognition, should it include semantics in cognition?

Nardi (1996) argues that the theory of distributed cognition devalues or restricts the meaning of cognition when there is no distinction made between people and things as cognitive agents. Her contention is that for an artifact to exhibit cognition, it must possess the quality of having the "act of or process of knowing, including awareness and judgment." On this definition of cognition, she feels that artifacts are incapable of consciousness and therefore, should not be put on the same level of consideration in a cognitive system. Technically, cognition is any activity that involves the act of recall, comprehension,

critical thinking (organizing, sorting, sequencing, comparing and contrasting, etc.) or creative thinking (brainstorming, predicting, synthesizing, etc.), that involves information processing. As such, any artifact that is capable of this action is performing some form of cognition. Recalling and generating knowledge is not the sole prerogative of consciousness. With huge strides in AI, we are seeing robotic machines that are capable of initiating interaction and performing complex cognitive activities but devoid of consciousness. The issue of awareness, consciousness and emotions may yet be elusive to the most advanced or powerful machine at present but in the future, who can tell?

social, cultural, Historical, and Emotional influences

Halverson (2002) points out that distributed cognition explores the broader sociocultural-technical system of the cognitive system. Clark (1998, p. 258) submits that the mind is best understood as the activity of "an essentially situated brain" in its bodily, cultural and environment context. Hatch and Gardner (1993) feel that the reason why cognitive scientists stayed away from the sociocultural elements is because of their unquantifiable nature and they first needed to understand the brain on its own before considering other aspects. Epistemologically, when a learner engages new learning materials, he does not interact with the material solely on a linear basis, detached from his or her surroundings. The people in the zone of proximity, the artifacts that the learner uses, the physical surroundings and context contribute to the learning process. Socially, the social role of a learner with peers affects learning. If he is held in high esteem by the peers or considered by the teacher to be a favorite student, the learning experience will be different from one who is not. Culturally, those from bigger families and are more outspoken at home, will find group activity more familiar and learning easier than those from a single child family. Learners with different histories with the teacher and classroom environments will differ in the processing of information. Personal histories with each other, with the artifacts, and with the environment will affect the learning. Learning with an unfamiliar face, machine or place compared with the familiar will yield different cognitive results. The emotional state of the learners also provides different learning experiences even when going through the same program and in the same context. Evidence has shown that emotions (Hatano et al., 2001) affect cognition and as a result, affects both individual as well as group performances too.

All these influences: social (Vygotsky, 1981), cultural (Bruner, 2005), personal histories, and emotions (Hatano et al., 2001), should be considered in the cognitive system, at the beginning, during and ending in distributed cognition. This description of learning challenges the idea that knowledge can be transmitted in an absolute and linear relationship. It also challenges the assumption that objective knowledge can be acquired in individuals. Whatever it is, the consideration of all possible influences in a cognitive system clearly seeks to give a holistic and comprehensive picture on how learning and cognition happens.

Highly contextual and multilayered cognitive activity

In distributed cognition, a system is observed to re-configure itself with subsystems enjoining in the interactions in the system while accomplishing the cognitive functions and task. The cognitive process is bordered by the functional relationships among elements that are participating in the process and not by the spatial distance relationship (Hollan et al., 2000). This suggests an emerging character of the cognitive processes in the system. Hutchins (2005) uses the term, "conceptual blending" (p. 1556), which involves the interactions between the mental spaces of the people,

artifacts and environment. These include the body language, coordinating mechanisms, various forms of communication and how tacit knowledge is shared and accessed. Salomon (1993, p. 112) also points to the "joint nature" of the distribution rather to one agent. These layers of cognition and interplay of mental spaces clearly present a multilayered cognitive activity to behold.

Contextually, Bruner (2005) clearly believes that any social cognition is highly situated in its local context and culture. This places the cognitive system as highly contextualized in its own setting: the human members and artifacts situated in the environment. The interplay and interconnection of each member's histories and culture clearly make the study immensely rich with many layers of relationships.

Zhang and Patel (2006) consider affordances as "allowable actions" offered by the environment coupled by the properties of the agent. Affordances are the functions that can be carried out (afforded) by the properties in the environment (Gibson, 1977), including the human agents. Simply put, art studios afford drawing, computer rooms afford computer work. Affordances are another key element in considering the environment as part of the cognitive system. This means that anything that affords an executive function that contributes to the accomplishment of the cognitive task are considered in the study of the cognition distributed in the system.

While all these may paint a rather complex and seemingly incomprehensible picture of what and how learning takes place, the consideration of these factors will not only open a wider and perhaps deeper understanding of learning but in doing so, offers a more holistic and authentic picture of what learning really is.

old winE in nEw winE bottl Es

Cole and Engestrom (1993) cite Wilhelm Wundt and Hugo Munsterberg as the early psychologists who were the forerunners in recognizing a different form of psychology that regards cognition as requiring interaction outside the brain. Unfortunately, their writings were not picked up and developed to any recognizable cognitive psychological strands. Subsequently, Leont'ev, Luria, and Vygotsky, the progenitors of cultural-historical psychology, sought to mediate basic cognitive tasks to more complex ones with cultural tools, including the use of language (Cole & Engestrom, 1993). This means that in order to perform higher cognitive tasks, more than just the brain alone is involved, and the mediation of other cultural artifacts is also required. Hutchins (1995) alludes to Vygotsky's "Mind in Society" (1978) where his notions of treating the society as having mind like properties. By this, he is using language of the mind to describe the activities of the group. Also, for Vygotsky, every high level cognitive function appears as an interpsychological process first before the intrapsychological process occurs. Conversely, Hutchins draws on Minsky's (1986) work, "Society of the Mind" where the language of the group can describe what is inside the mind. Minsky (1986) regards the higher level of cognition as composed of several lower level agencies and are interconnected.

However, this was not the case in the Soviet Union in the early 1900's where Lev Vygotsky's social-historical school, now known as activity theory, began (Rogoff & Wertsch, 1984, pp. 1–6). Vygotsky (1978) postulates that mental functioning occurs first between people in social interaction and later within the child's mind. Similar schools of thought also arose in Scandinavia and Germany, under the banner of activity theory, action theory, and situated action.

In educational psychology, Dewey (1963) warns against treating experience (learning and development) as something going on inside one's head. He recognizes that there are "sources outside an individual which give rise to experience" (Dewey, 1963, p. 39). Evidently, distributed cognition was not entirely new in its concept.

implica tions of u sing d istribut Ed c ognition in c ollabora tiv E lE arning Environm Ents

The first implication in using distributed cognition in the study of collaborative learning environments is that it is an authentic and naturalistic study, rather than a de-contextualized one where the results are not tenable when put to real life situations. In terms of research validity, using the holistic approach to study cognition and learning will ensure ecological validity. Using distributed cognition as a theory presupposes a qualitative case study approach, and mixed method to understand the various influences and relationships within the cognitive system. This snapshot of the cognitive activity legitimatizes the findings while respecting the sensitivity of time. Such a naturalistic study too, when trustworthiness is ensured, has translatability value.

Second, distributed cognition demands that any cognitive system be studied as a whole environment. This holistic approach means that every human and nonhuman artifact, their embedded cultural symbolism, historical data, emotional state and social relationships are considered. At the same time, the source, transformation, propagation and emerging of cognition through time, including the subsystems of cognitive relationships are duly considered. On top of this, together with the single and multiple relationships involved within the cognitive system, the system is, as a whole, also looked at. Collaboration is thus seen as a whole, together with its subcollaborations (subsystems) and the relationship between the whole and its parts. This three-tiered matrix relational study seeks to capture as much data as possible in order to holistically and comprehensively understand the collaborative and cognitive system. This will give a more accurate picture of the learning environment.

Third, the recognition of cognition as a whole unit, allows a holistic understanding of learning in a given context: seeing the cognitive actions as a whole culminating in the aggregate performance and allowing the researcher to see how each cognitive action and relationship contribute to the performance. This bigger picture of cognition will also better inform our studies into collective intelligence (Levy, 1997) or groupthink (Janis, 1997). Salomon, Perkins, and Globerson (1991), on ways of evaluating intelligence between people and technology partnerships, cite both "systemic" and "analytic" when considering both aggregate performance and specific contribution by each member.

Fourth, this whole-environment approach radically regards the individual as a member rather than central to the study, allowing an unbiased treatment of each member and artifact in the system. This means that no one member is prejudicially seen to contribute more or less to the process and performance. This will lead to greater integration of both technological and nontechnological artifacts, human actions and the environment. At the same time, this may reveal hitherto unconsidered elements that may surprise the research with potentially significant impact, due to the impartial treatment of all members and artifacts as equal partners in the cognitive system. Educational goals would then, shift from individual mastery to jointly accomplished performance (Salomon, 1993).

Fifth, the inclusive nature of this framework, in considering all observable representations of cognition in a cognitive system allows an unbridled approach to the study of cognition. This opens up a wider sphere of possible influences that affect the performance of the cognitive tasks. In effect, we can apply these theoretical constructs to a much wider range of considerations in the study of cognitive phenomenon.

With these macro implications delineated, clearly this perspective will render learning with a larger holistic feel: no longer restricted to the linearity of cognitive relationships, but the ability to see the whole. This includes the specific

contributions of each element, unbiased analysis for all members, and a broader understanding of the cognitive system.

At the micro level, the equal treatment of human and nonhuman artifacts as cognitive agents is significant in the collection and analysis of data. First, the distribution pattern and learning process will allow insights to what and how information is gathered, analyzed, synthesized, transformed, stored and created. This will help us see the flow of information, identifying both convergence and divergence points. Second, it also involves the study of the coordination between the internal and external structures in and outside the cognitive system, i.e. looking at sub systems. This will identify critical points of influences and effects to the relationships and the cognitive system as a whole. Third, scrutinizing the effects of time that each mental representation has on the cognitive processes in the system will reveal the dynamics and time sensitive nature of the human, artifacts and environment. This is central to the distributed cognition theory, the interplay and emergent qualities among the three entities: human agents, artifacts and environment. This will inform not only the design of future learning environments and its members within, but also reveal how humans actually think and learn. Critical learning incidents can be identified and enhancements be made. Fourth, the notion of cognitive artifacts opens up the perspective that intelligent artifacts are capable of cognitive abilities and of joint activity. The PDA example highlighted earlier is just one of the million ways an electronic device can contribute and collaborate in the cognitive systems to accomplish higher and more complex cognitive tasks. AI or cybernetic systems are examples of higher intelligent artifacts that may one day play a major role in learning. Fifth, the notion of affordances by artifacts and the environment gives us a dimension to consider in our studies. This study into affordances will greatly inform the future designs of learning environments.

Finally, the holistic approach stemming from distributed cognition will yield insights into the characteristics and influences of the coherent and emergent wholes (Goodwin, 2003) that make up much of the naturalistic learning environments. The inclusion of culture of the members in the analysis allows examination of the symbols and meaning attached to each visual, audio, feeling and verbal expression found in the cognitive system, and will give us insights into the reasons for human actions and behavior. Cultural considerations will force the researcher to consider the cultural perceptions of the human members towards each other, as well as the artifacts. The inclusion of the historical aspect of the members and artifacts in the unit of analysis allows the researcher to see why certain actions are taken and behavior is manifested. The historical aspect will mean looking into the histories of the cognitive systems as well as personal histories of both human and nonhuman artifacts. The technological experience or academic history of the learner will affect the interactions with other humans (with different histories) and artifacts (again with different histories). The inclusion of social structure informs the analysis of the hierarchical structure of human relationships. The inclusion of emotions into the study of cognition will let us see the behavioral and attitudinal dispositions of the interactions. The further inclusion of discourse analysis will allow researchers to examine the language used and communication that affects the distribution of the cognition. Potentially, with insights into how culture, history, emotions, communication and social structures affect cognition and its distribution, these will greatly inform the design learning environments, artifacts and learning strategies. It is believed that this framework will help to advance the studies of "effects with technology" (Salomon et al., 1991, p. 3), the partnerships with machines, which will lead to redefinition and enhancement of learners' performance with technology.

c onclusion

With the general dissatisfaction of reductionism and restrictive "within the skull" cognition, together with the prevalent exploratory social learning theories and social cognition movements, the emergence of distributed cognition is timely, especially since learning environments are constantly changing. The theory that cognition can be studied as distributed across human members and artifacts is fascinating as it offers a holistic view involving not just the social, historical and cultural aspects of a cognitive system but also the very idea that the cognitive system has an entity of its own is very intriguing. The theory also liberates the idea that artifacts can "do" cognition which opens up a world of possibilities in dealing with artifacts of the future, where they will certainly be more capable and more powerful as cognitive entities in their own right. Thus, distributed cognition sees cognition as one unit of analysis of the cognitive system, which was traditionally bounded by the skull, but is now extended to the elements outside the skull and bounded by whatever artifact and human agents that play a part in the cognitive system situated in a learning environment.

This chapter began with the nature of today's complex collaborative learning environments confronting our educational studies. Learning is currently seen as social, as well as situated in a context: involving other human agents as well as intelligent electronic devices. Understanding learning via distributed cognition as an extended cognitive system addresses the challenges highlighted by being nonreductionist, inclusive of various influences, and allowing reconciliation of multiple and emergent joint mediated activities. With increasing sophisticated cognitive tasks being introduced into our world today, the learning environment has become not only more crowded but filled with more sources and artifacts for cognition to be distributed. Distributed cognition can open up a new vista in understanding how cognition and learning can take place. This vista will allow us to examine the layers of cognitive processes and interplay of the internal and external structures resulting in insights that will assist us in human learning and cognition as never before. Crucially, because of its whole environment approach, influences can be identified from a broader and even deeper perspective and this will help inform technological design issues as well and human learning strategies.

As we advance in our thinking and research on learning *with* technology, distributed cognition gives us that breadth and depth to study, in detail as well as holistically, today's complex learning environments. And if learning is to be an enculturation of the practice of life-long learning and personal and professional development, then, the sooner we begin to understand the influences from as many disciplinary aspects as possible, the better we will be able to design and facilitate learning environments for our students of tomorrow.

Perhaps a more fundamental question and issue to address is how do our modern young learn. How do they learn and what makes them want to learn? What gives them meaning in learning? Answering these questions will begin to help us design learning environments that are suited for them and address the challenges of today's emerging technology. And we need a framework that can adequately address these questions in a comprehensive, holistic and ecologically valid manner.

This chapter may be in part, advancing what Kuhn (1970) advocates in his book, *The Structure of Scientific Revolutions*: the notion that science has become overly specialized with each succeeding paradigm, thus losing sight of the forest for the trees in investigating cognitive phenomenon. Nonetheless, this chapter is mindful that this paradigm of distributed cognition will not take that route.

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kEy tErms

Artifact: An object or document created by humans.

Cognition: An act of information processing pertaining to memory, attention, perception, action, problem solving and mental imagery.

Cognitive System: An area or space where interconnected items of knowledge and representations of human cognitive processes are studied.

Collaborative Learning Environment: A situated area or space, networked or otherwise where there is sharing, coordinating, and cocreating of knowledge between two or more persons aided by artifacts to achieve outcomes they could not accomplish independently.

Computer-Supported Collaborative Learning: A process of increasing in knowledge through joint intellectual effort with the help of computers.

Distributed Cognition: A framework of understanding how information processing is circulated across individuals and artifacts in an environment.

Human and Computer Interaction: A study on interaction between people and computers.

Reductionist: An idea that all complex systems can be completely understood in terms of their components.

Social Cognition: A study on how people process information socially in encoding, storage, retrieval, and application to social situations.

Socially Mediated: How information and knowledge are exchanged and negotiated between humans.

Chapter XXI
Modeling the Model for Distributed Learning

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abstract

Increasingly, educators in a range of venues and institutions (e.g., K-12 schools, post secondary institutions, training facilities) are being called upon to teach online. Because it is relatively new, there appears to be no commonly held pedagogy specific to online teaching and learning. Further, these educators have little or no previous experiences to draw on, and they often feel there are no best practices to guide them in their work. This study proposes to investigate an innovative approach to online learning. It explores the impact this approach has on graduate student learning and their subsequent professional practice. This research is a qualitative case study of an instructional design model. Students enrolled in two graduate courses using this model were recruited to this study. They were given an open-ended survey and artifacts from their course work and online discussion forums were reviewed.

introduction

Increasingly, educators in a range of venues and institutions (e.g., K–12 schools, post secondary institutions, training facilities) are being called upon to teach online. Because it is relatively new, there appears to be no commonly held pedagogy specific to online teaching and learning. Further, these educators have little or no previous experiences to draw on, and they often feel there are no best practices to guide them in their work. Oblinger and Hawkins (2006) observe, "Developing and delivering effective online courses requires pedagogy and technology expertise possessed by few" (p. 14).

This lack of expertise highlights the need for the investigation of innovative approaches to online learning. In this chapter, therefore, we propose a model for online or distributed course design and test the usefulness of the model within an online graduate course context, during two sections of the course. Further, while the majority of the students were K–12 teachers, many worked in adult education and training situations. In this chapter, we use the term distributed learning to include both solely online and blended learning opportunities.

This study focuses on teaching and learning in a distributed environment and the impact they might have on students' ongoing professional practice. The objective of this research includes the following:

- To propose a conceptual model for situated learning within a distributed context,
- To propose an actual course model, built from the conceptual model,
- To gain an understanding of the effectiveness the model, and
- To gain an understanding of the potential impact of the model on the students' practice.

rE viEw of t HE l it Era tur E

In 1997, the Globe and Mail estimates that the global market for technology-based distance learning is six billion dollars and will quadruple to twenty-six billion by 2006. For example, in the province of Alberta alone, twenty-three school districts have created online schools.

Online educators currently receive training and support through after-degree professional development initiatives (MacLaughlan, 2002), if they receive any at all. Many have simply started teaching online, learning technical skills along the way without formal consideration of an appropriate pedagogy for online teaching and learning (Haihuie, 2006).

Salmon (2004) recognizes "Successful online learning depends on teachers and trainers acquiring new competencies, on their becoming aware of its potential and on their inspiring the learners, rather than on mastering the technology" (p. vii). This will require a focus on the development of instructional design principles and learning theories (Kearsley & Blomeyer, 2004), understanding an emerging e-pedagogy (Good, 2001), and opportunities to experience what it is like to teach and learn online (Crichton & Li, 2004).

Within in the K-12 realm, it is important to note that schools with existing, and improving, technology infrastructures and curriculum mandates for ICT integration are shifting toward a blended model of learning to integrate and support learning technologies and incorporate new learning strategies that are student-centred, authentic, inquiry-based, and collaborative (ISTE, 2000). This shift has often resulted in increased pressure on teachers to build online courses, modify existing courses to include online components, and/or teach in a distributed environment that blends online with more traditional, face-to-face methods. It also requires a dramatic change in the roles and responsibilities of teachers (Coppola, Hiltz, & Rotter, 2002; Li, 2005; Reyes-Mendez, Torres-Velandia, Harrison, & Moonah, 2003). This shift requires teachers to re-examine their pedagogical beliefs and assumptions about learning (Becker & Riel, 1998). Palloff (2000) argues for the development of an e-pedagogy that involves a change in the traditional practices of teachers. Researchers note "Successful online learning depends on teachers and trainers acquiring new competencies, on their becoming aware of its potential and on their inspiring the learners, rather than on mastering the technology" (Salmon, 2004, p. vii).

As Robinson and Latchem (2003) note, in K–12 schools, post secondary institutions, and training facilities, online learning:

[...] is more than an alternative delivery system and its concerns are more than operational ones. Its planning and use soon confront fundamental

issues in [...] training and development; for example, how to achieve effective integration of theory with practice, or what model of 'ideal teacher' or theories of learning should underpin programmes and practices, or what kinds of teacher development result in better pupil learning. The extent to which planners [...] engage with or neglect these kinds of issues affects the quality of the provision (p. 2).

Graduate programs are one of the most important venues for preparing educators to work online (Hannum, 2001; Kearsley & Blomeyer, 2004; McKenzie, 2001). It is important to note that the growth in online and distributed learning is increasing while the number of trained teachers is not (Kearsley & Blomeyer, 2004; Robinson & Latchem, 2003).

tHE or Etical f ram Ework

The constructivist philosophy provides the theoretical underpinning for this study. Specifically, the theoretical framework for this study, including the design of a model that is described in the next section, is grounded in the principles of situation cognition (Lave & Wenger, 1991) and knowledge-building communities of practice (Bereiter & Scardamalia, 1993).

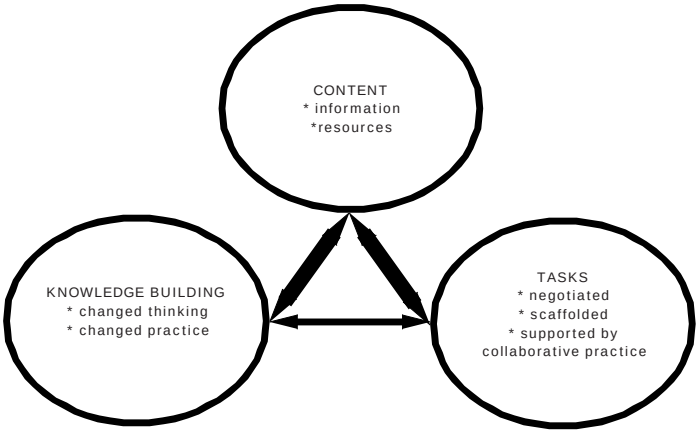
Learning viewed as a situated activity has as its central defining characteristic a process that we call legitimate peripheral participation. By this, we mean to draw attention to the point that learners inevitably participate in communities of practitioners and that the mastery of knowledge and skill requires newcomers to move toward full participation in this the sociocultural practices of a community (p. 29).

The intent of the model is to create an inclusive learning environment that would assist the newcomers (students in the course) to become functioning members in the community of practice (the course) and begin to see the larger community of practice of online and distributed learning professionals. The model provides the foundation for the development of a graduate level course within the specialization of Educational Technology.

Theoretical Construct for Model Design

In this chapter, we propose a conceptual model (Figure 1) that supports situated cognition within a community of practice in a distributed learning environment. In this model three distinct elements are identified—Content (information/resources), Tasks (learning activities), and Knowledge Build-

Figure 1. A conceptual model to support situated cognition within a distributed context



ing (demonstrations of student understanding).

Content usually provides the purpose for the various learners to come together within the organizational structure of a course, and it offers the foundation for the learning events that follow. Content can include information and resources generated by both the instructor and the students. Some content is provided at the beginning of the course while additional resources may be contributed/collected as the course goes along. Other content may include artifacts collected from previous offerings of the course such as products of students' knowledge building efforts.

Tasks are activities that are open ended enough to accommodate diverse student needs as well as prior learning. They can be negotiated between the student and the instructor. They must be challenging enough to motivate students and are drawn from complex real world situations. Consequently, they require careful consideration and appropriate scaffolding.

Knowledge building, as evidenced by authentic demonstrations of learning, allows the student and the instructor to see that changes in both thinking and practice. In the case of graduate studies, these changes may result in modifications to the student's actual practices (course design, teaching strategies, etc.) and subsequent interactions with their own students.

These three elements are consistent, in our experience, with the characteristics crucial for communities of practice as described by Wenger (2004). Wenger states, "Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (p. 1). He continues by explaining that these communities can be recognized by three characteristics:

1. **A common domain:** Something that is interest to all the members and worthy of bringing or holding them together. It allows for a "collective competence" that results from members working together.
2. **A community:** Members who work together within the community to develop the competence and recognize that together the individual gains more than when s/he works independently.
3. **The practice:** The community actually works on something together within the common domain. Without authentic, meaningful tasks, the community risks becoming unnecessary, and the members drop it, moving on to other competing interests. Collaboration is encouraged among the members because it supports the tended learning and helps to strength the community itself.

As Instructor 1 was developing the initial model and designing the first offering of the course, a concern for the development of a rich community of practice was foremost in her mind. Wenger's characteristic of Domain is reflected in the model's element of Content, Community in Knowledge Building, and Practice in Tasks.

Situated cognition (Lave & Wenger, 1991) provides the foundation for the model as it supported the three elements suggested above. Students, as novice learners, engage with the three elements within a supportive community of practice, experiencing the sociocultural practices of the field under study (the specific course and beyond).

Course Model

This model was developed to meet the needs of an online graduate level course in Distributed Learning. In this course, we want to ensure that the philosophy of constructivism and the principles of situation cognition are honored. To do that, we feel that students must engage in tasks that cause them to reflect on their traditional practices and consider potentially new approaches to their work. In reviewing existing online literature and instructional models, we were concerned that the limitations imposed by many existing designs suggested for the Blackboard environment would

not meet our needs. In the original conception of this course, the designer / instructor identified two key guiding ideas:

- Students needed to engage in authentic tasks that mirrored the instructional content, and
- Students needed to see the entire scope of the course activities and feel empowered to negotiate tasks to meet their specific needs.

To accommodate these two ideas, a template was developed for each instructional unit (Appendix 1). Each unit (session) represented a week's work within the 13-work course structure. To manage that work, an activity audit was developed that allowed the designer/ instructor to ensure that individual tasks were not repeated and that various levels of learning and learning styles were being addressed. To accomplish this, the content was placed in the design template and tasks were created to engage the learner in knowledge building. All of the sessions was laid out to determine and appropriate sequence/flow to the content presentation. The sessions were then rearranged where necessary based on activities required and content itself. This sequence was fine-tuned to ensure that task types (e.g., Web quest, rubric construction and evaluation, paper critique, discussion posting, development Web page portfolio) were not repeated. The development of this activity audit was in direct response to student feedback that suggested that many online courses mainly reply on the reading content, posting to a discussion, and writing papers. In the case of this course about distributed learning, the designer/instructor felt the added burden of modeling good online practices for a course about online teaching and learning, hence the need to model the model of good practice in a distributed environment.

The course was first offered in Fall 2003, and sequentially has been modified and taught every year since. The student feedback from the first offerings was overwhelming positive with students' commenting in both the course evaluation and private e-mails that the design was a welcomed departure from the typical online courses they had previously taken. Therefore, when this course was to be offered a second time, the designer/instructor offered the course to her colleague, who was assigned to teach the course. As that instructor reviewed the course, she immediately liked the design but realized that a third design idea was critical to the course. Participants needed have a sense of the big picture of the field under study as well as an understanding of the scope and sequence of the course itself. That is, they needed to know how all the pieces fit together. While this was understood by the initial designer/instructor, it was not obvious to the second instructor and therefore would probably not be obvious to the students either.

Therefore, the second instructor created a mind map (Appendix 2) as a conceptual overview. The mind map provided a visual, non-linear presentation of the field and the course, and was an alternative to the typical linear presentation of text documents found in Blackboard and other online learning environments. This map also served as a hyperlinked outline to the course content.

mEt Hods

Course Description

The online graduate level course in Distributed Learning is a core course of the masters program in Educational Technology. It offers a survey of the field of online learning, exploring the issues, technologies, methods and consequences related to the rapidly changing world of online activity, especially as it relates to distributed teaching, training and learning. Specifically, the course reviews the origins and history of distance education, analyzes the effectiveness of early technologies, and concentrates on current distributed

education mediums and methods. The purpose of the course is to engage in an inquiry of how distributed online teaching and learning environments are changing the design and practice of education and training[1].

Typically, the students enrolled in this course are within the Education Technology specialization. However, there are usually 10%–15% of the students who take this course as an elective within other specializations.

Participants

Students enrolled in the 2004 and 2005 online graduate course offerings were invited to participate in this study. These students were given an open-ended survey at the end of the courses that also explained their right to withdraw from the study. Of the students enrolled in the two course offerings, 70% agreed to participate. The majority of the participants were practicing K–12 teachers who were at various states of their graduate programs. Specifically, all except two participants were seeking a master's degree in educational technology. Of these two participants, one was a first year PhD student in educational technology, and the second was in her masters program in community workplace education.

data

Data included in this study consists of the following: qualitative survey responses, transcripts of their online discussions, and artifacts from the course (student assignments and projects). Although the other data helped provide useful information and conceptualize the framework for analysis, the main data source for this study is the student survey responses and the instructor's journal.

Qualitative Survey Responses

At the end of the semester, students were invited to complete a voluntary reflection about the course by responding to a set of open-ended questions. Sample questions included: What was your general impression of the look and feel of this course? Was it different from what you had previously experienced? Was it easy to navigate? Please elaborate. Did the design of the course allow you to interact in meaningful ways with your classmates? If yes, how? If not, why not? Are there elements of this design that you will incorporate in your own work? If yes, what? What suggestions would you offer us in terms of revisions or improvements to this course design? This reflection was designed for the students to critically evaluate the theoretical and practical consideration of the course structure. This information offered insights into the impact of the learning experience students had in the course on their learning of distributed learning and their own teaching/training practice.

Threaded Discussion

In this course, students were expected to actively engage in the activities and discussions. Students used the threaded discussion to reflect, critique, and evaluate their personal experiences and positions against others' thoughts based on the readings. They also interacted and connected with their colleagues using this tool. Both the quality and quantity of students' messages reflected their "contributions to the knowledge base and the knowledge building effort of the community" (Gilbert & Driscoll, 2002, p. 65). This data source provided information on student collaborative knowledge building which was an intentional outcome of the course design. In this context, collaborative knowledge building refers to the development of higher ordering thinking about complex concepts that is developed and supported in a collaborative community of practice (Wenger, 2004).

Written Assignments and e-Portfolio

Written assignments included research papers, literature reviews, analysis of online software tools, final projects, and e-portfolios. Collaborative group works were highly encouraged for several assignments, but students had the choice of completing the assignments individually or collaboratively. The major project was to either build a shell of or write a paper describing an online learning environment depending on students' expertise in software/Web design. Students were encouraged to work in small groups to first develop proposals and publish them on the course Web site. Students were encouraged to read every proposal and provide constructivist feedbacks to each other. Each group then completed the project based on the feedback and published them on their e-portfolio.

The e-portfolio assignment was designed to allow students to represent their participation in the course and their thoughts one distributed teaching and learning environments. Required elements of the portfolio, in addition to the written assignments, included a personal narrative describing their understanding of distributed learning, descriptions of the critical elements for an online learning environment, as well as for facilitating an online discussion, an annotated list of essential URLs, and appropriate graphics to support and animate their portfolio.

Instructor's Journal

Throughout the semester, the instructor kept a journal to record her action and reflections on activities, administration issues, and the structure in general. This journal also included lesson plans and summaries of a wide range of issues that arose from week to week. This journal provides insights into the teaching methods she used and her interpretation of the activities.

a nal ysis

This research is a qualitative case study (Merriam, 1998), using frame and code analysis (Goffman, 1959) for analysis of course artifacts and surveys as well as Action Research as the courses progressed.

The frame and code analysis of the data followed a two-step approach. First, the two researchers independently coded the data, looking for salient themes (frame) and supporting categories (codes). Once this was completed, the researchers worked together to review the data, sorting it into specific frames and codes. This allowed the researchers to collapse unused codes and to develop additional ones where needed.

The action research component consisted of instructor observations throughout course interactions. The instructor maintained a reflection journal, and she noted patterns and general observations, capturing salient e-mails and communications from the threaded discussions. This allowed her to elaborate on the patterns and engage in timely discourse with the students as they progressed through the semester. It also allowed her to reflect on her own practice and engage in recursive evaluation of her action steps. This approach is consistent with the Action Research methods described by Smits, Wang, Towers, Crichton, Field, and Tarr (2005) because it "[…] is oriented to building good communication and understandings within and among communities of practice" (p. 116).

rE sul ts

The course model proposed above, based on our conceptual model—*Conceptual Model to Support Situated Cognition within a Distributed Context*—appeared to provide a solid base for online constructivist teaching and learning. To determine the effectiveness of the model in actual practice, we sought to gain an understanding of

the impact of the model on student learning and eventual professional practice through this case study.

Five major themes emerged from the analysis of our data. These themes included: navigation, access to resources, task design, interaction, and changed instructor's role. Analysis of the data that supported these five themes and allowed us to answer our research questions and further informed our subsequent course design.

Navigation

Navigation refers to the way in which users of the course can find their way around the content. Further, a well-designed site helps the user to develop a conceptual understanding not only of the scope and sequence of the course but, more importantly, the actual field under study. In this course, visual and textual cues were intentionally designed within the model to assist the users.

Two major categories within this theme were the conceptual map that appeared in the opening screen of the course and the actual course content template that was used consistently for each course module.

The conceptual map was a modification to the initial course design. When the course the offered a second time, the instructor (Researcher 1) developed the map to help her see where the modules fit and how the course pieces were interconnected. She then realized it could be used as a visual mechanism to help the students as well. Adding this into the course reflects the robust nature of the design, as this was a major addition. Students report that the conceptual map helped them to see the bigger picture of the course and the field, was visually appealing, supported a learning style not typically addressed in most text based courses, and helped to reduce frustrations by being an organizer for where specific context could be found. By reducing the frustrations, it appears that the students could then focus their time and energies on more important tasks requiring high order thinking.

One student stated:

"[…the mind-map] was different, and very effective in helping me to organize the scope and the sequence of both the content development, and my responsibilities for weekly work and the big assignments. From week to week, every link opened with the same advance organizers with the headings of background information, readings, and tasks. This is VERY helpful, because without it, a type of exhaustion and frustration could crop up as I flounder around, looking for the little learning shelves, upon which I am to place my learning. I would rather spend my energy synthesizing content and applying it to my educational scenario."

Another student noted:

"I thought there was a rather strong flow. What I really liked about the course map was that it was possible to see the interrelation of the different pieces of this particular puzzle. It was great to be able to see how different topics branched off from the main themes of the course. We could have studied the topics in a different format, but I'm not sure that I would have been able to see the interconnections of the different topics as easily that way […] but then again, I find that I am a very visual learner and like these types of features."

Further, this student noted that he felt:

"graduate work should expose the learners to the vast body of the most current research that is available, and it is the facilitator's responsibility to frame the content without narrowing the topic too much. This requires that the learner is effective in organizing the content around their personal parameters, which creates relevance and accountability at the learner's desk."

This comment linked directly to the second theme, access to resources.

a ccess to r esources

Rather than relying on a single textbook, the initial course developer linked the modules to a range of online resources such as Stephen Downe's newsletter, university discussion boards, online journals, and other Web based content. The students felt that this allowed for the sharing of more authentic content, was more current, providing a broader body of literature, and could be more relevant to a diverse learners (K-12 teachers, corporate trainers, etc.).

One student commented that the access to discussion postings and readings "empowered me by giving me a voice in a highly personal medium." Others commented that the access to the rich and varied content helped them to build their individual understanding and participate more fully in the course tasks.

The use of timely, Web-based resources allows the instructor to keep the content current and to add rich materials located by the students. Both rural and urban students had access to the materials at the same time—they did not have to wait for books to arrive or spend extra money for dated content. This course was the first time the Instructor 1 had linked to the Downe's newsletter, and while students initially were skeptical as to its potential value, they rapidly changed their points of view. Instructor 2 used student testimonials to validate the use of the online newsletter as a resource, and she noted that the students appreciated reading the comments from the previous students.

The use of Web-based resources supports the notion of an online community of practice by creating a nimble learning environment that honors the contributions and contexts of its members. Encouraging students to locate timely resources supported a different type of task design within the course structure. The move from static, instructor selected content to more fluid, online, dynamic content selected from a range of sources required a leap of faith on the part of the instructors. "What if the students learned nothing from the online content? What if the content did not support the course tasks?" The answer to those questions rested in the task design. The overwhelming positive student feedback confirmed this point—the tasks had been designed flexibly enough to provide meaningful links to the online content and eventual learning.

Task Design

Because the topic of the course under study was online learning, and it was offered online, we felt it was imperative to model good online practices. Therefore, careful consideration was given to the types of tasks presented to the students. The instructional strategy underpinning the course design was constructivist. Consequently, the actual activities being asked of students needed to reflect this philosophy. The designer also wanted to model differentiated instruction. Tasks needed to be negotiable, consistent with the learning needs of visual as well as text-based learners. The analysis of the student reflection (survey), showed four categories that support the theme—Task Design.

Walking the talk is category one. It reflects the designer's ability to put into practice the principles that had been presents. In her survey response, one student stated, "This was one of the most constructive courses I have taken and it was delivered well online. I did not feel alone at any time. I would have to say the course 'walked the talk.'"

This student also noted a second design category which was the tasks were intentionally written with a degree of ambiguity that forced the students to take risks and interpret the task to reflect their individual backgrounds and understandings. They needed to immerse themselves in the authentic contexts and apply the learning to their professional practice. She commented:

"At first, I found that I had to second guess what was wanted in each assignment and project. This baffled me at times, but I took the plunge and completed each one based on my interpretation. This I came to realize was the point. The tasks were meant to be constructive in nature leaving me to interpret them based on my own experience and knowledge, and open to how I wanted to construct the outcome. I have to say, this is a lot easier to request of a student, than it is to do as a student. But, experiencing constructivism has been quite insightful."

A third category in this theme is that of critical analysis. Students can build on their prior knowledge by engaging in authentic activities that have been thoughtfully crafted. Tasks were designed such that the students could negotiate design solutions. This required the students to consider critically what was being asked and to formulate an individual solution. It was not expected that there would be common answers or even similar projects. A student commented:

"I like the rubric tasks as well as the design task. Both ask for critical thinking from an instructional designer's point of view. This puts the student in the driver seat where they can test their ideas that could be used in real situations."

Further, she adds:

"I would say the unique, hands-on learning activities called on my critically analyzing distributed learning using my prior experience and knowledge as a teacher, designer and student. I was quite surprised how much I knew and appreciated being given the chance to explore that."

The last category reflects the actual template design. By starting each module with a consistent format, students were able to engage with the content directly without wrestling with the interface / structure. There are four elements in the template: presentation, task(s), resources, and to do list (see Appendix 1). These elements organized the content and separated the background readings and resources from the tasks that the students were to accomplish. The theory and background information was clearly laid out and directly linked to the task that followed it. "When I look at the vast scope of this topic, I can see how the weekly assignments were designed to build enough theory and background information to enable the completion of the big assignments."

Further, the "to do list" offered a quick reminder of the items to be accomplished within each module. Presenting information of each module in such a concise and precise format enables students to follow the specific structure without limiting the students' creativity. Students commented that the tasks were more varied than in other online course they had expected. "I liked the course. I liked how the workload in the units varied—it was less monotonous that way."

The design of the tasks supported both individual and group work. Using the appropriate online tools to foster collaboration was an intentional element. The course designer introduced a range of synchronous software tools early in the course, so students could arrange their own collaborative sessions if they wanted to work collaboratively. The asynchronous discussion board and the synchronous use of conferencing software supported rich dialogue amongst the students and their instructor. For example, group Web sites were created so that students could exchange ideas and brainstorm key concepts, building on class discussions and interactions. Elluminate sessions were provided based on students' needs to facilitate dynamic exchanges. Students were asked to do this so they could experience first hand the potential and the power of online collaboration and group dynamics. "The discussion boards were useful. The Elluminate [synchronous software] was exciting. I enjoyed hearing my peers and seeing their work. The collaborative projects were fun. I made a new friend, K. We worked very well together."

Analysis of the data confirmed that the constructivist philosophy behind the task design was obvious to the students and consistent with their actual experiences in the course. This supports one of the objectives—that a course about online education needed to model good online educational practices. The "intentional" ambiguity of the tasks forced the students to negotiate understanding, initiate authentic and meaningful conversations, and engage in higher order thinking; all of which promoted a change in the role of the instructor.

Changed Instructor Role

The previous themes come together to support a changed course design that results in a changed teaching role for the instructors. Although constructivist philosophy guided the design and teaching of the course itself, it was not until the two instructors noticed the student discussion and the course artifacts that they realized the course has in fact supported a much more constructivist-learning environment. This, in turn, allowed the instructors to more facilitators learning than dispensers of knowledge. As a student noted, "I found the instructor to be less involved in the process and was a 'guide on the side'. Again, this supported the constructive learning environment as she did not preach or impose her ideas and knowledge."

Potential Impact

A research goal for this study was to determine the potential impact of the model and the specific course design on the students. Sixty percent of these students used the course design model to create their final projects. It is worth noting that four of these projects were going to be used in students' actual professional practice. Three projects would be used in provincial professional development online workshops, and another in a health care training module. As the student commented, "I liked the form so much that I used it on my final project [...] and would readily use it for another [...] project."

Another student commented that she liked "the format established and am in the process of setting something similar up using another learning platform called 'moodle' in my place of work."

Negative Aspects

Aside from the many positive impacts on the students, a few elements surfaced as negative aspects of the model. One was an unintended consequence of group work. Tasks had been designed to encourage students to work together using synchronous tools. They were asked to develop rubrics to evaluate software. This task was used three times in the course to evaluate three different platforms/applications. It was anticipated that the students would change groups and try working with different people. We found, however, that the students tended to stay with their original groupings. As one student noted, "I felt that once students were in a group for the first project they didn't want to change or include partners for the other projects. I found this a little limiting."

This is an important observation, as instructors may need to require students to change and rearrange group. The design of the tasks may be encouraging people to stay together. For example, the incremental developmental of rubrics across the three tasks, builds on the skills gained in the previous activity; therefore, students may feel more comfortable staying together and drawing on those common understandings gained during the completion of previous tasks.

Another negative aspect relates to the use of To Do Lists and the breaking of larger tasks into smaller tasks identified as Task One and Task Two, and so on in the template. This may give students the impression that there is more work to be done. Often online courses appear to rely

on the production of one or two larger papers. This was not the case in this course. One student noted:

"I found that I was scrambling to get the last few parts of the e-portfolio completed and was not really enjoying the process as much since it had become a task to complete rather than an experience to learn from […] I know that all of these different assignments helped to make the distributed learning picture a lot clearer for me, but perhaps there could be a way to combine all of these multiple smaller assignments into a few larger assignments? This way, the rigor would still be there, but it would eliminate this constant checking of the list to make sure that each small piece of the puzzle had been completed. It's a difficult thing to do […] perhaps you could offer learners choices […] options to do either the small pieces or a few larger complementary assignments (or a combination of the two)?"

A suggestion made by one of the students was that possibly the instructor should consider the use of contract grading which might provide greater flexibility in terms of the amount of content to be completed and the degree of sophistication of the work:

"Contract grading might be considered for this course because there were such divergent backgrounds and experience amongst the class, ranging from persons who have a very high level of technology skills, to those for whom this is a trial by fire. For example, I don't created [sic] very many Web pages in the course of my responsibilities, yet others who do might be more willing and able to build the big ones with a fraction of the time investment. For very busy students, it is good to know what we have to do with contract grading so that when life becomes much too busy, we can make decisions in the course content, relative to our goals, and our individual realities."

Reflecting on these negative points raised by the students, we believe that while they are important, they can be easily addressed and do not impact the value of the model produced here. In subsequent offerings of the course, Instructor 2 has made timely revisions based on student feedback, but none of the revisions are substantial enough to have altered the actual design or intent of the model. The revisions are well received. The process by which the revisions were undertaken reflect the designers' philosophy that Action Research is essential for any innovation as it allows for recursive evaluation and timely revision.

conclusion

The model proposed in this chapter worked. The course has been offered six times by three different instructors, most currently, the course was offered Fall 2006, all with overwhelmingly positive student responses. The model supported both the instructional design principles and the instructional strategies we wished to use. A question for us was "How scalable would the model be for another instructor with different course content?" To answer that, we offered the model to one of our colleagues, who was about to build a new online course.

She decided to use that template for a number of reasons:

"Firstly, at a top level, the template 'menu' logically divided the course into discrete chunks or lesson modules that suggested a week by week sequence but did not constrain students to that timeline or that sequence. Secondly, within each lesson, the left hand column also chunked the lesson into logical pieces that provided an organization-at-a-glance that was consistent from module to module. I also found that these pieces elegantly outlined everything that I (and the students) wanted to have in the lesson. Finally, the content segments or 'meat' of each part accommodated

flexible design. I could use text and put in links to graphics, videos, documents, URL's or to any other resources that I wanted to use. I could put in special instructions or dates. In summary, both the course and the lesson frameworks supported everything that I wanted to do" (personal communications, May 2005).

It is particularly interesting to note that this colleague is an instructional designer, so we believe her comments to be excellent validation of the potential to generalize our model to other courses and instructors.

Although we understand that distributed learning requires the ongoing development of a sound e-pedagogy, and that many useful approaches have been developed, this chapter simply offers a theory-driven, carefully designed, and field-tested model. The significance of this model lies in the belief that it is important for online educators to model good online teaching and learning opportunities as the modelling can potentially impact student professional practice. It is through this type of modelling that we begin to see a diffusion of affective e-pedagogy implemented in the distributed environments beyond the university.

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kEy tErms

E-Pedagogy: Teaching and learning strategic developed specifically for online and/or blended environments.

Instructional Design Model: The structure that allows a designer to make explicit the theoretical and instructional frameworks underpinning a learning event.

Task Design: Thoughtful development of activities that students will engage in to experience the learning process and to demonstrate their growing understanding of core concepts.

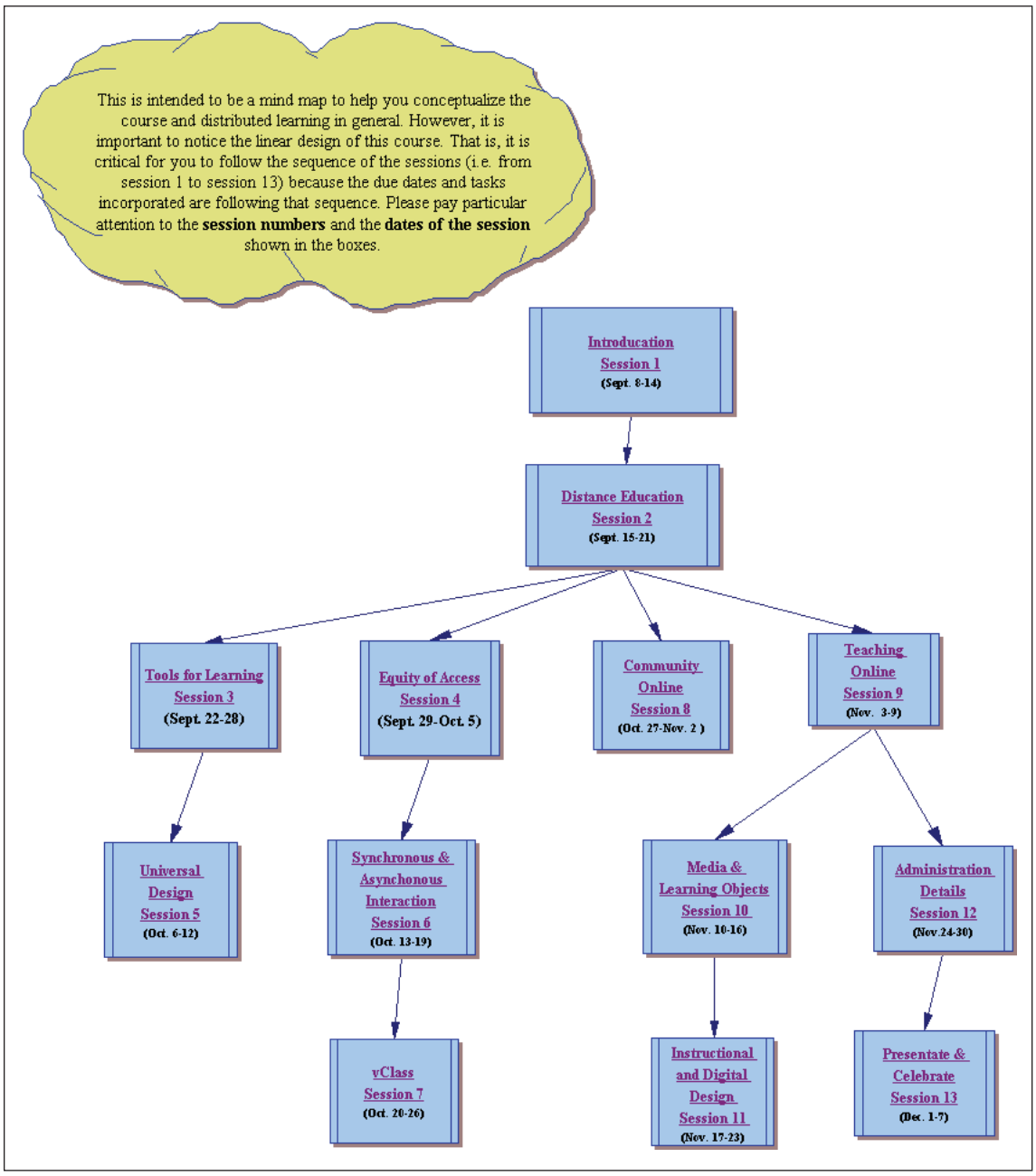
appEndix 1

Sample page from Distributed Learning Course—Module 8

SESSION EIGHT	Employment Opportunities
PRESENTATION	The growth in online and distributed learning is expanding! While there are figures citing the growth, the actual increase in real jobs appears to be real as well While not all of you may want to teach online, there may be a point in your professional lives when the idea is appealing. As we have seen in this course, not all online teaching involves contact with students in the K-12 or post secondary context. Some jobs involve curriculum development and teacher professional development. Increasingly, professionals with education degrees are being sought after for corporate and industry training and consulting. This week I'll invite people who work in these areas into our discussion board. They can explain what they do, how they got their jobs, what training they required, and how they keep themselves current and competitive. We'll also have a live session (face to face and synchronous) with potential employers.
	• Online educator • Online PD provider • Online Content Developer • Distributed Learning Site Coordinator • Corporate trainer • Consultant • Online Principal • Alberta Online Consortium
TASK ONE	Participate in the discussion board. The people I have invited to join us are tremendously busy. They are recognized leaders in this field, so ***PLEASE*** take advantage of the contact with them.
TASK TWO	Begin to think about your resume / CV. How will you capture the experience you have had in this course? How will you promote your skills and understandings? • Mini CD business card? • e-Portfolio
RESOURCES	Blackboard discussion area http://www.acs.ucalgary.ca/%7Emttech/special2003/Webdesign.html
TO DO LIST	• Participate online with this week's guests • Continue the development of your learning object and lesson / activity and assessment item • Work on that inquiry paper

**Template design by Crichton*

appEndix 2



**Mind map design by Li*

Chapter XXII
Capacity of an Electronic Portfolio to Promote Professionalism, Collaboration and Accountability in Educational Leadership

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abstract

This chapter is the result of an investigation into the capacity of an electronic portfolio (e-folio) to promote reflection and collaboration in a process of educational leadership. A cohort (n=11) of volunteer aspirant and current school leaders participated in the trial of an innovative software package designed to facilitate the creation of an electronic portfolio. The research has followed the development of the volunteer group as they underwent the process of constructing an e-folio, in an effort to understand the efficacy of an electronic portfolio as a tool for demonstrating self-reflection, analysis of personal leadership, and collaborative practice. The trial members recorded their reflections regarding their experiences as leaders into their portfolios using the parameters of the "Leadership Framework" as the conceptual guide. This chapter focuses on the results of a content analysis conducted on individual reflections, which found collaborative practice as a key performance indicator in the discharge of educational leadership responsibilities.

introduction

t he Professional Portfolio

Pressure is increasing on Australian schools to respond to rapidly changing conditions brought about by improvements in technology and a shift in emphasis towards a more pluralistic and accountable approach to administration. School leaders are being asked to demonstrate how they are responding to these challenges and to demonstrate the ways in which they are improving their leadership to meet the enormous demands made upon them. Brown and Irby (1996) emphasised the complex, multifaceted responsibilities of school leadership, and studies by Joyce and Showers (1995) have demonstrated that educational leaders must develop continuously as professionals and instructional leaders to optimise learning conditions for student success. Each of their studies suggested that a professional portfolio created by educational leaders had the potential capacity to develop and showcase their skills and capture the complexity of their task.

A professional portfolio has a number of definitions depending on its use: "[...] a thoughtful, organized, and continuous collection of a variety of authentic products that document a professional's progress, goals, efforts, attitudes, pedagogical practices, achievements, talents, interests, and development over time" (Winsor & Ellefson, 1995, p. 1).

According to Simmons (1996) and Wolf and Dietz (1998), there are three main functions of the portfolio: learning, assessment, and employment or professional presentation. The first two are more student-oriented, whilst the third is meant to demonstrate professional development, containing (for example) a resume and artefacts of *best practice*. The third type of portfolio includes a statement of teaching philosophy, letters of recommendation, awards, official documents, curriculum innovations, lesson plans, reflections, and personal evaluations (Hurst, Wilson, & Cramer, 1998).

A professional portfolio is an "organized collection of complex, performance-based evidence that indicates one's growth, goals, and current knowledge and skills needed to be competent in a role or area of expertise" (Campbell, Melenyzer, Nettles, & Wyman, 2000, p. 151, cited in Heath, 2002). Heath, (2002) elaborates further that, a portfolio must be more than an organized collection of artefacts, but should also indicate areas of proposed future growth based upon assessments of past performance and current strengths. These assessments, says Heath, are made as a result of personal reflection both on personal performance and on the selection of artefacts on which reflections are based where "[...] the act of reflection, which is a critical element of portfolio content, further defines the professional portfolio as our own" (Heath, 2002 p. 19).

Creating a leadership portfolio according to Meadows and Dyall (1999, p. 3) is "[...] a culminating experience in the educational leadership program assisting prospective administrators in the areas of performance appraisal, professional growth, and career planning."

According to Salend (2001), however a portfolio is organised or prescribed, professional leadership portfolios should be both process and product oriented with a focus on the collaborative and reflective process of the teaching and learning experience.

The Western Australian Context

The Western Australian Department of Education and Training developed its Leadership Centre in partnership with several associations of school administrators in 1998. The mission of the partnership was to establish and foster "the growth of leadership in a school centre and to encourage the sharing of the knowledge, skills, attitudes and values of leadership between leaders" (Leadership Centre Web Site, 2004). Furthermore, the leadership centre positioned itself with three strategic broad aims:

- Developing a contemporary understanding for the profession of school leadership;
- Raising the professional standards of school leadership; and
- Provision of opportunities for professional growth and development for government school leaders.

With the collaboration of the Leadership Centre, a number of academic researchers in two WA universities, the Professional Associations, the Australian Education Union and in line with its broad strategic aims, the organisation developed a leadership framework underpinned by a range of leadership competencies and standards (Figure 1).

The framework adopted a reflective practice model, which aimed to develop personal assessment and continuous growth in educational leadership.

Underpinning this model were four major assumptions: first, that the professional values, knowledge, attributes and skills of educational leadership are essential, generic and applicable to any educational context; second, that the competencies are a result of rigorous research, and represent one way of describing effective leadership within Western Australia; third, that competencies are interrelated, complex and difficult to describe and serve to highlight key elements of effective leadership without privileging one over another and fourthly that the conceptual basis for the construction of the framework is in organisational change and the facilitation of empowerment by educational leadership in the wider school community (Wildy & Louden, 2002).

The model is a linearly structured framework which integrates the characteristics and competencies of educational leaders through context, linking performance standards, facilitating self-reflection with the ultimate goal being improvement in student outcomes. The cyclical link between leadership performance and self-reflection, whilst intrinsic and intuitive is not made explicit in the current model.

The subdivision of leadership characteristics into three areas (Attributes, Values, and Knowledge) enables specific and comprehensive categories of recognisably simple and explicit ideals of which an educational leader should have command. Similarly, the competencies are divided into five subheadings, (Policy and Direction, Teaching and Learning, Staff, Partnerships and Resources) which have been identified as key areas that indicate mastery of educational leadership. Each competency has a series of definitions of the attributes with illustrations of the levels for each and a series of commentaries explaining how the competencies are applied and measured against context. The common link between the Attributes, Values, and Knowledge dimensions is the collaborative nature of leadership at all levels of administration, management, and interpersonal relationships between leaders, staff and students within the bureaucratic structure of the education department. It was against the background of this research and the resultant model that the enhancement of the strategic aims of the Leadership Centre that the development of an e-folio evolved.

Reflective Practice

The Socratic axiom that a life without reflection is not worth living, may be stretching the boundaries of 21st century credulity in what has become a media-dominated somatic culture, but like the Greek philosopher Sophocles, who was also a proponent of thoughtful reflection by carefully observing and describing human performance, it provides an interesting entrance into the world of modern reflective practice and its potential for developing leadership.

At the root of the concept of modern reflective practice is the philosopher Dewey whose seminal work *"How we think: A re-statement of the relation of reflective thinking to the educative process"* (1933) was the beginning of a line of thinking which resonates today with many

educators and continues to influence policy making and educative processes. Rodgers (2002) succinctly summarizes Dewey's ideas without losing complexity:

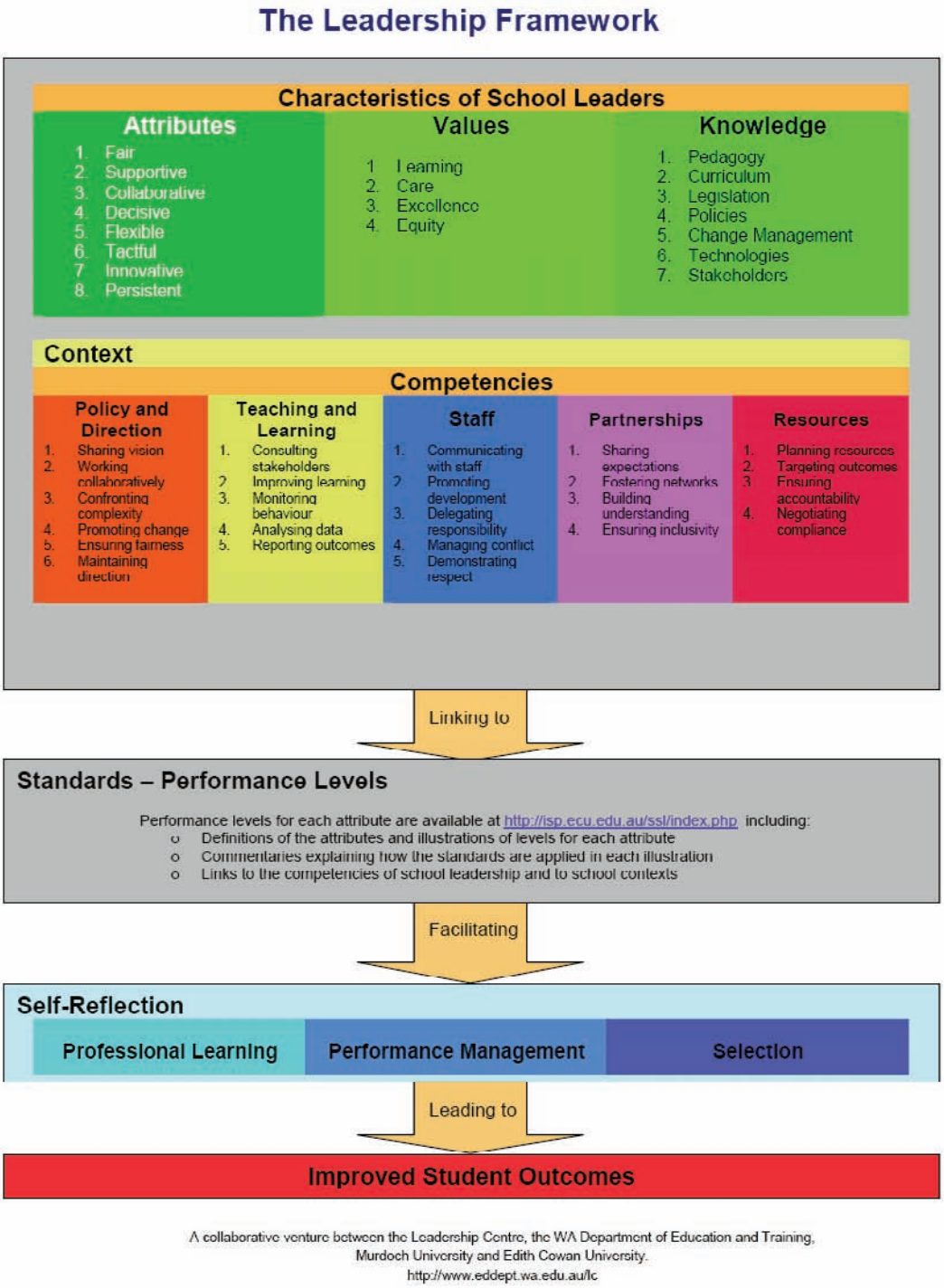
"Reflection is a meaning-making process that moves a learner from one experience into the next with deeper understanding of its relationships with and connections to other experiences and ideas. It is the thread that makes continuity of learning possible and ensures the progress of the individual and ultimately society. It is a means to essentially moral ends. Reflection is a systematic rigorous, disciplined way of thinking with its roots in scientific enquiry. Reflection needs to happen in community in interaction with others. Reflection requires attitudes that value the personal and intellectual growth of oneself and others" (p. 845).

Schön (1983), a scholar who elaborated on the work of Dewey, spoke of reflective practice as the dialogue of thinking and doing which enables one to become more skilful. Osterman and Kottkamp (1993) surmised that reflection is a means of developing self awareness and improving performance. Schön, working with Kolb, has given currency to reflective practice recently by applying reflection on experience to improve action in professional practice, forcing one to learn through questioning and feedback which leads an individual to examine the basis of what is believed to be either true or false (UK Centre for Legal Education, http://www.ukcle.ac.uk/index.html). Reflection as a learning process, examines current or past practices, behaviours, or thoughts in order to make conscious choices about future actions, implying that reflection is the combination of hindsight, insight, and foresight. (Barnett & O'Mahony, 2006). Brookfield (1998), takes this a step further, describing critically reflective practice, which is a "process of inquiry involving practitioners in trying to discover, and research, the assumptions that frame how they work" (p. 197). He asserts that there are four complimentary lenses through which practitioners interrogate these assumptions; "[...] the lens of their own autobiographies as learners of reflective practice, the lens of the learners eyes, the lens of colleagues perceptions and the lens of theoretical, philosophical and research literature" (Brookfield, 1998, p. 197).

The notion of critical reflective practice, especially the autobiographical lens and its capacity to create a resource from which personal insight could be gleaned to inform practice, became a key element underpinning the design of the e-folio which is at the centre of the current research. Reynolds (1999) similarly accords critical reflection as a commitment to questioning assumptions and taken for granted beliefs in both theory and professional practice. He argues that it has the potential to be used as a training tool, particularly with regards to critical incidents where explicit questions such as; "How could I have managed this situation more effectively? How was my comment about 'x' received by individuals?" can be starting points for critical reflection. (NCSL, 2003, p. 14). Reflections on prompts like these are often recorded and used later in reports required by Education District Superintendents and other education authorities. The potential for reflective journals to form a part of a collaborative and structured training program in leadership development is recognised in a number of studies (Boud, 2001; Brubacher, Case, & Regan, 1994; Holly, 1989; Kottler, 1993; Zehm & Kottkamp, 1990): "Writing to reflect involves a cyclical pattern of reflection: first, reflecting on experiences as you write; and then reflecting on the journal entries themselves at some later stage, which may provide material for further reflection, and so on" (Holly, 1984, p. 7).

Ghaye and Lillyman (2000) observe that, reflection is not necessarily everyday spontaneous professional behaviour, except in the cases where things go wrong, or in a major life crisis. Furthermore, Gelter (2003) proposes that reflection is "a learned process of an unconscious selecting of spontaneously generated thoughts" (p. 338).

Figure 1. The leadership framework (Wildy, Louden, & Andrich, 2002)



He intriguingly suggests that the conscious capability for reflection is a historically recent development of human beings; that the conscious "I" and its capacity to reflect (as opposed to the unconscious "me") arose in the dawn of modern society in association with the development of a free will and that reflective capacity is thus epigenetic and has to be learned and encouraged and therefore lends itself to collaborative and cooperative investigation. Kinsella (2005) took a practical view in the application of reflective practice especially with regards to professional development. She postulated that the actions of a reflective practitioner included recognition of practical experience as an avenue for learning. She encourages individuals to reflect regularly and to learn to recognise other ways of knowing within one's profession. The development of self knowledge, the examination of the context of practice and examination of the ideologies of the systems in which one works should be put towards envisioning and applying positive change. Scrutinising personal assumptions to enhance self awareness should be undertaken. Articulating theories of practice and comparing espoused theory with actual practice in a collaborative spirit with colleagues with the overall aim of developing praxis, is paramount.

c ollabora tiv E practic E

As mentioned above the e-folio project is essentially a reflective process however the key element of collaborative behaviours between the adult learners involved is crucial to its success. The terminology regarding individuals working together in groups shifts from "collaborative learning" to "cooperative learning," "group learning," and "group investigation" with incremental and varying distinctions. Davidson (1994) indicates that there are six approaches to the generic term, cooperative learning. These approaches include Student Team Learning, Learning Together, Group Investigation, Structural Approach, Complex Instruction, and the Collaborative Approach.

Davidson suggests that the five major attributes of collaborative learning include the provision of a common task which is suitable for group work, the facilitation of small group learning, the development of cooperative behaviours, interdependence between group members, and individual responsibility and accountability.

Collaboration is fast becoming more important to the delivery of quality educational outcomes in schools, technical and further education, higher education and professional development for adult learners. It has become essential to the success of a number of leading organisations particularly as we move further into the 21st century. More and more individuals need to be able to work together in order to solve complex problems and by engaging in collaborative processes they are required to develop the skills necessary to share information and experiences with others in order to conceptualise and negotiate effective outcomes. Collaborative skills must be learned and it is important to provide individuals with the ability to experience collaborative learning opportunities as part of their educational journey no matter their life-stage. Clearly the earlier these skills are learned the more sophisticated the individual becomes in navigating problem-based scenarios and working through successful cooperative processes with a range of personalities who arrive at the problem solving situation with vastly different contexts and value-sets. Involving educational leaders in collaborative reflection as part of the e-folio process early in their development should assist them to articulate into more sophisticated levels of leadership as their careers evolve.

Much of the educational research which is currently available indicates that effectively designed collaborative learning projects assist participants to develop appropriate cooperative behaviours which in turn lead to enhanced learning outcomes. According to Slavin (1995) and Johnson and Johnson (1994), it is not enough for designers and

facilitators of collaborative learning to provide simply a channel for communication. Ongoing and comprehensive monitoring of student behaviour and interaction along with sufficient guidance throughout the duration of each project must be embedded in the initial instructional design on order for each group to work effectively.

Jonassen, Davidson, Collins, Campbell, and Haag (1995) posit that it is social interaction that is most important in students' achievement of educational objectives. Collaboration is essential to create effective learning environments. The central theme in any collaborative enterprise is to discuss and reflect upon existing frameworks which support values and beliefs for it is these that inform much of our interactions throughout life. By entering into the collaborative model of problem solving each participant must, by the nature of the collaborative process, engage with peers to argue and negotiate the construction of knowledge (Harasim, 1989). The facilitation of collaboration so that personal knowledge can be constructed is one of the major aims of the e-Portfolio Leadership project. The project is a highly personal experience for those in the sample as it requires participants to deeply reflect upon their skills and attributes as they are made manifest in the workplace. In this way the collaboration and the purpose of the engagement is made meaningful to the learner. According to Harasim (1989), it is important that an appropriate context is arranged for the collaborative activity, for example, designing a 'real world' circumstance or task for learners, that reflects events which are commonly experienced by each participant. According to Jonassen et al. (1995), the major components of a collaborative approach to learning include the provision of opportunities to enhance personal construction of knowledge. This can be achieved by setting an appropriate context for the learning as well as facilitating collaboration amongst learners through the use of conversation.

According to the literature there are a number of assumptions that underpin collaborative learning. First, we assume that knowledge is created through interaction and not simply transferred. Second, learning needs to be student-centred (and particularly in the case of adult learners, with consideration given to individual experience and understanding). Third, the educator's role is that of facilitator, developer and provider of the learning space or habitat whether that occurs in the physical face-to face setting or through the use of e-Learning environments.

Matthews, Cooper, Davidson, and Hawkes (1995) went further to expand on these commonly held assumptions to indicate that learning in an active mode is more effective than passively receiving knowledge and that participating in small group activities develops higher-order critical thinking skills which enhance the individual's ability to use knowledge. Their research also posited that accepting responsibility for learning as an individual and as a member of a group leads to enhanced intellectual development as well as increasing retention rates and each participant's sense of success.

Collaboration and the Adult Learner

The importance of social and cultural influences on personal development as well as task navigation is becoming more important particularly with the rise of e-Learning as facilitated through the Internet. Social interaction, whether it be in physical or virtual manifestations does not simply offer a kind of intellectual nourishment in order to assimilate new knowledge but stimulates an activity of accommodation (Morin, 2000). According to Dillembourg (1999), this perspective is the basis for a socio-constructivist approach to collaborative learning. In this way learning is a dynamic process whereby even students with the same level of development (as is often the case with adult learners) may benefit from the interaction as each individual participates from their own unique perspective and this leads to learning.

As adult learners, these individuals have different needs, motivations, incentives and perspectives to those of younger students. Knowles, Elwood, Holton, and Swanson (2005), in their work on "adult learners," identified that they need to have a level of self-determination and control with regards to their learning. They come to a task with a depth of life experience which they feel should be recognised. This experience influences their perspectives and they frequently feel that it is useful in providing insights about solving a problem alone or collaboration with others (Long, 2004). When adults have a problem or issue they are most receptive to learning experiences that will assist them to solve or resolve them.

The question of who participates and who does not, and why, is a recurring preoccupation for adult learners in collaborative contexts. The question of who participates can be interpreted at two levels. First, it can be seeking to understand the needs and motives of adult learners. Second, it can be seeking to explore the issues of what actually facilitates adults' learning, hence, their participation in educational opportunities. Some researchers have proposed that the responsibility for non-participation must lie with the providers. The argument here is that given the right content, methods and conditions, all adult learners are attracted to an educational experience. Merriam and Caffarella (1999) found that 83% of adult learners sampled attributed some past, present or future change in their lives as the motivator for them engaging in learning. Factors that both positively and negatively impact on participation included employment, subject interest, improved qualifications, perceived usefulness, portability and equivalence of credits and the encouragement and incentives offered by employers to engage in the experience. According to Wlodkowski (2004), the emotional response of the adult learner to the collaborative educational opportunity determines motivation. The emotional response is bound to a large extent by the culture in which the adult learner locates himself/herself and this in turn influences task engagement. If adult learners are to engage with professional development opportunities such as the e-folio which is the focus of this chapter, it is incumbent upon the employer (in this case, the Western Australian Department of Education) to provide a learning atmosphere in which the participants and facilitator feel connected to one another. Wlodkowski (2004) also suggested the essential factors that directly influence adult learners' engagement are a favourable attitude towards the new learning; enhancing meaning that included learners' perspectives and values; and encouraging a culture of learning that is truly valued by the organisational context. Additionally, adults tend to be motivated to learn by factors such as self-actualisation; the desire for recognition; security that results in a higher quality of personal and/or work life; and to increase their self-confidence and self-esteem (Wlodkowski, 2004). The learning has to be perceived to be directly relevant to their work or personal lives and the "teacher" or "facilitator" from whom they are learning must be enthusiastic and credible (Wlodkowski, 2004).

According to Wildy et al. (2004) levels of collaborative practice, (High, Satisfactory, and Low), balanced with the attributes and interpersonal skills of educational leaders can be described (Figure 2)

tHE E-folio proj Ect

The major aim of the research was to investigate the capacity of an electronic portfolio (e-folio) to promote professionalism, collaboration and accountability in educational leadership. The study followed the development of the volunteers as they underwent the process of constructing an e-folio, in an effort to understand the efficacy of an electronic portfolio as a tool for demonstrating leadership, for improving leadership and as a mechanism for self-reflection, analysis and collaborative practice. The project aimed to bring to

Figure 2. Levels of collaborative practice (Wildy et al., 2004)

A high level of collaborating will provide clear and consistent evidence of engaging all members of the school community and other stakeholders in substantive matters of school policy. Collaboration will be characterised by well-developed lines of communication with relevant parties and an inclination to trust people and their judgements.	**A satisfactory level of collaborating** will provide some evidence of engaging members of the school community and other stakeholders in substantive matters of school policy. Collaboration will be characterised by some communication with relevant parties and an inclination to trust people and their judgements may be indicated.	**A low level of collaborating** will provide little or no evidence of engaging members of the school community and other stakeholders in substantive matters of school policy. Any collaboration will be deficient in communication with relevant parties and little inclination to trust people and their judgements will be apparent.

light the complexity and multifaceted issues of educational leadership and emergent trends that arise from within the portfolio-making process.

The volunteers involved in the research were provided with a brief, half-day training program during which they were introduced to the portfolio and the relatively simple technology involved to create it. They were provided with a context in which the portfolio could be developed. Each participant was provided with the software package, and the group was given the opportunity to explore and experiment with it. They were subsequently provided with regular technological backup to assist in the development of their professional portfolio. Regular meetings with individual volunteers to ascertain progress were conducted monthly for the duration of one year. These meetings lasted for approximately one hour each. A focus group meeting for a half a day at the end of the twelve month trial period helped to determine the efficacy of the e-folio as a collaborative tool as well as informing the evaluation and modification of the conceptual framework and the software where necessary. A panel of senior education department executives was formed for a one-day assessment of the e-folios, which provided assessment and feedback.

The trial group began with eleven volunteer aspirant and current educational leaders. One dropped out of the trial on personal grounds in early February. Two drifted away from the trial for a number of personal and professional reasons during the course of the study. Eight participants completed the trial; two primary principals, (P1 and P2) three primary deputy principals, (DP1, DP2, and DP3), and three secondary heads of departments, (HD1, HD2, and HD3). Of the eight who saw the portfolio through to the end of the trial, two made excellent progress, three finished the portfolio with a high degree of achievement, two finished with a moderate to high degree of achievement and one made simple entries and barely satisfactory progress. Achievement was measured in terms of the number of tasks completed, the amount of information provided, the clarity of the organisation of the portfolio, the technical competence with which the artefacts were produced and inserted, and personal perceptions of completion.

The resultant portfolio product, mitigated by the panel feedback proved to be a record of professional learning, which had the capacity to be used as a performance management tool. It demonstrated the capacity to be used in connection with the requirements for teacher/leader registration, as a tool to support application for promotion and as a tool for personal growth and development through its self-analysis and self-reflection focus. It also demonstrated the capacity to assist aspirant leaders to ascertain at which level they were working and provided the scaffolding to develop towards the achievement of excellent performance levels in educational leadership as espoused by the Leadership Framework. Most

importantly, was the emergence of collaborative practice, as perceived through reflection and artefactual evidence in the portfolio, as a key element of successful educational leadership. It appeared that one of the most useful components of the e-folio experience was the opportunity for the group to meet together in order to reflect upon their individual leadership styles and problems experienced in the workplace with adults learners who were experiencing similar situations and levels of development.

mEt Hodology

Written reflections from participant portfolios were edited to remove unnecessary information, for example, dates and names. Spelling errors were corrected, and other extraneous information, such as pictures and captions were removed, with the resultant data containing only reflective comments, which were then gathered into an Excel file. The file was subjected to SPSS Text Analysis for Surveys, (Version 2) in order to ascertain frequencies of responses, linguistic and semantic groups which provided context for the open ended reflections. SPSS Text Analysis authors claim that their software uses "advanced linguistic technologies to extract and classify key concepts [...] and can code open ended text consistently and reliably" (SPSS, pp. 1–2).

Content analysis is an important research technique in the Social Sciences in that it makes sense of data as "symbolic phenomena" and is analysed in an unobtrusive way (Krippendorff, 1980). Furthermore, content analysis works within a framework in which the context of the data, how the analysis partitions reality, the target of the content analysis, inference and validity, combine to create a successful outcome:

"The framework is intended to serve three purposes; prescriptive, analytical and methodological. It is prescriptive in the sense that it should drive the conceptualization and design of practical content analyses for any given circumstance; analytical in the sense that it should facilitate the critical examination of content analysis results obtained by others; and methodological in the sense that it should direct the growth and systematic improvement of methods for content analysis" (Krippendorff, 1980, p. 26).

SPSS offered the opportunity to reduce the bias normally associated with manual content analysis techniques, and improve the validity of the findings. Content Analysis is an iterative process. Moreover, "content analysis is fundamentally an empirical approach in orientation, exploratory, concerned with real phenomena and predictive in intent" (Krippendorff, 1980, p. 9). Conceptually, content analysis is able to make reproducible and valid inferences from data to their context, and is a systematic and quantitative description of the manifest content of communication (Berelson, 1952, p. 18).

f indings and discussion

Individual reflections were analysed using the SPSS application and then the total corpus of information was combined to seek emergent trends as a group. A word count of each of the contributions is demonstrated in Table 1.

The raw data was then converted into linguistic extractions from the text using SPSS to create categories. These categories were thoroughly interrogated for "fit" and appropriate adjustments were made until nineteen key themes emerged. These are described in Figures 3 and 4 below.

s taff

The key concern for participants was broadly categorised as *staff*. However this category belies the complexity of the relationships and context to which the concept referred. *Staff* as it was used

Table 1. Corpus contribution of participants

Identity	Corpus Contribution SPSS (Words)
DP1	12, 637
DP2	11,740
HD1	4,889
DP3	4,441
HD2	3,525
P1	3,369
HD3	2885
P2	2,711
Total Corpus Size	46,176

in the transcript was translated as being teaching staff. The category was referred to 162 times (15.2%) and aligned with the same Leadership Framework competencies including *communicating, developing*, and *managing conflict.* Linguistic frequencies indicated the strong relationships in participant reflections between *staff, pedagogy* and *learning* (81), *staff* and *students* (77), *staff* and *performance* (66) *staff* and *vision* (51), *staff* and *collaboration* (51) and *staff* and *parents* (44). Clearly, educational leaders in the project viewed *staff* as the single most important consideration of their responsibilities, and especially the relationship between *staff, students, pedagogy* and *learning.* Reflective comments consistently indicated the importance of improving the quality of learning and methods by which they could inspire their staff to do so (Box 1).

Pedagogy and Learning

The second emergent key theme to be gleaned from the data analysis concerned *pedagogy* and *learning* (P&L). Although participants used the concepts of *pedagogy* and *learning*, the context of their comments suggest they were referring to teaching and learning as it is traditionally understood. This category was referred to 145 times (13.6%) and aligned convincingly with the Leadership Framework competencies of *improving learning, consulting stakeholders* and *monitoring behaviour* in particular. The analysis identified links between *P&L* and *staff* (81), *P&L* and *students* (66), *P&L* and *collaboration* (52), *P&L* and *performance* (52), *P&L* and *vision* (50), *P&L* and *planning* (43). The links between *P&L*, *collaboration, performance, vision* and *planning* are interesting as they indicate the emphasis of the culture of planning and development towards teaching and learning (Box 2).

Students

The third most important theme to arise from the analysis concerned the *student* category which was referred to 127 times (11.9%). Although this was considered to be of very high importance, it is not a characteristic or competency which has any direct equivalent within the Leadership Framework. Students were correlated linguistically with *staff* (77) *pedagogy and learning* (66), *parents* (46), *performance* (46) and *skills* and *knowledge* (42).

Box 1.

"I actively encourage my staff to monitor student progress and learning"

"I worked to encourage my staff to seek continual improvement and reflect on their teaching…."

"I opened discussion with the teacher that my decision would ultimately affect, I explained how I envisaged the program would work, what benefits it would bring to their students and what I imagined would be the impact on them as the classroom teacher, outlining the immediate benefits but also explaining what I saw as the challenges. The response was very positive and the enthusiasm and eagerness to accept the changes I saw as both a reflection of my ability to 'sell' a change but also by skill of working collaboratively, through allowing their suggestions, innovative through ensuring that new ideas in the school were taken on board and through realising the vehicle by which that change could occur"

Figure 3. Key linguistic relationships between categories from all participants

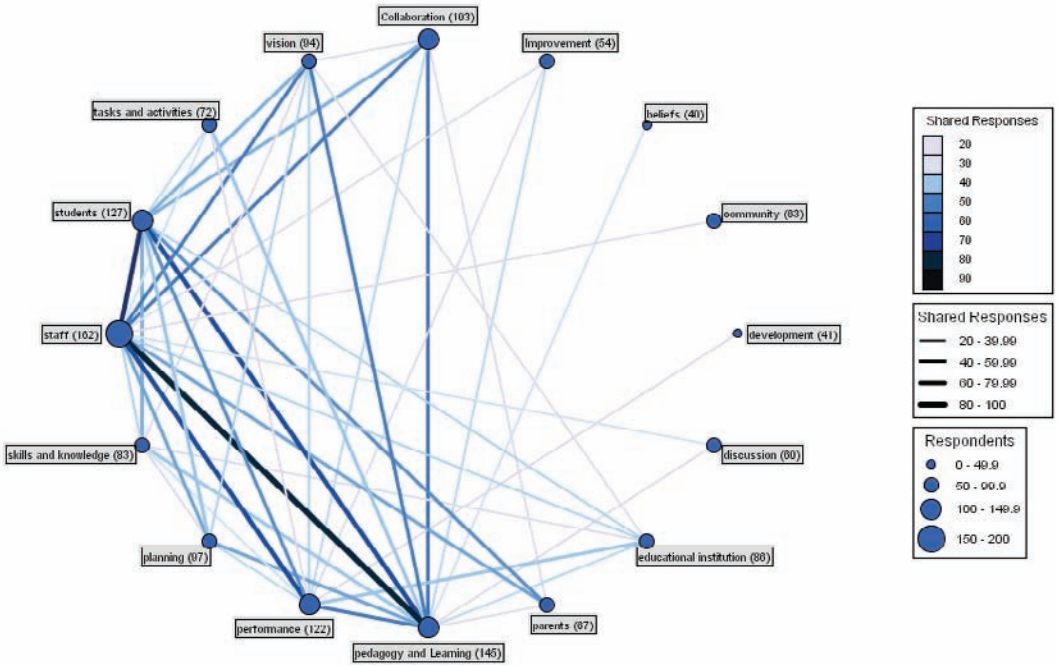


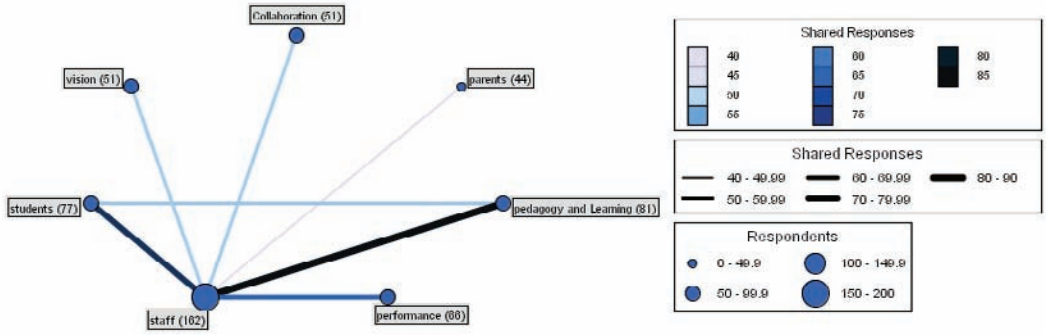
Figure 4. Key themes extracted from participant reflections

Category Bar | Category Web | Category Web Table

Color bars by: Select reference

Category	Bar	Selection %
staff		15.2
pedagogy and Learning		13.6
students		11.9
performance		11.4
Collaboration		9.6
planning		9.1
vision		8.8
educational institution		8.1
skills and knowledge		7.8
tasks and activities		6.7
leadership		6.6
parents		6.3
community		5.9
discussion		5.6
Improvement		5.1
values		4.7
professional		4.4
time		4.1
Accountability		4.0

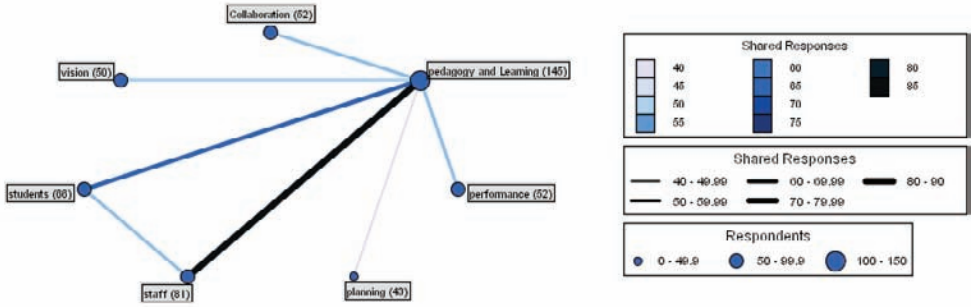
Figure 5. Staff



Box 2.

> *"Through discussion and debate on the CF and SOS we decided to develop a proposal encapsulating the main strategies of these documents. "Making the Difference at Blank School" enabled the establishment of a Curriculum Team. I identified teachers who had excellent interpersonal skills, were team players, and had sound curriculum knowledge and strong background knowledge of the school. To successfully implement the CF and SOS we decided that Curriculum Leaders should be given extra DOTT and PD funds to enable year level collaboration and preparation and presentation of appropriate staff PD. I restructured the timetables to allow for common DOTT to promote a collaborative and supportive environment. This increased ownership and improved learning programs and student outcomes. The Curriculum Team was extremely successful at the school, community and district level was seen as being innovative and proactive. Common DOTT is now used at Blank school to accommodate collaborative planning. Developmental Learning Team leaders report to me regularly"*

Figure 6. Pedagogy and learning



Participant leaders were most concerned with staff student relationships, student learning, student and staff relationships with parents, school and scholastic performance and the improvement of student knowledge (Box 3).

Performance

Fourth in order of importance by frequency was the category referred to as *performance* (122). It straddled two of the Leadership Framework competencies of Teaching and Learning (particularly with regards to improving learning and monitoring behaviour) and Staff (especially communicating, promoting development and managing conflict). The linguistic connections showed that participant reflections highly correlated performance with *staff* (66) *pedagogy* and *learning* (52), *students* (46), *educational institution* (40), and *vision* (37). The analysis suggests that staff performance and staff management were high priority concerns for educational leaders. It also creates a link between the need for developing a vision through leadership to improve student outcomes (Box 4).

Collaboration

Fifth in importance by frequency of linguistic relationships was *collaboration* which was cited 103 times (9.6%). This aligns with elements of the Policy and Direction, the Teaching and Learning and the Staff competencies of the Leadership Framework. The *collaboration* category was linguistically linked to *P&L* (52), *staff* (51), *students* (41), *performance* (35), and *vision* (30). Participants in the project understood the value of collaboration especially with staff and students working together to improve performance. Creating a vision to improve pedagogy and learning was perceived as paramount in the reflections of the participants (Box 5).

Planning

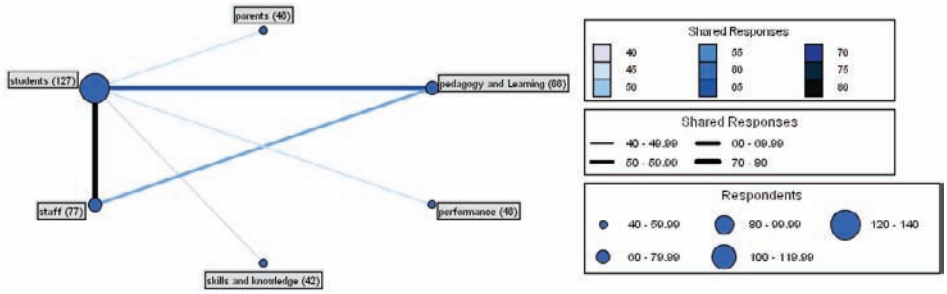
The sixth category which emerged from analysis was *planning*, which was made explicit 97 times (9.6%). The *planning* theme linked linguistically with *staff* (43), *P&L* (43), *students* (40) *vision* (37) *performance* (36) and *skills* and *knowledge* (29). Planning was integral to all major themes, but was most importantly linked with staff and included meetings and timetabling and developing a vision.

Box 3.

"I then was determined to deploy staff for best outcomes for students and reorganised the Key Teacher timetable to ensure the LOTE program could be delivered to students in all year levels. This programme has been running for 8 years and the outcomes which have been met in the ensuing years have drawn much praise from students, parents, teachers and District Directors".

" I needed to ensure that the community participated and felt empowered, the children were involved in a program geared toward flexible learning styles, a vision for improvement existed and an accountability system was in place. The action I took was to set an agenda for regular ASSPA meetings and increase the focus on the student outcomes, promote agency committee links and encourage parental participation and feedback. I began to liaise regularly with the AIEO, provide professional development and problem solve with the school staff on Aboriginal issues. I capitalised on opportunities in school planning sessions to promote the homework centre profile and celebrate the successes of the ASSPA, the AIEO and Aboriginal Studies. I established a clear set of rules and consequences for the homework centre and delegated the responsibility of lesson programming and resourcing to the First Steps teacher. As a result of these actions more students attended the homework centre, less time was spent on MSB and greater learning outcomes were achieved. There became a greater accountability for the expenditure of the ASSPA budget as I had successfully led the school through a period of vast change resulting in a more student-focused and outcome-driven Aboriginal Education program"

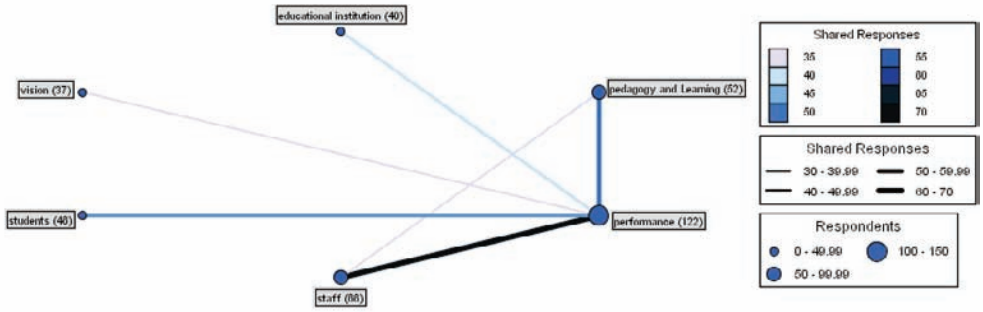
Figure 7. Students



Box 4.

> *"I have also recently been responsible for the Performance Management of staff. I worked to encourage my staff to seek continual improvement and to reflect on their teaching. I was presented with the challenge of a new position where the previous incumbent remained in the faculty. I met this challenge through a policy of open dialogue, encouraging the individual to remain actively involved in the faculty, to seek out continued professional development opportunities, and to openly seek their support and advice on matters where I felt that they could have a valuable contribution. I model a collegiate approach to managing my peers and am careful to consult in order to enlist their support for analysing information and collaborative problem-solving, which has been critical in Faculty Planning I have encouraged staff to develop a vision for our school and to seek every opportunity to develop this vision, I used my circumstances, with continued study, tertiary lecturing and professional development to encourage the principle of continuous improvement and I role model positive leadership and self-improvement."*

Figure 8. Performance



Planning was perceived as very important to developing relationships with students and maximising their performance and learning. This is the first category to align with the resources management section of the Leadership Framework, but as in most other categories the sections dealing with T&L and staff were well represented (Box 6).

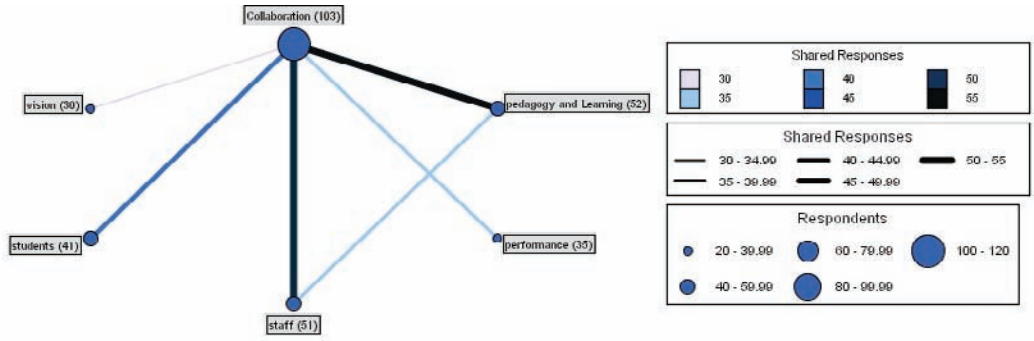
Vision

The seventh major theme to emerge from the study was categorised as *vision* which was included 94 times (8.8%). *Vision*, as it related to the context of the reflections under analysis referred to creating a future set of goals for *staff* (51), *P&L* (50), *students*

Box 5.

> *I meet fortnightly with my Curriculum Team, where we discuss how our collaborative teams are going, and brainstorm alternatives to any issues that have been encountered and discuss the future plans for our collaborative team meetings and school development days and determine who will play what role for these in order to improve the quality of teaching and learning in blank school*
>
> *As a result of our partnership with Curtin University, providing time for our staff to meet regularly as a collaborative team for reflection and planning for improvement our staff and successfully implemented cooperative reading throughout our years 4-7. Our students were clearly engaging in the reading program and were achieve greater outcomes. Students would openly discuss with me and show me what they were doing in cooperative reading.*

Figure 9. Collaboration



Box 6.

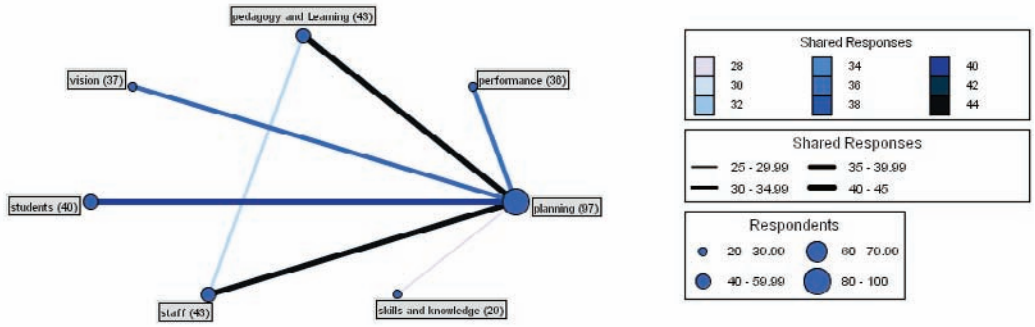
> *I reviewed and analysed the success of that process and saw how I could transfer the success to blank school. I consulted and discussed the ideas with all staff. As a result, my staff have formed collaborative planning teams and formally and informally share ideas and planning. I in-serviced staff at blank school on the use of technology as a learning tool eg, Web quests. Many are moving into the use of interesting Webquests as a means of increasing their computer skills and an easy way of incorporating outcomes based learning in their classrooms. My staff now plan to use CF and outcomes, and lifelong learning and catering for the child of the 21st Century are becoming part of the general discussion about learning at blank school*

(41), *planning* (37), and *performance* (37). This category best illustrated the Policy and planning section of the Leadership Framework, though there was also overlap with the Teaching and Learning, Staff and Partnerships competencies. The ability to create a successful school strongly underpinned the participant leaders' perceptions that having a clear view of the direction, and creating change in the school in terms of staff and students was a motivating and powerful force (Box 7).

c onclusion

The complexity of the key concerns of modern educational leadership and the interrelatedness of themes which constantly overlap in this study is clearly demonstrated through analysis of participant reflections. The portfolio served as a vehicle for capturing some of these complexities and brought to light concerns which could prove useful to senior management for the future

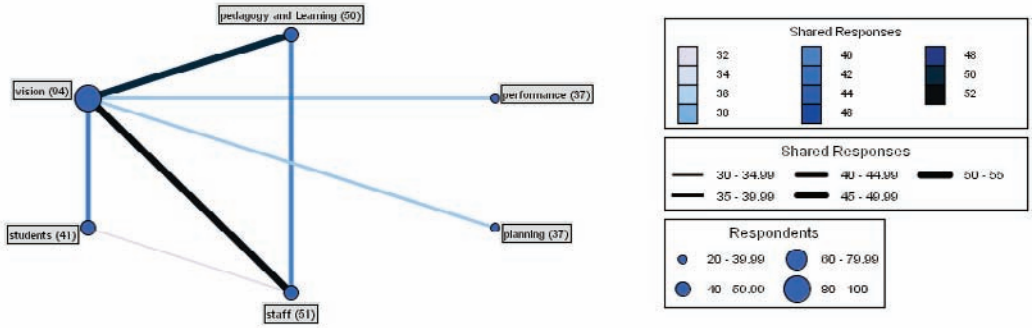
Figure 10. Planning



Box 7.

> *"Under my strong leadership the collaboration between students, staff, parents and the wider school community ensured the very successful fulfilment of a wonderful shared and clearly articulated vision"*
>
> *"To be a 'People Person' with a clear, well articulated vision empowering and leading a collaborative team in the pursuit of personal and professional excellence to improve student outcomes"*

Figure 11. Vision



development of educational leaders in terms of training and how they can best be managed and resourced to improve the culture of the school environment they lead.

Very importantly, the Leadership Framework created by Wildy and Louden (2002) proved to be an effective conceptual framework for the e-folio. The study tends to validate their model and reinforces the five main competencies and their accompanying descriptors. The model provides an appropriate link to performance standards within the context of the environment leaders are expected to operate. The reflective entries by the trial members demonstrated professional development over time through the application of reflective practice. The portfolio provided strong evidence of competency within the framework in most cases and has the potential to be a powerful

tool for future selection, line management and the demonstration of personal professional growth.

Where the model appears to be underrepresented in the trial is in the lack of reflective comments by participants about their own characteristics as school leaders, especially within the attributes and values categories. It could be that the participants were modestly reluctant to be descriptive of their own characteristics; however much of what was written suggests their fairness in dealings, their supportiveness of staff and students, their persistence and flexibility and their tact and flexibility. It is as if those characteristics are inherent, expected as the natural state of leadership and not necessary to be illustrated explicitly. Further study should be undertaken to interrogate the veracity of this observation.

Key findings of the study included the importance to educational leaders, of collaboration with their staff in relation to communicating, developing, and managing conflict. There was explicit recognition that the nurturing of this skill was paramount to improving collegial relationships especially given the pressures for organisational change to develop better outcomes for students. The concept of collaboration echoed through the model in the consultation and monitoring processes associated with pedagogy and learning. Participants in the trial recognised the communal nature of their complex leadership tasks and that collaboration with students, parents, business, district offices and the general community were absolutely essential for the smooth progression of daily activity and the planning, acquisition and deployment of resources.

Finally, the Leadership Framework is crowned by the participant's reflective emphasis on student outcomes and a striving towards the highest of professional education standards possible. This is overwhelmingly present throughout the reflective portfolio entries. There is a constant and consistent thread which ties resources, both human and material to the betterment of teaching and learning; there is a palpable imperative to improve the quality of outcomes within the limitations of the education bureaucracy, its resources and general community concerns.

It could be convincingly argued on the evidence provided through this trial that the benefits of introducing reflective portfolios based on the Leadership Framework, to future and current educational leaders, and the benefits of the collaborative, collegial nature of the process, has enormous potential.

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kEy tErms

Accountability: A commitment by educational leaders to excellence, effectiveness, quality teaching and learning, communication and high standards of achievement in the educational environment, and the engagement in self-examination reflection and analysis to maintain these qualities (WA Department of Education Accountability Framework, 2003).

Collaboration: "Collaboration is an interactive process that engages two or more participants who work together to achieve outcomes they could not accomplish independently" (Salmons & Wilson, 2007).

Leadership/Educational Leadership: Educational leadership refers to a leader or leaders in an educational setting who demonstrate and enact moral purpose, understand and embrace change, build relationships, create and share knowledge, and create coherence in the education community for which they are responsible (Fullan, 2001).

Portfolio/Electronic Portfolio/E-Folio: A portfolio is "[...] a thoughtful, organized and continuous collection of a variety of authentic products that document a professional's progress,

goals, efforts attitudes, pedagogical practices, achievements, talents interests and developments over time" (Winsor & Ellefson, 1995, p. 1).

Professionalism: The capacity of an individual to collaborate with key people or groups of people in identifying and solving problems, to communicate with empathy and understanding of different viewpoints, to have a holistic understanding of professional practice, and the capacity for self reflection (Elliot, 1991).

Reflection/Reflective Practice: "Reflection is a meaning making process that moves a learner form one experience into the next with deeper understanding of its relationships with and connections to other experiences and ideas. It is the thread that makes continuity of learning possible and ensures the progress of the individual and ultimately, society. It is a means to essentially moral ends. Reflection is a systematic, rigorous, disciplined way of thinking with its roots in scientific enquiry. Reflection needs to happen in community in interaction with others. Reflection requires attitudes that value the personal and intellectual growth of oneself and others" (Rodgers, 2002, p. 845).

Chapter XXIII
E-Mail Reflection Groups as Collaborative Action Research

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abstract

Departmental e-mail reflection groups promise to help resolve two of the most pressing problems facing the teaching profession, finding time for meaningful, ongoing professional development (Cook, 1997) and the retention of new teachers (Reed, Reuben, & Barbour, 2006). The ultimate goal of teacher research and all other forms of professional development is learning, learning to be a better teacher. Though learning is often defined as lasting change (Driscoll, 2000), little change occurs in a vacuum. One path to professional development for teachers is personal reflection, but its power to generate meaningful change is limited by the individual teacher's existing knowledge and experience. On the other hand, meaningful change tends to flourish in cultures defined by rich social interaction (Piirto, 1992). Though classroom teachers can and sometimes do draw inspiration and ideas from other educators (Manning, 2006), practical opportunities for this are much too rare (Selwyn, 2000).

introduction

Change is not always perceived to be a good thing, and change for the sake of change rarely is, especially in education. Positive and persisting change in education tends to emerge most often from thoughtful, systematic approaches to learning. A systematic approach to learning is a common definition of research. It follows then that effective professional development for educators requires a systematic approach and access to a richly interactive learning context.

Defining Research

Though the general definition of research enjoys wide acceptance, what constitutes a systematic approach does not. What then is teacher research? Is it one thing or is it many? Recognizing the complex practical realities of teacher research, MacLean and Mohr (1999) define teacher research as any inquiry conducted by teachers that is intentional, systematic, public, voluntary, ethical, and contextual.

Stagnant Momentum and Resistance to Change

The public schools suffer from a history of daunting stagnant momentum, resisting any effort to change, hanging doggedly onto centuries of tradition and precedence. Consequently, though all manner of school reform comes and goes with some regularity, what transpires in schools today is remarkably similar to what went on a hundred years ago. With the single exception of the public schools, most aspects of day to day life in 21st Century America would seem alien and be almost unrecognizable to people living a hundred years ago. Though faces change, textbooks change, buildings change, politics change, and school jargon is revised from time to time, like schools themselves, teaching evolves so slowly that it seems almost set in stone.

Though teaching evolves slowly, it does evolve and improve. However, again and again, it seems educators must relearn that all meaningful and lasting change in the public school emerges from within, from the core. At the core of the public schools is the classroom teacher. Schools are resistant to change, because teachers are resistant to change (Rusch & Perry, 1993). Only when teachers are the agents of change does real and lasting change occur in the public schools.

This chapter forwards the argument that active participation in a private e-mail discussion group can reduce teacher isolation and facilitate the growth of personal and professional relationships within content area departments in secondary schools. It also describes how active membership in an e-mail discussion group successfully transformed one such department into a reflective, supportive, self sustaining, close-knit, and collegial unit, ultimately resulting in lasting cultural, curricular, and instructional reform within the department.

background

Institutionalized Isolation

Though teachers' resistance to change is complex and bound up in the larger context of personal traits and school culture, one cause of this resistance is institutionalized professional isolation. Teachers are held apart from other teachers by a combination of personal pride, institutional limitations, and cultural taboos. It is not that teachers are oblivious to the need for improvement or outside influences on their practice. Managing and interacting with students, planning, and the many other acts that define teaching dominate teachers' attention for most of their waking hours. The experience is physically, mentally, and emotionally exhausting, leaving little desire for anything that might intrude further into their lives. Also, especially among less experienced teachers, ready acceptance of change may be seen as a professional challenge or an admission of failure, and so they find fault in any practice that diverges from their own. Teacher culture inhibits teachers from seeking or accepting advice from their colleagues. Though formal mentoring of new teachers is a recent attempt to change this, teachers are expected to "know it all," from the moment they accept that mantle.

Acceptance of this culture of isolation begins early, well before the student becomes the teacher. From a child's perspective, each teacher is an island, each classroom a sovereign entity. Rules and ideas are specific to each classroom,

and teachers appear (and are typically expected to be) sovereign, self sufficient, and totally autonomous. Rarely, do students see teachers collaborating, sharing, helping each other. Ironically, this extraordinary autonomy is one reason many people become teachers in the first place. When these children grow up, become teachers, and are assigned their own students and their own classrooms, this perspective is reinforced by the daily practical realities of planning, teaching, and managing the classroom. In most schools today, this institutionalized isolation severely inhibits professional dialogues that might lead to personal growth and general instructional reform.

Contrary to what may seem logical, a large percentage of classroom teachers are introverted by nature (Kiersey & Bates, 1984). In fact, this trait influences their choice of profession, where the introvert's natural tendencies toward introspection and autonomy are apparently valued. This personality trait contributes many qualities that define good teachers, but also bears upon the introverted teachers' acceptance of collaboration and outside influence.

Professional Dialogues and Change

Both the pace and quality of meaningful teaching reform depend upon the existence some mechanism permitting rich professional dialogues. Somehow, the personal and contextual traits that engender resistance to change must be overcome. Somehow, teachers need a way to build strong, personal and professional relationships with their colleagues. Experience has demonstrated that traditional face-to-face meetings held infrequently, outside of school hours rarely result in this kind of conversation. What is needed is a way for teachers to talk that encourages regular and frequent exchange, does not involve formal meetings, and does not force them to extend their work day. Asynchronous computer mediated communication in the form of e-mail discussion groups is rapidly becoming recognized as an effective way to reduce the barriers to communications between people within organizations (Sproull & Kiesler, 1996).

The Dilemma of Reflective Conservation

Reflective teaching practice involves a purposeful analysis of actions and decisions with the intent of recognizing problems and successes, hypothesizing solutions to the problems, and applying both recognized successes and new solutions to future actions and decisions. Doing this takes time and discipline—time to think, time to read, time to journal ideas and concerns, time to plan and test solutions.

Teachers are constantly struggling to balance personal and professional demands upon their time. Meaningful, purposeful reflection is just one more burden to bear, and one that is easily ignored. The reality of teaching is that the extraordinary intensity of the experience leaves teachers with little time or energy left for active, focused reflection. Teachers tend to devote their non teaching time to day-to-day realities such as maintaining relationships, paying bills, buying groceries, doing the laundry, and caring for children. Maybe it follows then that though most teachers recognize the value of reflection, they tend to resist the discipline of regular and purposeful reflection (Schon, 1983, 1987). Zeichner (1987) describes this resistance as "reflective conservatism" suggesting that most teachers do not want to be especially reflective or analytic about their work and that they actively resist any change.

Group Reflection

Group reflection involves engaging a group of professionals with common interests, tasks, and experiences in dialectic conversations where the they openly reflect upon those experiences and then engage in elaboration and critique with the intent of understanding or finding meaning in

those experiences and, by doing so, improve the professional practice of all those participating. Such discourse occurs in contexts ranging from highly organized and tightly controlled forums to the equivalent of a relaxed dinner table conversation.

Collaborative reflective discourse used purposefully to facilitate the improvement of professional practice originated in the field of medicine, primarily nursing. Formal group reflection evolved into a common tool in medical schools during the 1980s, and over the past couple of decades, recognizing the continuing value of reflective practice, doctors and nurses are increasingly finding ways to make group reflection a continuing part of their personal and professional lives (Gould & Masters, 2004; Graham, 1995). Bolton (1999) suggests that regular reflection enhances health practitioners' ability to use their skills, knowledge, and experience creatively and lovingly to provide care that is alert and alive to the patient's needs and wants. Bolton reports that one purpose of these reflective dialectics is to strengthen participants' professional self-concept and task awareness. Medical educators found that participating in reflection groups incorporating written reflection promoted a form of social constructivist thinking, built collegiality, and fostered dispositions that encouraged collaboration and peer review (Bolton, 1999; Mountford & Rogers, 1996). These outcomes are exactly the kind of thing needed to improve teaching and learning in the public schools.

It is not surprising that medical researchers found that the biggest threat to the effective functioning of group reflection was finding the time and energy for it in the midst of challenging and stressful training and clinical practice (Olofsson, 2005). The same is true for teachers. Both the medical and teaching professions are defined by a similar need for continuing professional improvement and by great demands on the practitioners' time and energy. Though individual reflection has received much attention and support from educators for the past quarter decade, group reflection found its way to the teaching profession only recently.

Like the medical profession, reflection groups in education function in two modes. Sometimes they focus on the resolution of critical incidents, specific cases or dilemmas faced by teachers in the classroom (Kitano & Landry, 2001). In these cases, format and participation is often bound by convention and geared toward efficiency and equal participation. Other times, discussions are defined by dialectic response to personal professional narratives provided by the participants. In this case members of the group initiate discussions emerging from lived experiences, reflecting the participants' immediate needs and concerns. Group decorum is fluid and socially constructed to meet the personal needs of the participants. Participants in reflection groups engage in reflective thought not only when relating their own experience, but also when responding to those of others. Though this study focuses on group reflection via e-mail discussion group, most early iterations of purposeful group reflection were conducted in face-to-face meetings, usually held regularly and within the immediate working environs of the participants (hospital/school).

Reflective Writing and E-Mail Discussion Groups

Unlike most of the group reflection described in the literature of the medical field, the dialogue described in this chapter is written on computers and takes the form of e-mail letters or messages. Though written discourse such as this has obvious limitations in fluency, it also offers certain advantages over more traditional conversational mediums.

Writing as Reflection

Writing is fundamentally a concrete manifestation of thought. It is inspired, guided by, and grounded

in the knowledge and experience of the writer. It is introspective, self-generated, and analyzable. In short, all writing is reflection, reflection that provides a durable self-perspective (Kottkamp, 1990). Though not all reflective teachers keep reflection journals or write teacher narratives, Connelly and Clandinin (1985) report that teachers who do believe these to be key elements of their reflective practice. When teachers write their own stories, they lend substance and permanence to the dynamic and transient nature of the teaching experience. Once captured in writing, thoughts and records of events can be reviewed and critiqued, while providing a manifest and permanent record of the teacher's memory. As teachers write about their successes, their failures, and their unresolved dilemmas, they deconstruct those events while they rethink and reevaluate every facet of the experience and the thought processes involved. The written text allows others to engage in meaningful professional dialogues with the writer.

E-Mail Discussion Groups

E-mail discussion groups are known alternately as reflectors, listservs, and forums. E-mail discussion groups function by forwarding all messages sent to a common address to all members of the group. They may be configured to distribute the messages immediately upon receipt or in daily "digests." The primary advantages of such discussion groups are that participants may read and respond to messages at their convenience, and every message and response is automatically recorded, providing a written transcript of the discussion, permitting unlimited reflection and review. E-mail discussion groups may become quite intimate if the group size is limited and well defined. E-mail discussion groups may be configured to allow each participant to have messages sent to any number of e-mail addresses, permitting members to read and respond to messages at home, at school, or any place they can send and receive e-mail. Finally, in a survey of technology comfort levels among teachers, most respondents ranked e-mail as the computer application they were most comfortable using and as the one they used most often (Smerdon, Chronen, Lanahan, Anderson, Iannotti, & Angeles, 2000).

Writing in the form of e-mail has several advantages that may encourage group reflective discourse. In a study involving an e-mail reflection group populated by physical education teachers, Russell and Cohen (1997) found that when teachers engaged in reflective journalizing via e-mail, their thoughts were formulated without interruption, and reflection occurred at a deeper level during the writing process. They found the written document not only provided a permanent record, but also permitted time to think before responding and opportunities to conduct a form of recursive reflection. This is a characteristic that introverted teachers should find both appealing and empowering. Russell and Cohen also found that e-mail was a more spontaneous, rich, and fluid medium than letters sent by mail or even face-to-face communications. Russell and Cohen also described reduced inhibition to participation and candidness compared to face-to-face or phone communication. They report the e-mail reflection group to be an especially effective medium for teachers as it caters to the individual time schedules of each participant, overcomes geographical distances, and promotes sustained relationships among participants. Wilkinson and Pennington (2002) concluded that not only is reflective thinking a desirable practice for teachers, but that written reflection generated through participation in an e-mail discussion group greatly enhances the reflective process and leads to meaningful professional development.

E-mail discussion groups provide teachers ready access to colleagues with whom they can share teaching practice and problems. Although simple access to an e-mail discussion group does not mean that reflection will occur, it does provide teachers more opportunities to engage in reflective dialogue. With regard to group reflec-

tion, DiMauro and Gal (1994) suggest that the convenience and asynchronous nature of e-mail discussion groups tend to encourage participation fluency.

Reflective thinking is a desirable aspect of any educators' planning and practice. Teachers thoughtfully consider their personal values and beliefs and make modifications based on such reflection. This focused introspection occurs privately, either during or soon after actively teaching. Private reflection such as this, though productive, may amplify teachers' inherent sense of isolation. Participation in an e-mail reflection group helps remove the sense of isolation many teachers feel by providing ready access to a community of fellow teachers with whom they may comfortably and conveniently share and test the product of their reflection.

E-Mail Reflection Groups as Collaborative Action Research

Hopkins (1993) defines collaborative action research as an informal, qualitative, formative, subjective, interpretive, reflective and experiential model of inquiry in which all individuals involved in the study are knowing and contributing participants. E-mail reflection groups enable and encourage the systematic collection and analysis of data with the goal of answering research questions arising from day to day teaching. Participants regularly publish timely and relevant data describing some phenomenon within their professional experience. Then, each member of the group analyzes that experience hermeneutically and critically from an individual, informed perspective and publishes a considered response to the group. These responses are analyzed similarly, promoting a circular dialectic within which findings and conclusions are eventually forwarded and tested through imbedded peer review. Many independent or interdependent threads of conversation may occur concurrently. Due to the nature of the data involved and the methods of analysis, activity such as this is a form of qualitative research. Such research can be purely descriptive, but in this context is often applied in problem solving, comparative, or evaluative modes.

The e-mail reflection group model meets most of the criteria for validity in qualitative research (Lincoln & Guba, 1985). As the participants are intimately aware of the context and other participants, they automatically consider personal biases and contextual variables in both individual and group analyses. This is especially true as individual and group relationships mature. Such intimacy within the group also makes any finding very "transferable" between participants. Lincoln and Guba suggest that the more persistent and more frequent data is collected, the more "credible" the results should be. E-mail reflection groups enjoy the possibility of virtual permanence, the ultimate longitudinal study. As each e-mail posting constitutes an instance of data collection, this meets Lincoln and Guba's persistence criteria, further enhancing the design's "credibility." As all parties involved are equal participant observers, neither perspective bias nor observer expectation bias should unduly influence the outcome.

The collective text generated by the e-mail exchange creates a rich and accessible "paper trail," a source of primary data. All data are available for secondary review and member check at all times over the entirety of the research period. The body of text generated by the reflection group easily meets the most common criteria for quality in any form of descriptive or narrative research, rich description.

Learning resulting from e-mail reflection groups and the changes in curriculum or instruction manifesting that learning are the result of continuing and systematic data collection conducted by teachers and in schools. Decisions emerging from reflection group interaction are "data-driven."

Case Study

From 2002 through 2004, the author studied the evolution of an e-mail discussion group whose members were all teachers in the same junior high school English department (Redmon, 2004). The department was typical of most secondary content area departments in that the members functioned almost independently and as virtual strangers. Even though they all taught the same subject in the same building and occasionally met in departmental meetings, the teachers rarely participated in meaningful professional dialogues and were only vaguely aware of what went on in their colleagues' classrooms. In fact, they knew very little about each other and were even less concerned with helping their fellow teachers improve their classroom practices. A private e-mail "reflector" was created for the teachers in this department in order to learn the manner and extent to which the e-mail discussion medium and group reflection framework might be accepted and employed by classroom teachers and whether this intervention might promote a more reflective practice and the growth of departmental collegiality. From the outset, the explicit purpose for participation in this group was group reflection as a collaborative process focusing on both individual and departmental improvement based on both the individual and collective lived classroom experience of the participants. The resulting e-mail dialogue rapidly became a user-friendly, transparent, ongoing forum for collaborative action research.

Participants

Participation was purposefully limited to a single department so that the participants' range of professional experience was similar enough to permit an informed and empathetic dialogue. Participants were asked to post at least one message a week describing some issue of professional interest or concern arising from their personal classroom experience, and to respond in some way to the posts of the other group members. No other requirements or limitations were placed on participation, and no attempt was made to guide or police the nature of posts to the reflector.

Six of the seven members of the English department of the target school volunteered to participate. The small size of the group was intended to encourage the growth of trust and intimacy between participants. At the beginning of the study, the youngest participant was in her first year of teaching, and the oldest had taught for over thirty years. Besides monitoring and recording the content of all posts to the e-mail reflector and sharing the findings at the end of the first year with the members, the researchers' only participation in the discussion was the orientation message.

Prior to beginning the study, several members of the group were interviewed, revealing that, although the three who had been in the department for the longest time did enjoy existing social relationships, their professional relationships were best described as hesitant or strained. None had a clue how the others taught, but all had definite ideas about who was the better teacher. The remaining three participants were either new to the school or new to teaching and described no personal or professional relationships with of the others; feelings about their fellow English teachers ranged from isolation to intimidation. None reported any recent meaningful conversation within the department related to instructional improvement or day-to-day teaching.

Procedures

All e-mail sent over the reflector was collected and analyzed to determine the nature of the interaction and the extent to which it contained reflective content. Reflective content was coded as themes emerged from the text. The transcript was also analyzed for distribution and frequency. Finally, the participants reviewed the results for accuracy of content and interpretation before the report was finalized.

Results

The reflection group conversation did not cease at the end of this study. It continues three years later even though university support in the form of the dedicated e-mail reflector ended after two years. During the formal data collection period, 750 individual posts had been recorded over a period of 242 days.

The distribution of posts was relatively consistent among the members. Though none of the participants posted significantly more often than the others, two did tend to initiate conversation threads more often than the others, suggesting the emergence of leadership. Of these two participants, one tended to focus more on professional issues and seemed to keep the conversation grounded in school and teaching matters, while the other typically introduced topics of a more personal nature. Though the informal discourse was not an intended function of the reflection group, it likely did much to engender the growth of trust and strengthen personal relationships among the group, facilitating a more robust professional dialogue.

Several peaks in participation were observed over the course of the study, the largest of which began during the later weeks of summer break and extended through the first month of the school year. This peak likely reflected enthusiasm and planning for the new term. Other peaks in participation seem related to specific threads in the conversation. The first peak, early in the summer, resulted from a spirited conversation related to summer workshops and reading. A peak occurring in late October and early November focused on a discussion of literature being taught in classes. Another peak, developing as the study ended, related to changing the school schedule to allow for separate reading and writing periods, a language arts block.

Throughout the study, many posts were partially or wholly personal in nature, including very involved discussions of personal reading. I found it hard to separate the posts involving personal reading from those recorded as professional reflection. As all participants were teachers of literature, it seemed that discussing reading and books, whether or not the books are part of their teaching curriculum, was relevant reflection and contributed to their professional development. Additionally, the most significant curricular change in the department emerging from the discussion was the adoption of workshop approaches to reading and writing instruction, which emphasizes teacher modeling of reading and writing, student choice, talking about reading and writing, and the integration of popular adolescent literature.

Individual posts often contained reflection and commentary related to multiple topics and themes. Most themes appearing in the discussion were those related directly to teaching and curriculum. Participants wrote about student teachers, grading, lesson planning, what to do with late work, progress reports, professional development, and myriad other things that demonstrate active reflection on practice. More than 2/3 of all messages addressed at least one topic related to teaching or curriculum. Those topics were grouped into fifteen themes and are listed in the order of their relative significance. The most significant topics are listed first and are followed by a number representing the number of posts in which they appear:

1. General pedagogy and classroom management (176).
2. Teaching reading, vocabulary, and literature (129).
3. Professional development activities (115).
4. Teaching writing, library research, and grammar (72).
5. Parents and students (48).
6. Organizing classrooms, including gathering of supplies and materials (41).
7. Meetings and extra duties (37).
8. Activities related to school start-up and close down (35).

9. Preparing students for TAKS and district benchmark tests (31).
10. Fatigue resulting from teaching or teaching related duties (30).
11. Block schedule and class size (16).
12. Mentoring student teachers and new teachers (16).

Three other themes appearing in the discussion were not directly related to teaching or curriculum. The most significant of those themes was coded personal matters. This theme ranged widely in topic from gossip and lawn care to vacation trips and cooking. In addition to more relevant themes, approximately 1/3 (281) of all messages also addressed at least one personal topic. The other two themes, technology and personal reading, actually did relate to teaching, but in a less direct way.

Posts with heavy reflective content often resembled journal entries, rather than e-mail communications. Here is an example:

"I'm trying to fine-tune my letter to parents about my rules, etc. With this new positive approach, should I list my consequences? I've always done the regular warning, 2 minutes after class, 30 minutes after school, office referral, but I'm thinking of changing that to warning, warning after class (meaning about 30 seconds to 1 minute), 2 minutes after class, 10 minutes after school, 30 minutes after school, officer referral. Should I even worry about having a progression of consequences? I know we should tailor the consequences to the crime, but I'm not sure I can do that as fairly as with a standard set of consequences. Back to the letter, should I even bother listing them, or should I just put in a blanket statement such as, 'Keep in mind that there are consequences for breaking the rules and rewards for following these rules?"

Following such a posting, other participants regularly offered support (or advice) or extended the reflection into their own experience:

"I just reviewed my letter from last year, and I did mention the rules and the consequences. I haven't started revising it yet, but I think I will include both again. I am still playing with it, but I think I will go with warning, 30 seconds, 2 minutes, ...not sure....then to 10 min and 30???? I didn't have to do much last year after I started using the yellow slips. I simply warned a student once and thereafter gave him or her a yellow slip for each infraction, each yellow slip taking them to the next penalty. I may rethink the stuff as I run tomorrow. That's when I usually come to terms with something I am pondering."

Participant Feedback

Participants were uniformly positive about the experience, using words like "wonderful" and "fun." All felt they had learned both from the reflective process and from each other and valued the opportunity to share ideas, insights, experiences, successes, and frustrations with fellow teachers who understood and shared their experience. Five of the six reported that their personal and collegial relationships had been dramatically enhanced by participating in the group. The growing bonds were very apparent to the author, as was the increasing trust and intimacy within the group, which permitted greater depth and honesty in the exchanges. Participants all felt the e-mail connection allowed them to continue and extend conversations begun in school and to permit the "teacher talk" that teachers rarely have time for during the school day.

One participant commented that she felt the experience had been a "catalyst" for personal improvement, helping her to make changes and try new things that she had never before been brave enough to attempt. She valued the support and validation she received from her now very close colleagues. Another credited the group with helping her to learn to be more "realistic and practical." A third member of the group warmed up to the idea slowly, but became thoroughly

"hooked" after a while, believing it inspired her to be more "creative" in the classroom and in her planning. The youngest and newest teacher in the group readily admitted using the discussion as a "support line" and as a way to "mine" her more experienced colleagues for teaching ideas.

In the feedback questionnaire, I asked the participants if they thought an e-mail reflection group would work with a larger or more diverse membership. One response did a good job of summing up the position of the group: "For this kind of thing to work, the teachers involved need to teach the same things to the same kind of kids, like in the same school. I'm not sure it would work, otherwise."

Summary

The teachers in this study valued their participation in the e-mail reflection group. They exhibited focused self-awareness and self-critique, and generated meaningful changes to both their pedagogy and their curriculum. The teachers in this study unanimously agreed that the experience helped them enjoy teaching more and benefit both personally and professionally from the closer, more collegial relationship engendered by participating in the group. They enjoyed learning from each other and loved sharing their experiences. They were observably more confident teachers, willing to showcase their successes and ready to adopt new ideas. The e-mail dialogue brought about a number of both small (e.g., bulletin boards and notebooks) and large changes in curriculum and pedagogy (revised literary canon, grading rubrics, and reading-writing workshops). The teachers appeared to approach discipline in their classrooms more thoughtfully and more collaboratively. They also seemed to be growing more engaged in curriculum reform, whole school reform, and district policy issues. Finally, participants seemed to have discovered a sense of collective power and were beginning to use that power to leverage their perspective and needs when negotiating changes in curriculum and policy with school administrators.

f utur E t r Ends

E-Mail Reflection Groups and Professional Learning Communities

The professional learning community is a professional development initiative that has gained the rapid and enthusiastic acceptance of educators over the past few years. Based loosely on the teacher study-group concept, DuFour , DuFour, Eaker, and Thomas (2006) define professional learning communities as organizations of educators that work together to improve student outcomes. Professional learning communities may involve group reflection, but as described by DuFour et al., are typically face to face in nature with externally defined outcomes and tend to be defined by existing departmental hierarchies. Although DuFour et al. call for schools to carve time out of the school day for meetings of professional learning communities, this is increasingly difficult to accomplish with any frequency. E-mail reflection groups share the goals of professional learning communities, but with much greater convenience, a more egalitarian context, and opportunity for regular participation without disrupting the school routine.

E-Mail Reflection Groups and Teacher Burnout

It is generally agreed that one of the most pressing issues related to public school teaching today is the alarming rate at which teachers are leaving the profession. Schlichte, Yssel, and Merbler (2005) identify isolation and lack of professional support as major causes of teacher burnout. Reducing teacher isolation by involving them in reflection groups not only promotes professional development, it may also reduce the numbers of

teachers who leave the profession prematurely. E-mail reflection groups offer an attractive intervention that not only removes the personal and professional barriers that isolate teachers, but also provides a powerful source of continuing professional support.

Recent research in teacher retention also emphasizes the importance of mentoring new teachers (Porter, 2003). E-mail reflection groups provide new teachers with access to rich collegial support, not as a novice among experts, but as an equal, contributing member, easing their entry into the culture of the school while developing valuable personal and professional relationships much more quickly than is possible otherwise.

c onclusion

The e-mail reflection group offers teachers a workable and attractive opportunity to enjoy personal and professional contact with colleagues that might otherwise be impossible, given the increasing demands of teaching and living in the twenty-first century. E-mail reflection groups do seem to engender a collaborative attitude and mutual support on the part of the participants (Redmon & Burger, 2004). Additionally, e-mail reflection groups appear able to encourage reflective thinking and reflexive practice on the part of the participants, giving them the opportunity to think carefully through some the theory-to-practice issues regularly confronted by teachers. The written nature of the activity seems to encourage participants to reflect in a focused and organized way, while the group nature of the activity apparently encourages participation and professional collegiality through a natural allegiance that evolves from active group membership (Graham, 1995).

The convenient, asynchronous nature of e-mail reflection groups seems to provide at least a partial answer the dilemma facing teachers who find it difficult to discipline themselves to focused reflection. E-mail reflection groups appear to have the ability to reduce teachers' isolation and "reflective conservatism," resulting in truly reflective teachers who approach teaching and the teaching profession in a more thoughtful and collegial way.

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kEy tErms

Action Research: An informal, qualitative, formative, subjective, interpretive, reflective and experiential model of inquiry in which all individuals involved in the study are knowing and contributing participants (Hopkins, 1993).

E-Mail Reflection Group: An asynchronous, e-mail enabled discussion group formed for the purpose of collective reflection of common experiences.

Institutionalized Isolation: Personal and professional isolation resulting from close scheduling and all consuming duties on the job.

Mentoring: A collegial relationship of advice and support provided by an expert teacher to a novice teacher.

Professional Dialogues: Conversations between teachers about teaching related issues.

Professional Learning Community: A professional development model involving classroom teachers in study groups, professional dialogues, and other collegial activities.

Reflective Conservatism: The tendency of teachers to avoid being especially reflective or analytic about their work (Zeichner,1987).

Reflective Thinking: A purposeful, thorough consideration and critique of one's thoughts, beliefs, and assumptions.

Research: The systematic study of phenomena resulting in new knowledge, skills, or understandings.

Stagnant Momentum: The tendency of the status quo to remain the status quo.

Chapter XXIV
Integrating Student Peer Mentoring Online

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abstract

This chapter reports on a mixed study dealing with the impact of integrating student peer mentor facilitators into online discussions in an effort to improve the quality and effectiveness of collaborative learning. The study included developing and testing of an assessment scale for measuring students' perceived peer mentoring course satisfaction. During the five-week study, training interventions were implemented in the third week. The study tested whether college students' perceived peer mentoring course satisfaction scores increase as a result of the peer mentoring training intervention. The resulting increasing quantitative mean score trend combined with positive qualitative feedback provided evidence of an overall growth in students' perceived peer mentoring community satisfaction, worthy of further investigation. The assessment instrumented created has positive implications for online collaboration at all education levels.

introduction

This chapter examines the implementation of student peer mentors to facilitate online dialogue or conversations used for learning. Peer mentors are defined as students sharing the responsibility for generating and posting questions, responding to others, asking further questions to clarify understanding, guide, support, and provide summary comments to facilitate building the collective knowledge base. "In a collaborating stance, the mentor and protégé codevelop the information pool" (Lipton, Wellman, & Humbard, 2003, p. 24). With the information pool referring to the

collective knowledge generated through interactions directed towards learning.

Study results for students' perceived satisfaction with the use of peer mentoring are reported in an effort to improve the quality and effectiveness of collaborative online e-learning environments. According to Harasim "collaboration enhances connectivity and socioemotional engagement to the learning process, as well as creating an intellectual climate that encourages participation" (Harasim, 1990, p. 54). By allowing each student to serve in a leadership position, personal and collective responsibility for collaborative group learning can emerge.

The research was designed to explore whether implementation of student peer mentors serve to increase students' perceived satisfaction. The potential benefits of using student peer mentors include increasing student responsibility and engagement in learning by sharing the leadership role. Students benefit from diverse views shared by peer mentor facilitators, rather than with one instructor alone. By sharing the facilitation tasks, instructors can focus their efforts on designing effective instructional materials while concentrating on proven learning strategies and high quality learning activities. Students' alternated serving as peer mentors to generate and post thought provoking questions based on the weekly reading materials. In addition, student mentors facilitated online text based dialogue used for learning by providing timely feedback, additional probing questions, resources, confirmation, support, and summary statements as appropriate. Various peer mentors shared the workload and ensured quality was maintained. Student satisfaction was measured both prior to implementation and after implementation to measure any changes in student perceived peer-mentoring satisfaction.

Magennis and Farrell (2005) found a 90% retention rate when teaching new material to others and a 75% retention rate through practice by doing, as found in peer mentoring. Together they appear to provide an added retention benefit. Mentoring has the potential to provide each student with autonomy (Ryan & Deci, 2000) through alternating leadership roles. The use of peer mentors provides a strategy for engaging learners collaboratively within the online threaded discussion forum. Additionally, students can be very creative when posting intriguing and challenging questions for peers while tapping into the language of youth in many unique ways.

background

As pointed out by DuBois and Archer (2004), mentoring has a long history in human writings, originating in ancient Greece. As recorded in Homer's *Odyssey,* before Odysseus sailed away to war, he entrusted his son to the care of Mentor, an older wise man. It is believed that the existence of mentoring predates writing and Homer, reaching back to the time of early hunters and gatherers. Today, a tremendous resurgence of interest in mentoring is occurring in such diverse groups as commercial industries, government, "not-for-profit organizations, corporations, and legislative initiatives at state and national levels" (DuBois & Archer, 2004, p. 2). The growing interest includes scholars in many disciplines.

With so many types of mentoring being used by so many different interest groups, it is a little tricky to define. Mentoring is often associated with volunteer organizations where older individuals serve as mentors. However, mentoring in the workplace is growing as a way to facilitate workers learning from one another and assisting "in issues to do with professional development, and improved effectiveness" (Holbeche, 1996, p. 24). During 2000, "71% of the Fortune 500 companies used mentoring" (Sweeny, 2002, p. 1). Peer mentoring is not commonly used, as many educators have not considered its use in an educational setting. By broadening the scope of the mentoring definition, many possibilities can be created to foster positive collaborative social relationships directed toward

assisting students to meet desired learning goals and objectives. Students, in the same age group, serving as peer mentors can be a very powerful tool for both teaching and learning. By providing regular learning opportunities while monitoring progress towards mutually beneficial goals and objectives, combined with positive constructive feedback, mentors can lead peers to rewarding learning experiences. As a teacher observing peer mentoring in the classroom setting, it is easy to see the strength derived from the inherent social-relationship-based connections focused towards desired outcomes meeting the needs of both the mentor and mentee. When students alternate the leadership positions, the instructor is entrusting the student mentors by challenging them to make good instructional leadership choices and to perform at higher levels. This challenge can serve as students' intrinsic motivation by satisfying needs for autonomy through leadership choices (Ryan & Deci, 2000). The choices include generating curriculum-based questions to building leadership competencies. Good mentors help to explore new content and take initiative to set and reach personal and collective learning goals. Other anticipated benefits of students serving as mentors is the opportunity to accept responsibility for learning while improving their own decision making and problem solving skills. Mentors inherently develop their affective social group management skills to foster an equitable and socially successful collaborative e-learning community.

As evidenced by work done by Piaget (1969), Jonassen (1999), and Brookfield (1995), a collaborative learning community is composed of students working together to construct knowledge through social interactions. By having students share mentoring responsibilities they contribute to the collaborative community through their vested interest in the learning outcomes. Their collaborative efforts then serve to foster active engagement while working towards common learning goals. Developing a sense of a shared community can lead to positive learning outcomes and student perceived satisfaction according to Tu and Corry (2002), Picciano (2002), Gunawardena and Zittle (1997), Kazmer (2000), and Murphy, Drabier, and Epps (1998). Palloff and Pratt state "learning together in a learning community, students have the opportunity to extend and deepen their learning experiences, test out new ideas by sharing them with a supportive group, and receive critical and constructive feedback" (2005, p. 8).

Challenges exist when learning online due to the variety of preferred learning styles, abilities, and personalities, with all of those facets coming into play when working together collaboratively in the threaded discussion forum. By implementing student peer mentors the responsibility for learning becomes shared. When students are in a position to generate thought provoking questions and facilitate the dialogue, diverse perspectives emerge. Providing students with a mentoring environment allows for opportunities to participate equally in the text-based discourse to build a shared collaborative knowledge base.

Most students tend to seek out courses with content value, active participation, timely responses, and the possibility to develop a positive identity where they can make valuable contributions while building and sustaining positive social relationships. Additionally, most students seem to enjoy sharing knowledge, and want to be accepted by the group. The development of caring relationships by students has the potential to help foster a rewarding learning process both socially and academically through the collaborative construction of knowledge. However, students can view these activities as risk taking. As a result, getting students to be open and freely express their thoughts and questions can be a challenge for the instructor when trying to create positive collaborative interpersonal groups within the online learning environment. From the onset, one of the facilitator goals needs to be fostering a positive, safe, secure environment where knowledge building can take place. Building safety and trust is key to creating cohesive groups and requires

risk-taking by students during their social interactions (Palloff & Pratt, 2005).

To ensure the successful building of collaborative groups requires the instructor to set forth clear guidelines, expectations, and goals; such as, ideas and contributions from all students are valued and respected. Facilitators and students should help the group by providing needed inclusive social connections, supports, incentives, and timely positive feedback. By becoming active listeners and sharing resources, students will be able to work together collaboratively. "Group goals, commitment to those goals by group members, and individual accountability are the prerequisites of collaborative learning" (Brandon & Hollingshead, 1999, p. 112). With clear classroom guidelines, expectations, and goals in place, the instructor can expect, once engaged, students will tend to stay in the course and become part of the e-learning community. Social interactions will then serve as scaffolding to support and guide students in the collaborative process of knowledge acquisition.

Collaborative learning, a social process, thrives in an environment where learners can share resources, communicate with each other and their tutors, and provide mutual support (Ryan, Scott, Freeman, & Patel, 2000). Collaborative environments can provide students with positive outcomes for both affective social learning and for higher academic achievement. Well-structured environments can contribute to increased participation, innovative ideas, and the ability to solve complex problems. Students can learn to transfer and apply new knowledge better than in individualistic or competitive learning environments. Acquiring new content, skills, and attitudes through information sharing and subsequent knowledge building can be the catalyst for facilitating knowledge creation. The facilitator can plan questions for the group ahead of time, make valuable contributions, help to filter critical information, and bring closure to the group's academic progress. In this way, the academic potential can be tapped through the online dialogue developed by student mentors to enhance the "intellectual processes through collaboration among knowledge workers" (Harasim, 1990, p. 40).

Facilitators support learners' needs in regard to being on track with the content learned, by providing assessments and timely feedback on student progress. Wang, Newlin, and Tucker's (2001) study reports the frequency of communications provides clues to students' course performance. By monitoring participation, facilitators can intervene early to help students succeed. Assessments can be implemented to rate the quality of collaborative efforts with online dialogue, by providing extrinsic incentives or rewards through grade credit. Oftentimes, students' satisfaction increases when a significant portion of the course grade is based on their dialogue, resulting in increased interactions. With online courses generating extensive amounts of dialogue, class sizes must stay small, personal, and satisfying, while keeping them effectively managed and facilitated. The course content cannot be completely predetermined when using free-flowing student dialogue. Flexibility must exist to allow for inclusion of current issues, experiences, and ideas related to the content as they evolve through the process of the social discourse.

Peer mentors, serving as facilitators can use questioning strategies to request students to extend discussions, add responses, rephrase comments, explain in detail for clarity, and guide with questions leading to correct responses. Facilitators can also ask other students for help when they themselves have difficulty coming across clearly. Once students become engaged in the discussion, the facilitator can manage the social environment by stepping back to guide, as needed, from the position of referee, "coach, moderator, host/hostess, listener, observer, information provider, presenter, counselor, recorder, monitor, peacemaker, and summarizer" (Nilson, 1998, p. 90).

According to Fisher and Coleman (2002), "communities of practice" are not naturally occurring phenomena, but rather an accomplishment

to be developed. Enlisting appropriately trained peer mentors, serving as facilitators, can help share the responsibility for learning and make the prospect of success more feasible while enhancing the overall quality of the learning environment. Within this shared learning space, dialogue can flourish to reach common goals, objectives, purposes, and practices through relevant real world learning activities, thus inspiring all to learn.

Responsibilities of mentors include attending to both emotional and intellectual aspects of diverse student populations. According to Lipton et al. (2003), mentoring relationships need to support, challenge, and facilitate the learning vision. Mentor support includes actively listening, providing acknowledgement, creating a safe space, time investment, and offering needed resources to learners. Mentors can create challenges to promote learning and growth by participating in planning the goal-driven conversations, guiding a focus on student learning, providing samples, actively engaging learners in problem solutions, coaching, assisting in making connections between theory and practice, and reflective practices. The mentoring vision can be achieved by setting high, yet attainable outcomes, expanding learning beyond the lesson, identifying resources to meet the learning goal, modeling, and encouraging collaborative learning opportunities.

an ov Er vi Ew of t HE aff Ectiv E community study

The study was performed to determine the effects of implementing student peer mentoring guidelines and interventions in an online learning environment to create a positive affective community. In the study, students' perceived satisfaction was measured in regard to the implementation of student peer mentors, observed individually then combined in a one-way repeated measure ANOVA research design. The study was designed to examine whether online college students' perceived peer mentoring satisfaction scores increased across time prior to and after implementation.

The study consisted of three phases. The first phase dealt with an initial pilot study to testing the reliability of survey items created, since appropriate existing measurement instruments were not available for use. The survey assessment items were distributed to and responded to by a national audience through *T.H.E. Journal of Technological Horizons in Education* (2006) electronic e-mail newsletter.

Phase two of the study dealt with two statistical convenience sample groups of intact college level courses. The phase two pilots served to refine the measurement instruments for use in the actual study, to serve for comparison purposes between different groups of participants, and to increase the overall number sampled.

Phase three was the actual study, of one convenience sample group using an intact college level course. The research study controlled the course type and design. The study had no control over the number of students enrolled or number of participants agreeing to participate. The following Table 1 reflects the dimensions implemented for Peer Mentoring training.

The study had students read the course materials then discuss that material in an online discussion forum. Following the five weekly discussions, students responded to a Perceived Peer Mentoring Satisfaction (PPMS) survey. The PPMS survey was designed to measure students' course satisfaction when no mentors had been implemented and later after mentors were added, to record any changes in students' perceived course satisfaction. Conducted at a small Midwestern university thru its Department of Instructional Design Technology, the study used one instructor, one curriculum, and Lohr's (2003) textbook. Readability studies conducted on the chapters from Lohr's textbook established a consistent difficulty of the content.

The study used a convenience sample of students enrolled in one online course in Web page

Table 1. Dimensions of peer mentoring (Holland, 2008)

Dimension	Characteristics
1. Guides and Monitors	Helps direct learners' efforts to facilitate learning.
2. Encourage Cooperative Collaborative Learning	Assists students in working together to expand learning opportunities.
3. Fosters Trusting Environment	Respects contributions, includes all students, keeps confidences, problems resolved privately, builds on success.
4. Uses Good Communication Skills	Communicates ideas clearly and responds to any confusion or miscommunications.
5. Makes Valuable Contributions	Mentors make contributions to extend the knowledge base.
6. Encourages Reflection	Asks thoughtful questions requiring higher-level responses.
7. Promotes Quality Discussions With Challenging Questions	Works towards raising the cognitive level of the dialogue so responses require thoughtful consideration.
8. Provides Thoughtful Responses	Listens to students and responds in a way that extends the dialogue.
9. Motivates Efforts With Valuable Contributions	Provides valuable input, motivating students to become actively engaged.
10. All Ideas, Values, Beliefs Respected	Each person is accepted as a unique individual with valuable contributions.
11. Feedback on Group's Efficiency	Mentors provide feedback on the students' successes.
12. The Facilitator Calls Students By Name	Personalized comments and feedback are made using the person's name.
13. Timely Individual Feedback	All student questions and projects need to be addressed, whether by the mentor or other students. Comments on successful features need to be done in a timely manner.
14. Conflicts Are Managed and Moderated	Students may need to be reminded that differences of opinions are respected. The mentor will try to find some common areas of agreement. If needed, the discussion will be redirected away from emotional issues to the content under study.
15. Problems Resolved Privately	Praise in public. Serious conflicts will be dealt with privately.
16. Summary Closure of Main Points	At the conclusion of discussion over a specific content topic, the main points will be summarized to bring closure to the activity and reinforce what was learned.
17. Provides Help and Clarification When Needed	Mentors are responsible for making sure all student questions and confusion are addressed, either through peers or themselves.
18. Positive Role Model	The mentor is to serve as a positive role model to students. This serves as scaffolding to support student learning.
19. Keeps The Focus On Meeting Goals, Objectives, Tasks	Some social dialogue is needed to build a positive affective community. However, mentors are responsible for ensuring class time is productive and meets the needed learning goals and objectives.
20. Encourages All To Participate	Interesting topics, good questions to the class, and even individual questions can help to be sure all students have an equal chance to participate.

design, consisting of 17 students, 12 female, and 5 male. Out of that group, 11 students, consisting of 3 males and 8 females, participated. Students in the online class were geographically dispersed, ranging from undergraduate preservice teachers, professionals, maintaining accreditation, or working towards a Masters degree, individuals from industry, and individuals in continuing education. The students enrolled had diverse interests and backgrounds within Instructional Design Technology. Through the online learning environment, students responded at different times of the day, working from computers at the university, home, or work.

Data Collection Materials and Procedures. A quasi-experimental research design was used since the group participants were based on a convenience sample using an intact group. The interventions and survey questions were implemented weekly using a single experimental group with repetitive measures.

During the first week with instructor facilitation, baseline data was gathered with no interventions implemented. Peer mentoring survey questions were removed until peer mentors were implemented. Week three, peer mentors without training were added. Week four, peer mentor training was added. Since weekly interventions taught new skills, and each skill was not dependent on any other, each treatment effect was not affected by prior training. Data collection included course transcripts of online dialogue.

Measurement. Dependent variable survey data was collected to measure students' perceived satisfaction after exposure to the intervention variables, based on a 1–5 Likert type scale with (1) never; (2) rarely; (3) occasionally; (4) often; and (5) very often. The survey consisted of 11 question items with 1 poor item removed, for a total of 10 questions. One additional, short five-question dependent variable, open-ended questionnaire was used to gather qualitative input from participants. This was used to look for important information not revealed through quantitative measures.

Validity and Reliability. This experimental research design used a one-way repeated measures ANOVA with one experimental group. The validity of the study was tested using Cronbach's coefficient alphas for internal consistency with estimates of reliability set to .75 or higher level. The study lasted five weeks to seek consistent results across time. A weekly test-retest procedure was used both to improve the stability and reliability of the testing.

Pearson Product Moment Correlations were used to analyze the relationship between Pilot 2, Pilot 3, and the actual study, with scores ranging from negative relationships of -1 to positive relationships of +1. The analysis was conducted to examine significance between variables during each week data was collected. Correlation coefficients allowed measuring the strength of the relationship between two sets of scores. Scores of 0.7 or above were considered an acceptable correlation coefficient.

Data Analysis. As noted earlier, ANOVA was used to examine multiple dependent scores across the five-week study to determine whether significant differences occurred as a result of the intervention. A multivariate analysis was conducted using Roy's Greatest Root to reduce the responses over time to one dimension. The data analysis examined peer mentoring. Scores were compared between treatment groups' repeated measures within all areas to determine potential post-test gains. Additionally, qualitative open-ended discussion comments were summarized to clarify students' perceived satisfaction with peer mentoring.

Participant Demographics

Descriptive statistics included a national pilot testing of the survey instruments used, two classroom pilots, and the actual study together encompassing three intact consecutive online courses in higher education. In the main study, there were 11 responses (n=11), 3 (27%) male and

8 (73%) female. Study participants' ages ranged from 21 to 55 (M=31, SD=0.88), with all participants reporting their age. The national survey participants subject area of concentration included 66% in Instructional Design and Technology, 11% Education, 11% Core Area, 5% Psychology, 3% Library, 2% Counseling, and 2% Art. The subsequent pilot and classroom study participants subject area of concentration were 100% from Instructional Design and Technology.

Descriptive Statistics

The survey instrument consisted of 26 items on peer mentoring. Demographic data collected from the survey, included age, gender, level of education, and subject area of online course experience. One open-ended question served as a concurrent measure of course satisfaction.

For Pilots 2, 3 and the actual study, data was collected each week in an effort to observe whether any changes in survey response scoring or significant posting frequency resulted. During the actual study, one practice matching activity was implemented on peer mentoring and was followed by an assessment to evaluate the effectiveness of the peer-mentoring training. The assessment consisted of providing students with the desired dimension and characteristic then providing an example of how the features could be implemented, thus demonstrating understanding of the concepts. During the first two weeks of the course, the instructor facilitated the discussions. From the third through fifth weeks, small groups of students served as peer mentor facilitators. Data was collected each week to observe whether changes occurred as a result of the intervention during week four.

All students were required to post to the online threaded discussion forum over the course content reading material. For Pilot 2, the average number of postings was (M=6.08). Pilot 3's average number of postings was (M=5.68). For the actual study, the average number of postings was (M=4.72). The total for the pilots and the actual study combined posting frequency was (M=5.5). Student peer mentor facilitators tended to post near average or above.

Quantitative Analysis Results Pertinent to Hypothesis

The study was designed to test whether college students Perceived Peer Mentoring satisfaction scores will increase across time. The Perceived Peer Mentoring Survey was composed of 26 items (PPMS) developed for this study. This required a new scale and testing was necessary to determine whether underlying scales emerged from the analysis. All of the items on the Perceived Peer Mentoring Survey were scored as: *Never (1), Rarely (2), Occasionally (3), Often (4), and Very Often (5)*. The item to total correlations in the reliability analysis were inspected and since no negative correlations were found, it was not necessary to reverse score any of the items on the PPMS. Total reliability for the 26 items, was calculated to be Cronbach α=0.9611. While this is high, reliability is a factor of the number of items (N=26) and the method used to calculate reliability. The total Perceived Peer Mentoring reliability (α=0.9611) indicates a very high level of internal consistency and reliability. All 26 of the items on the Perceived Peer Mentoring Survey were used in this analysis.

The Descriptive Statistics for National Perceived Satisfaction Survey (N=51) with a mean of 10.347, standard deviation of 18.25, minimum score of 62, and maximum score of 129.

The Peer Mentoring scale consisting of 26 items had a high level of internal consistency and reliability. Items in this scale included: (a) promotes quality discussions, (b) makes valuable contributions, (c) fosters a trusting environment, (d) keeps the focus on the task, (e) motivates students' efforts, (f) encourages reflection, (g) guides and monitors, (h) provides thoughtful questions, (i) provides thoughtful responses, (j)

timely feedback, (k) feedback on the group's efficiency, (l) adds clarity when needed, (m) rewards and praises valuable contributions, (n) uses good communication skills, (o) encourages cooperative, collaborative learning, (p) encourages all members to participate, (q) provides assistance when needed, (r) accepts others ideas and opinions, (s) points of agreement are highlighted, (t) the facilitator calls students by name, (u) serve as a positive role model, (v) conflicts are managed, mediated, negotiated, (w) problems resolved privately, (x) works towards meeting goals, objectives, tasks, (y) all ideas, values, beliefs are respected and valued, and (z) provides a summary or closure. None of the items in this scale were reverse scored.

If a respondent answered *Never* to each of the items in this scale, the score would have been 26, while responding *Very Often* to each of the items in this scale would have resulted in a score of 130. Thus, scores ranged from 26 to 130 and a higher score indicated a higher level of agreement with the items in the scale.

Quantitative Results for Pilots 2 and 3

The data collected during Pilots 2 and 3, served as a way to continually improve the measurement tools and instructional methods implemented in the study design. Additionally, the data collected helped to serve for comparison purposes between the three different online courses to determine whether changes resulted from group differences.

One additional change resulted from Pilots 2 and 3, once it was realized exposure to interventions was not considered sufficient training or instruction. To teach peer mentoring, new materials were created and used in the actual study. These included instructional materials, matching activities, and assessments over the guidelines. When instructional materials are to be implemented in a classroom setting, it is recommended the practice activities be further refined. The matching item format was confusing for some students since several responses were similar. The more open-ended assessment format was a much more accurate reflection of student ability.

Since data was missing and improvements resulted from the pilots, it was decided to focus on the data analysis for the actual study. The pilot information was only used to examine potential group differences in an effort to be able to generalize the findings to other studies. Table 2 below illustrates the means and standard deviations used for Pilots 2 and 3, and the actual study data analysis comparisons.

Quantitative Results of the Actual Study

The test revealed mixed significant differences on each unit as a whole, indicating Peer Mentoring was statistically non-significant as a separate en-

Table 2. Means and standard deviations for pilots and the actual class study

Scales	Week 1 Mean	Week 1 SD	Week 2 Mean	Week 2 SD	Week 3 Mean	Week 3 SD	Week 4 Mean	Week 4 SD	Week 5 Mean	Week 5 SD
Pilot 2										
Peer Mentoring					114.50	13.68	119.67	12.15	118.25	14.71
Pilot 3										
Peer Mentoring					110.54	12.13	116.08	12.63	118.00	13.63
Class Study										
Peer Mentoring					124.50	14.61	127.73	8.58	131.09	5.84

tity. Over time, the mean scores revealed an overall increasing trend with multiple significant weekly contrasts. These results point to the potential benefits of conducting a follow-up study with a larger sample size to increase the study power.

During the actual study, weeks one and two began with teacher-facilitated discussions over the course reading material without the use of student intervention training or practice guidelines in an effort to collect baseline data. During week three, peer mentors were implemented without any training and practice activities. In week four, a new small group of student peer mentor facilitators led discussions after the class received training and practice activities in the use of the Peer Mentoring Guidelines.

The Perceived Peer Mentoring Satisfaction (PPMS), as a model entity was not significant (F (2, 18)=1.96, p=.1699). Out of 26 items scored from 1–5, with a range of 26-130, the PPMS mean scores for weeks 1-5, beginning after peer mentors were implemented during week 3, include: week 3 (M=124.50); week 4 (M=127.73); and week 5 (M=131.09). Over the three-week period when peer mentors were implemented, a rise in mean scores reflected an increasing trend after receiving training, practice, and assessment activities when using the peer mentoring guidelines.

Students' PPMS student survey responses were, on average, about the "Very Often" range of response during week three after implementing student peer mentors without training or practice activity guidelines. Student responses were on average about the "Very Often" range of response during week four after implementing training and practice activities using peer-mentoring guidelines. Student responses were on average about the "Very Often" range of response during week five. Table 10 illustrates the actual study multivariate test and multiple contrasts for peer mentoring. Figure 1 illustrates the weekly mean scores for peer mentoring.

One-Way ANOVA Analysis of Pilots 2, 3, and Study

The study examined differences for each of the measures across Pilots 2, 3 and the actual study. To this end, Table 4 demonstrates the results of the data analysis. ANOVA was used to test the hypothesis there would be no differences between the students in each class for each measure by week. The data collected for the study was gathered over a five-week time span with the treatment intervention. The ANOVA statistical analysis calculated the individual group means and the combined overall group mean. The within-group variation was determined by examining the total deviation of each score from the group mean. The between-group variation was calculated by the deviation of each group mean from the overall mean. Ultimately, an F statistic was produced representing the ratio of between-group variations to within-group variation. A higher statistically significant difference is likely if the between-group variation is significantly greater then the within-group variation.

Table 3. Actual class study multivariate test and multiple contrasts for peer mentoring

Contrast	Means	Contrast	Means	Contrast	Significant
Week 3	124.50	Week 4	127.73	F (1, 9)=.40, p=.5423	
Week 3	124.50	Week 5	131.09	F (1, 9)=3.06, p=.1143	
Week 4	127.73	Week 5	131.09	F (1, 9)=8.32, p=.0181	*Significant

**Weekly Contrast Significance p≤ 05*
***Non Significance Overall Roy's Greatest Root: (F (2, 18)=1.96, p=.1699)*

Table 4.

Scales	Week 1	Week 2	Week 3	Week 4	Week 5
Peer Mentor	Instructor Led No Mentors Yet	Instructor Led No Mentors Yet	F (2, 38)=3.16, p=.0579	F (2, 30)=3.24, p=.053	F (2, 28)=4.30, p=.023 *** Significance**

**Significance p≤.05*

All Weeks ANOVA Between Pilot 2, Pilot 3, and Actual Class Study

By examining all three groups across each week, on each scale, significant differences emerged, reflecting changes in the delivery of the class and changes in students. The means and standard deviations for Pilots 2, 3, and the actual study are in Tables 7, 8, and 9. Table 11 illustrates the areas of significant differences over the five-week time span of the study.

No statistical differences occurred between the pilots and the actual study during weeks one, two, three, and four. Beginning with the third week of the study, student peer mentors were implemented without training, practice, and assessment activities and no statistical differences were found between groups. Beginning the fourth week of the study, student peer mentors facilitated the online dialogue with the addition of training, practice, and assessment activities.

Beginning the fifth week of the study, student peer mentors facilitated the online dialogue after training, practice, and assessment activities, then the only area of statistical difference was found within the Peer Mentoring scale (F (2, 28)=4.30, p=.023). The Peer Mentoring scale included 26 items scored from 1-5, with a range of 26-130. The mean scores for the three groups included Pilot 2 (M=118.25), Pilot 3 (M=118.00), and the actual study group (M=131.09), with student responses falling in the "Very Often" range for the pilots and actual study.

Qualitative Results from Open-Ended Questions

Open-ended questions were posed, both to confirm students' responses on survey items and to allow for input not addressed in the study design. The students' responses were subdivided into positive and negative responses. Student comments were combined from Pilot 2, 3, and the actual study. The responses were taken from a weekly survey question item and open-ended online discussion thread. The summary of positive comments were 37, with only two negative comments.

The first open-ended survey question asked students, "Do you have any other suggestions for course improvements?" The second open-ended question came from a closing online discussion thread, requesting students to "Share your reflections on the course this semester." The responses from the questions provided qualitative data. This data became a valuable resource to compare against the quantitative results.

Positive comments came from the use of student Peer Mentors. Students found this to be a "great way to collaborate with colleagues," "build the knowledge base," "develop a community of peers," "share resources," "increase class enjoyment," and "worthwhile enough to want to implement the techniques into their own professional environments." When comparing the mean score trend results to the student comments, the mean scores aligned with student survey responses, ranging from "Often" to "Very Often" on the Perceived Peer Mentoring Satisfaction scale. Peer Mentoring, overall, demonstrated a

steady progressive score increase over the five weeks of the study.

The negative qualitative responses revealed the difficulty students had in trying to formulate their own questions to post to the discussion forum when serving as peer mentor facilitators. This is not to say the prospect is bad, since quality learning may not always be an easy task. Sometimes these challenges can fuel student motivation and higher level thought processes. However, it did bring to the researcher's attention the need to develop quality instruction on questioning strategies, with practice and assessment activities, so students have the needed guidance to be successful.

discussion of study findings

This study found non-significant differences in the areas of Peer Mentoring as a separate entity in the class examined. However, the increasing mean score and positive qualitative feedback indicate trends warranting further investigations with larger groups and additional subject areas.

Review of the Framework

It was the intent of this research to discover ways of improving the quality of instruction and facilitation used in collaborative online learning environments. The major theoretical constructs underpinning this study dealt with the examination of peer mentoring. Peer Mentors reflected no statistical significance at the .05 levels as an independent entity. The study did demonstrate weekly increasing mean score trends worthy of further analysis with a larger sample size. By comparing the trends against the literature base, potential benefits were illuminated. Placing online students in the role of peer mentor facilitators, "generating their own research questions, setting up and improving their intuitive theories and searching scientific information as well as sharing their cognitive achievements" is a relatively new position for many online learners (Jarvela & Hakkinen, 2002, p. 1). Since online "cognition is so sensitive to social and cultural context … we must find good and elaborated mechanisms by which people actively shape each other's knowledge and reasoning processes" (Jarvela & Hakkinen, 2002, p. 5). Rather than offering the instructor's perspective alone, mentoring can provide multiple contexts to shape the formation of students' knowledge building. When bringing together a culturally diverse group, with many different backgrounds, personalities, intentions, and interpretations, it becomes important to "establish what is mutually known," or common ground (Jarvela & Hakkinen, 2002, p. 5). By collaboratively sharing the facilitation process, mentoring can further extend the "pedagogical solutions" by "increasing the mutuality" through joint readings, discussions, understanding, and shared leadership (Jarvela & Hakkinen, 2002, p. 5). When students share the role of leader or facilitator, they have the opportunity to learn how to ask effective questions, become self-directed in research, gain skills in synthesizing and presenting new information, and how to manage collaborative group efforts. Ultimately, all of this can help students become self-directed learners.

Interpretations of Results

Non-significant outcomes were found in the area of peer mentoring as a separate entity. Overall, the study demonstrated increasing mean score trends with multiple significant weekly contrasts. These follow-up comparisons, however, were only significant at the .05 level, and many would not have been significant at more conservative levels often chosen in follow-up analyses. The findings indicate the potential benefits of conducting follow-up studies with larger sample sizes to increase the study power. This study extended the knowledge base by demonstrating overall increasing mean score trends with overwhelming positive open-ended comments from students. These two

issues make it worthy of further investigations with a larger sample size.

The use of student Peer Mentors can be implemented to facilitate online learning. Students serving in a shared leadership position as mentors have the opportunity to work collaboratively with peers in reaching desired learning goals and objectives. Students serving as mentors can practice valuable leadership skills while learning to become self-directed learners. The mentoring research from past studies focused primarily on adults mentoring youth, rather than students mentoring other students in the learning environment. Overall, very little work has been done on student peer mentoring in the online learning environment.

Peer mentoring was not implemented until the third week of the study, so the number of potential contrasts was reduced. What is important is the rise in mean score trends occurring during the three-week period mentors were implemented. Positive qualitative student comments were very much in favor of the use of peer mentors, even to the point of wanting to adopt it in their own professional settings. All contrasts between instructor facilitated versus student-peer-mentor facilitated resulted in higher student score ratings in favor of student peer mentors.

Negative indications are the lack of overall statistically significant scores in regard to Peer Mentoring. Perhaps, with a more extended time frame for studying this aspect or some additional clarity on the semantics, this area can be further improved. Or, it may indicate a need to further refine the materials in this area. When comparing the results to the qualitative open-ended student comments, only a few negative comments were made in regard to the difficulty of creating questions to post for their peers. This comment seems to have more to do with a need for developing improved instructional methods for teaching questioning strategies than a specific issue dealing with mentoring.

The Peer Mentor Survey contributed to the literature base by providing a new measurement instrument to be used in the online learning environment. The survey had a very high level of internal consistency and reliability with a total Perceived Peer Mentoring score of (α=0.9611).

The data analysis demonstrated numerous positive weekly contrasts within the Peer Mentoring. The positive outcomes indicate the potential for the constructs to contribute to fostering a positive online learning environment.

Implication of the Major Findings

As previously noted, the statistical analysis demonstrated no significance on peer mentoring as an isolated construct. However, this finding is in conflict with the current literature base, increasing mean score trends, students' positive qualitative survey responses, and significant multivariate weekly contrasts at the .05 level. With the overall increasing mean score trend, it would be worthwhile to conduct a follow-up study with a larger sample size to increase the statistical power of the findings.

The open-ended qualitative feedback responses by students clearly reinforced the literature base and potential positive outcomes with students' strong overall perceived course satisfaction. These results indicated the importance for instructors to provide training within these areas by using guidelines, practice, and assessment activities. Over a period of time, students were able to realize benefits and enhance their perceived satisfaction within the online learning environment.

Instructional designers will need to consider the implications of current research when designing instruction for students. Designing online courses requires an alignment of the pedagogy with current best practices to improve overall course satisfaction and to foster quality-learning opportunities.

sugg Estions for futur E r Es Earc H

Many significant multivariate contrasts were found within the weekly scales during the study indicating a need for additional research. Duplicating this study and altering variables, such as the number of participants, expanding the geographic dispersion, or using different subject areas and content materials would further validate these findings to a wide variety of learning environments. Through additional research efforts further refinements of the guidelines, practice, and assessment activities are possible.

Although beyond the scope of the current research study, it would be worthwhile to develop and test new instructional materials for teaching questioning strategies and guidelines using practice and assessment activities. The results could be analyzed to see if the interventions are effective at improving the quality of teaching and learning when students serve as peer mentor facilitators in the online learning environment.

Online learning environments yield a wonderful collection of unique individuals. Each student brings his or her own personality, culture, experiences, needs, goals, and learning styles. As evidenced by the weekly multivariate contrasts and increasingly positive student comments, peer mentoring has the potential for a successful impact on learners.

One important component emerging from this research study is the possibility for developing a true collaborative learning community, where students are able to share the responsibility for learning. Instructors, alone, no longer need to be in the driver's seat for leading, questioning, and facilitating the learning process. Current Web-based learning systems are not designed to allow the use of student peer mentors to facilitate online discussions. Based on the findings of this study, it has become apparent this is a great area for future development and growth.

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k Ey t Erms

Affective Community: The affective community is composed of learners engaged in building a socially successful and supportive online learning community where ideas, knowledge, and experiences can be shared and respected.

Collaborate: Students collaborate or work together with classmates in a team effort to expand the mutual generation of intellectual ideas, knowledge, and experiences in the online learning environment.

Dialogue: The dialogue, conversation, or text-based communications in the online learning environment are used for exchanging ideas, knowledge, and experiences.

E-Learning Environment: The e-learning environment refers to the collaborative interactions used for knowledge acquisition within the online computer mediated digital system.

Facilitator: The facilitator is the person responsible for leading or coordinating the work of the group, such as leading an online group discussion by generating and posting questions, responding to others, asking further questions to clarify understanding, guide, support, and provide summary comments to facilitate the group interactions.

Intervention: The intervention refers to the actions taken to effect change in knowledge and behavior through the implementation of guidelines, training, and practice activities.

Peer Mentoring: Peer mentoring is defined as students sharing the responsibility for facilitating the online interactions by generating and posting questions, responding to others, asking further questions to clarify understanding, guide, support, and provide summary comments to facilitate building the collective knowledge base.

Chapter XXV
Outcomes of Computer Mentoring

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abstract

This study examined the effect of computer-based videoconferencing and text-based chat on mentoring relationships, and compared the findings to those of face-to-face and telephone interactions. The results of this study indicate that protégés in all communications conditions found the mentoring to be satisfying and helpful in reducing stress. The amount of variability assigned to communication mode was negligible, especially when compared to the amount of variability attributable mentors, suggesting that efforts to implement online mentoring should focus on training mentors, rather than on concerns over communication mode effects. The authors hope that these findings will help organizations in implementing online mentoring, as well as encouraging researchers to expand on the findings of this study.

introduction

The study described in this chapter was designed to examine the effect of computer-based videoconferencing (VTC) and electronic text-based chat (TBC) on mentoring relationships, and is unique in that the experimental design allowed for: (a) direct manipulation of communication mode, (b) establishment of clear temporal precedence, and (c) control over variables that could have served as potential confounds, such as the length of the relationship, the frequency of interaction, and the hierarchical level of the participants.

Collaboration implies two or more people working together in order to accomplish a project or goal. One form of collaboration is mentoring—a relationship in which mentors and protégés work together to develop the skills and knowledge of

the protégé. Mentoring is typically considered a face-to-face activity. For a number of reasons, such as increased knowledge specialization and the globalization of the economy, the degree to which such interactions will occur without participants meeting face-to-face is likely to increase.

Current examples include: (a) Bpeace, a volunteer organization that helps women entrepreneurs in war-torn regions such as Rwanda develop businesses, in part through distance mentoring in business practices, finance, and marketing (Bidforpeace, 2007); and (b) Covance, one of the world's largest drug development services companies, which uses distance mentoring to promote development for global managers (Darmstadter, 2006).

background : communica tion mod E

Different communication modes vary along the dimensions of sequentiality, audibility, visibility, copresence, simultaneity, and cotemporality (Clark & Brennan, 1991). These dimensions and their influence on communications are discussed in the following sections.

Cotemporality, Simultaneity, and Sequentiality

Cotemporality refers to whether a message is received at the time it is sent (i.e., synchronous communication). *Simultaneity* means that the communicators can send messages at the same time, and *sequentiality* means that participants' messages stay in sequence. These three media characteristics regulate the flow and continuity of conversation. Without these attributes, the logical sequence of discussions becomes disjointed, and as a result, the psychological distance between communicators increases, discussion comprehension is reduced, and group members are less satisfied (Hambley, O'Neil, & Kline, 2007; Hughes, Wickersham, Ryan-Jones, & Smith, 2002).

Visibility and Audibility

Both visibility and audibility generate effects on communication through nonverbal cues such as eye contact, hand gestures, facial expression, tone of voice, laughter, and stress patterns. These cues aid in message assessment, production, and comprehension (Driskell & Radtke, 2003; Hidalgo & Massaro, 2007), and provide information, regulate interaction, and express intimacy (Derks, Bos, & Grumbkow, 2007). As a result, one of the primary functions of nonverbal cues is to reduce psychological distance (Hambley et al., 2007; Short, Williams, & Christie, 1976).

Co-presence

Copresence refers to participants located in the same physical setting; however, the effect of copresence is to make the dyadic partner more salient, more "real," an effect that Short et al. (1976) called "Social Presence." Social presence is a critical component of satisfaction with communication; for example, students' perceptions of social presence in online courses are related to their perceived learning and satisfaction with their instructor (Richardson & Swan, 2001).

background : mEnt oring outcom Es

A number of different outcomes are related to mentoring; for the purposes of this study, the outcomes of interest were stress, satisfaction with the relationship, and learning. With regards to stress, Allen, McManus, and Russell (1999) investigated stress and peer mentoring in an academic setting, and found that the amount of perceived mentoring protégés received was related to protégés' beliefs that their mentors had helped them deal with stress. Sosik and Godshalk (2000) found that protégés who perceived receiving greater amounts of mentoring reported less job-

related stress. Previous research has also linked the amount of mentoring to protégé satisfaction with the relationship (Godshalk & Sosik, 2000; Young & Perrewe, 2000),

Only a few studies have looked at mentoring and learning. Feldman, Folks, and Turnley (1999) found that students on international internships who received lower levels of support from their mentors had poorer socialization to internship assignments and lower levels of learning. Evertson and Smithey (2000) found that student teachers mentored by experienced teachers were more effective in organizing and managing instruction.

t HE curr Ent study

The study described in this chapter was designed to extend previous research by examining the effect of VTC and TBC on mentoring relationships. In order to do so, mentoring relationships in four communication modes (face-to-face, telephone, VTC, and TBC) were compared.

The outcomes of interest were protégé satisfaction with the relationship, school-related stress, and organizational learning. The existing research on the effects of sequentiality, audibility, visibility, copresence, simultaneity, and cotemporality on communication led to a series of hypotheses regarding the effect of communication mode on mentoring outcomes.

- Hypothesis 1: Communication mode will have a significant impact on levels of stress reported by protégés.
- Hypothesis 2: Communication mode will have a significant impact on protégé satisfaction with the relationship.
- Hypothesis 3: Communication mode will have a significant impact on protégé learning.

Subjects

The protégés in this study were 72 freshman students from a Southeastern university. Of the 72 protégés, approximately 43% were male (*n*=31) and 57% were female (*n*=41). Their ages ranged from 18 to 20, with a mean of 18.32. The mean grade point average (GPA) was 3.29, with scores ranging from 1.4 to 4.0.

Mentors were juniors or seniors with at least a 3.0 cumulative grade point average. Four of the mentors were juniors (22%) and 14 were seniors (78%). Of the 18 mentors, approximately 33% were male (*n*=6) and 67% were female (*n*=12). Their ages ranged from 19 to 28, with a mean of 21.56. The mean GPA was 3.55, with scores ranging from 3.2 to 3.98.

Method

Protégés were randomly assigned to both mentors and communication condition; while each mentor had four protégés, one in each communication condition. Each dyad communicated for fifteen minutes once a week for three weeks, using the same medium for all their sessions. The order in which mentors were exposed to the various conditions was counterbalanced to control for carry-over effects.

The laboratory set up allowed mentors and protégés in the non face-to-face conditions to arrive for their sessions without meeting. In addition, participants were asked not to contact each other outside of the laboratory, and to exchange first names only during their interactions. All of the interactions were recorded.

measures

Because there was reason to believe that typing ability might be a covariate, all participants were given a typing test prior to starting the experiment. As with typing ability, it seemed likely that

computer attitudes might have an effect on how favorably participants viewed the computer-mediated conditions. Therefore, all participants were asked to answer a questionnaire developed by Levine and Donitsa-Schmidt (1997) regarding their computer attitudes prior to the start of the experiment.

The learning measure was developed for this study and included useful information that incoming students were unlikely to know, such as "Where can I go if I need help deciding what to major in?" and "Where can I go if I need help with school work?" The learning measure was administered prior to beginning the experiment and at the end of the experiment.

A measure of school-related stress adapted from Allen et al. (1999) was administered to protégés at the beginning and end of the experiment.

At the end of the experiment, both mentors and protégés were asked if they would like to continue the relationship with their dyadic partner, and were both also given a measure evaluating their satisfaction with the relationship. A five-item scale developed by Finkelstein, Allen, and Rhoton (2003) was used.

r Esul ts

The sample size, mean, and standard deviation for each dependent variable are shown in Table 1.

Between-subjects ANOVAs, one for each dependent variable, were computed to test the hypotheses, as this allowed for simultaneous comparisons across the groups without raising family-wise error.

Learning

Differences in means on the learning variable by condition were not significant, $F(3,63)=2.25$, $p=.09$. Neither typing ability nor computer attitudes were significant covariates.

Protégé Satisfaction with the Relationship

Differences in the mean satisfaction score for the four communication conditions were not significant, $F(3,68)=.64$, $p=.59$. Typing skill and computer attitudes were not significant covariates.

Table 1. Sample size, mean, and standard deviation for dependent variables

Condition	N	Learning		Satisfaction		Stress		Mentor Efficacy	
		M	SD	M	SD	M	SD	M	SD
FTF	18	5.11	1.13	4.13	.80	2.72	1.15	3.15	1.22
VTC	18	5.39	1.09	3.7	1.08	2.89	1.17	3.24	1.34
Phone	18	4.78	1.40	3.86	1.00	2.92	.97	2.89	1.15
TBC	18	4.39	1.24	3.87	.91	2.86	1.25	3.22	1.14
Overall	72	4.92	1.25	3.89	.95	2.85	1.12	3.07	1.21

stress

Differences across means in reported stress at Time 2 were not significant, F(3,68)=.84, p=.49. Both Time 1 stress and computer attitudes were significant covariates, however adding them in as covariates in the ANOVA did not result in significant differences between conditions, F (3,63)=.98, p=.41.

Mentor Efficacy

Differences across means in mentor efficacy by condition were not significant, F (3,63)=.13, p=.96. The mean score over all condition was 2.85 out of a possible six points, with higher scores representing higher levels of efficacy.

discussion

Although from an applied perspective it is encouraging to note that the mentoring interactions were robust enough to have a positive effect regardless of the medium, this result was disappointing from the perspective of hypothesis-testing.

The search for additional evidence that would allow rejection of the null explored a number of alternatives. Both previous research and logic predict positive relationships among the mentor/protégé desire to continue the relationship, and satisfaction with the relationship. In order to determine if the mentoring relationships were being perceived in a manner consistent with that of previous research, these analyses were computed. As shown in Tables 2 and 3, all the correlations were in the expected direction.

Further analyses were performed to investigate if the lack of main effects on the dependent variables was due to: (1) the result of the sample's high levels of computer literacy, or (2) lack of power. The sample was highly computer literate, with a mean computer attitude score of 4.26 on a six-point scale. The sample was split into two groups; those with mean scores equal to or less than three, and those with scores above three. Because the sample of those who scored less than of three was very small, Levene's test for equality of variances

Table 2. Mentor and protégé desire to continue the relationship

Source	Mentor			
	FTF	VTC	Phone	TBC
Protégé	.48*	.52*	.46	.30

*Note. n=18. * p <.05*

Table 3. Mentor and protégé satisfaction

Source	Mentor			
	FTF	VTC	Phone	TBC
Protégé	.19	.35	.61**	.38

*Note. n=18. ** p <.01*

Table 4. Dependent variables by computer attitudes

Variable	Positive Attitude			Negative Attitude			Significance	
	N	Mean	SD	N	Mean	SD	t	p
Learning	67	4.81	1.29	5	5.00	5.71	-.15	.44
Satisfaction	67	3.92	.93	5	3.44	1.19	1.10	.14
Stress	67	3.06	1.21	5	3.27	1.30	1.38	.09
Efficacy	67	2.88	1.11	5	2.40	1.34	.93	.18

Note. Positive Computer Attitudes=Mean score > 3
Negative Computer Attitudes=Mean score ≤ 3
p is one-tailed

was performed to check that the variances were not significantly different from each other. The results of the equal variance independent sample t-tests are shown in Table 4. There were no significant differences between the two groups for any of the dependent variables, suggesting that the lack of difference across conditions was not due to computer literacy.

The final possibility was that there was simply a lack of power to find an effect. For satisfaction as the dependent variable, the amount of variability attributable to condition was .03 (partial eta-squared value), and the observed power (i.e., the power of the test when the alternative hypothesis is set to the observed value was .18 at α =.05). For mentor efficacy as the dependent variable, the amount of variability attributable to condition was .01 (partial eta-squared value), and the observed power was .07 at α =.05. In comparison, using protégé evaluations of the mentor's behavior, the amount of variability attributable to mentors was .39 for career-related support.

Several explanations present themselves for these unexpected findings; including the nature of the task, the nature of the relationships, and the sample. The "task" for these dyads was to communicate about concerns and questions. Some things that the dyads in this study did *not* have to do were: solve a problem imposed by the researcher, reach consensus, or negotiate an outcome. Yet, these are precisely the types of tasks commonly found in research on the effects of communication mode. Without the pressures imposed by a more structured task in the form of time limits, specific outcomes, or evaluative criteria, the limitations of the media may not have been as salient.

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Several promising areas for further research are suggested by this study, including the benefits offered by computer mediation, and the adaptations made to compensate for lack of social presence. IJsselsteijn, van Baren, and van Lanen (2003), suggested that more research should focus on what computer-mediated communication offers, rather than on what it lacks. Examples include such capabilities as saving the history of interactions, or reviewing and revising a message before transmitting it.

Loewenstein, Morris, Chakravarti, Thompson, and Kopelman (2005) compared the effects of synchronous and asynchronous communications on negotiations, and found that asynchronous

communications provided advantages for one side in a negotiation. However, synchronous communication provided an advantage to the other side, because counterparts could not generate rebuttals in time and ended up making concessions. In a similar vein, Hung, Huang, Yen, and Chang (2007) had distributed dyads working together via either instant messenger or e-mail. The instant messenger teams generated more ideas and were more successful than the electronic mail teams.

Another promising area for future research is to focus on the adaptations communicators make in an attempt to compensate for the lack of social presence. For example, students participating in online course discussions reduced the psychological distance amongst themselves by employing paralanguage, (emoticons, punctuation, capitalization, exaggerated spellings), self-disclosure, humor, and approval (Richardson & Swan, 2001). In an experiment by Derks et al. (2007), students participated in either task-oriented or socioemotional electronic chat. Results showed that participants used more emoticons in socioemotional than in task-oriented social contexts, suggesting that emoticons serve as a replacement for nonverbal displays found in face-to-face communication.

conclusion

In this study, a series of hypotheses tested the effect of communication mode on protégé satisfaction, stress and learning. The results of this study indicate that the benefits of mentoring interactions are robust enough to overcome the limitations of communication mode; protégés in all communications conditions found the developmental interactions to be satisfying and helpful in reducing stress.

Because this study was experimental in design, there was control over the amount of interaction, the frequency of interaction, and prior acquaintanceship. However, in gaining this control, a certain amount of realism was lost; the interactions were very short, and the participants appeared not to be driven by a specific knowledge needs, resulting in interactions that were primarily psychosocial rather than informational in nature.

Finally, the sample consisted of highly computer-savvy young people, many of whom have been using computers since early childhood; this familiarity with the technology may have made the sample's reactions nongeneralizable.

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k Ey words

Co-presence: A communication dimension that refers to participants in a communication being located in the same physical setting. One effect of copresence is to make the dyadic partner more salient, more "real," while the absence of copresence leads to: (a) reduced other-awareness,

(b) more uninhibited behavior, (c) less responsiveness to one another's ideas, and (d) less public self-awareness.

Cotemporality: A message is received at the time it is sent. Telephone communications have cotemporality, as the listener receives the message as the sender is transmitting it. E-mail, on the other hand does not have cotemporality; messages may be read several days after they are sent.

Sequentiality: Messages in a communication stay in sequence. Electronic text-based chat lacks this dimension, as the message receiver may be posting a reply while the sender is transmitting a new message. Sequentiality regulates the flow and continuity of conversation. Without these attributes, the logical sequence of discussions becomes disjointed, and as a result, the psychological distance between communicators increases

Simultaneity: Participants in a communication can send messages at the same time. Thus, in a face-to-face or telephone conversation, speaker's messages may overlap. In e-mail, on the other hand, one person must wait until the message is received until responding. Without simultaneity, the logical sequence of discussions becomes disjointed, and as a result, the psychological distance between communicators increases.

Social Presence: The degree of salience of the other person in an interaction, and is a function of copresence. Decreased social presence leads to: (a) reduced other-awareness, (b) more uninhibited behavior, (c) less responsiveness to one another's ideas, and (d) less public self-awareness.

Synchronous Communication: Communication that takes place at the same time. Examples of synchronous communication methods are: face-to-face communication, text-based chat rooms, and videoconferencing.

Chapter XXVI
Rubric to Determine a Quality Online Discussion Posting

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abstract

When teachers integrate online discussions into courses, they are faced with the challenge of deciding how to evaluate the postings. This chapter discusses a study that used a discussion board rubric to evaluate online discussions. The study tested the reliability of the instrument (rubric) to assess the quality of the content of Web-based discourse. To obtain the rubric interrater reliability, researchers used the rubric to evaluate the discussion postings of preservice teachers' enrolled in six different sections of an English language arts methods course. Six hundred sixty two (662) postings from 165 preservice teachers were analyzed using the rubric. The study utilized the scorings from six judges. When measured with Cronbach's alpha intraclass coefficient, the findings indicated substantial agreement between judges in two of the four rubric criteria: evocative (.8742) and reference-resource (.8209). The other rubric criteria rumination (.7256) and storytelling (.5984) scored at the moderate and fair levels respectfully.

introduction

When universities began to provide access to various e-learning tools such as Blackboard, WebCT, and E-College, these electronic collaboration tools were used in online courses as well as in traditional face to face courses. Specifically, teachers could use the asynchronous discussion board, which is available in several different forms, to extend or enhance the traditional classroom discussion. In a typical face-to-face discussion, the teacher moderates while the entire class discusses a topic or problem. There are many variations of this whole group face-to-face discussion. For example, a pair of students or a small group might share first and then each group shares with the whole group. This type of discussion occurs in real time and the students may or may not have extra class time to prepare their response. In the asynchronous discussion board, the teacher may or may not moderate the discussion and the students usually have a specified number of days to post their response to a prompt and respond to their classmates' posts. Whatever form it takes, the discussion board offers students the opportunity to work collaboratively to solve problems or discuss various topics. The students' participation in the discussion board is usually part of the students' grade in the course.

Teachers are not limited to pure textual messages when posting prompts to the discussion board. They can post pictures, graphics, sounds, video, and many combinations of multimedia. In our version of the discussion board called, Online Video Case Studies (OVCS), we posted 3–5 minute video clips of "real classroom footage" accompanied by one or more open-ended discussion prompts for the student to discuss. This discussion provides the students an opportunity for critical reflection which is an essential component of student growth and development. Discussion boards should create a collaborative environment where the students actively engage in group discussions, read the comments of their peers, and converse with other students and the instructor.

As the researchers began to integrate more discussion board assignments into their classes, they wanted to find out if learning was occurring when students composed these discussion posts. Thus, the purpose of this study was to test the reliability of an instrument (rubric) to assess the quality of the content of Web-based discourse to attempt to discern if learning was facilitated by OVCS, and to asses the quality of the online discussions. Even if the reader chooses not to use the OVCS model, the rubric can be used to evaluate any online posting.

background

Case studies have been found to be a powerful pedagogical tool for teacher education (Moore & Kearsley, 1996; Risko & Kinzer, 1997). Discussions about cases fostered thoughtful engagement (Dawson, Mason, & Molebash, 2000; Silverman & Welty, 1996). Specifically, video case studies provided a realistic, yet controlled, context that considerably enhanced textbook readings by bringing descriptions of actual classroom settings to life (Shulman, 1992). Further, Computer-mediated discussions increased time for reflection in formulating thoughtful dialog (Daiute, 2000).

In a pilot study of OVCS, we (Larson, Boyd-Batstone, & Cox, 2004–2005) reported on the nature of online discourse according to who was the discourse audience and what were the discourse functions utilized by a group of 98 preservice teachers in a university language arts methods course. The rubrics used (Flynn & Polin, 2003) provided useful categories for content analysis. But the researchers found that content analysis was limited in determining the function of the dialog. A persistent question was raised about the nature of a quality dialog online. In other words, how can one determine whether learning was taking place and knowledge was being constructed?

Based on the work of John Dewey (1943), Bruce and Levin (1997) applied a taxonomy developed by Dewey to evaluate the utilization of information technologies. The taxonomy included inquiry, communication, construction, and expression. Although the taxonomy was useful for understanding ways information technology was utilized, the categories were considered too broad to evaluate online postings. Wade and Fauske (2004) borrowed four genres of dialogue (conversation, inquiry, debate, and instruction) from Burbules (1993) to evaluate discourse strategies of computer mediated discussions. But, again, content analysis alone did not evaluate the quality of the content of postings online. How could the present categories be used to evaluate learning and the construction of knowledge? Before we continue with this discussion, we need to provide the reader with some background information on the e-learning tool Blackboard.

blackboard information

Various e-learning tools such as Blackboard, WebCT, and E-College, exist to accommodate electronic collaboration. All these tools have the same basic functions available. Since the discussion board posts for this study were posted in Blackboard, it would be useful to describe the features of the discussion board. Blackboard e-learning environment provides tools that support asynchronous communication for conducting class discussions. Multiple users can view and post messages in the environment and the asynchronous nature of the medium means that messages do not need to occur in real time. Students can sign-on, read the messages, and post in a time and place that is convenient for them. Discussion board messages can be sorted in numerous ways: author, date, and subject. Unlike traditional e-mail or list-serve messages, discussion board messages are threaded which means users can access the messages in a multitude of ways. By default, the messages are sorted by subject and the user can choose to join the conversation anywhere along the "thread." Each time a message is posted, it is linked and users can see the visual course of the conversation. As users choose to participate in different aspects of the threads, the discussion may branch out in multiple sub conversations. When you read the posts, you need to take into consideration that the users may not have necessarily read the previous material when they participate in the conversation.

issues, controversies, problems, and findings

In an effort to find out if learning was occurring in the online discussions, we read and reread the discussion threads. As the researchers studied the data from the OVCS discussion postings (Larson et al., 2004–2005), they began to notice that postings that utilized multiple discourse functions tended to be more robust and engaging. A robust posting would combine several categories on the Flynn and Polin (2003) discourse function criterion: rumination, storytelling, argumentation, social interaction, procedural/logistical, acknowledgement, reference/resource, inquiry, and other. In developing the rubric to assess the online discussion, we selected the discourse functions (criteria) that directly related to the content of the online discussion and to the criteria that were utilized in the most engaging or thought provoking postings: rumination, storytelling, and reference or resource. For example, postings rated high in *rumination* showed an effort to gain understanding of a topic and showed evidence of the formation of or development of one's own ideas. Postings rated high in *storytelling* contained statements that contextualized the information or knowledge by using personal examples or stories. Postings rated high in *reference or resource* contained statements which went beyond asynchronous

class discussion by evoking the works of experts in the field, embedding or pointing to artifacts such as Web sites, diagrams, or other media. This chapter used the pilot study's analysis of discourse functions to develop a rubric that would assess the quality of the online postings and to test its interrater reliability.

As the research continued, we noticed an aspect of robust or higher quality postings that could not be adequately evaluated by the three previously selected discourse categories of rumination, storytelling, and reference or resource. What we saw was that there were certain postings that drew greater interest from the group. This occurred initially when a particular posting would have a much greater number of responses than the others. There was a quality in these kinds of postings that was evocative, that called for a response. They were not necessarily lengthy postings, but the ideas were either well-reasoned or synthesized thinking in a metaphor that the group could relate to. Another observation was that sometimes these posts involved a collaborative sharing of ideas. For example, the students might be providing solutions to problems, sharing insights, or discussing critical issues. In an attempt to analyze the content of these posts, the study added *evocative* as a rubric criteria item.

r Es Earc H mEt Hodology

Our version of Online Video Case Studies (OVCS) used assigned readings from a textbook used in 90 universities, *Teaching Language Arts: A Student and Response Centered Approach* (Cox, 2007); Web-based video clips of best practices matched to the text; and online discussion boards with discussion prompts provided. Two instruments were used to gather data for the study: (1) the Blackboard discussion prompt and the responses created in the discussion board, and (2) the *Online Postings Discourse Functions Rubric* (Table 1). Table 1 is the online postings rubric that we used to evaluate the students' online postings. Four criteria (rumination, storytelling, evocative, and reference-resource) were listed in the first column and columns two through five contained the possible ratings. Scores ranged from a four, which is the highest rating, to a one, which is the lowest rating.

Table 1. Online postings discourse functions rubric (Larson et al., 2004–2005)

Criteria	4	3	2	1
Rumination	Posed a new idea or developed an opinion in depth	Opinion stated clearly	Opinion not clearly stated	Little or no evidence of rumination
Storytelling	Provided vivid personal examples or story to give context to the topic	Provided personal examples or story related to the topic	No use of personal examples or story	Unrelated personal examples or story—Off-topic
Evocative	Justified reasoning or use of metaphorical thinking that encouraged responses	Interesting idea or metaphor posed with some justification	Argument without justified reason	Uninterest- ing ideas pose no responses
Reference, Resource	Appropriate-ly cited relevant ideas beyond the assigned readings	Appropriate referenced class lectures, notes, material, or readings	No citation or references	Inaccurate citation or misapplied reference

Data consisted of six individual class discussion board postings related to the first students' sharing prompt. The following prompt was posted to the discussion board of all six class sections:

"Think about students sharing in the classroom (in the video clips). In the Discussion Board, share your ideas and link them to the ideas about teaching language arts in Chapter 1. Also, imagine you are a classroom teacher. What language arts activities might you suggest to each of the students after listening to them share?"

Four other threads were part of the OVCS discussion board but this one was selected because it showed an example of how an effective teacher directs a sharing time for children.

In the researchers' first attempt to evaluate the postings, we conducted a pilot study (Larson et al., 2004–2005). In the pilot study, two researchers began by individually reading and rereading the entire data set, while periodically meeting to discuss their impressions. This assured that in the coding process that the content was not taken out of context. The qualitative data gathered from the sharing prompt was analyzed and coded in NVivo, a qualitative research software, using the constant comparison method (Lincoln & Guba, 1985). This method allowed for the emergence of relationships and patterns or themes as the data was collected and it enabled for the data collected to be constantly compared with existing data throughout the data analyses process. The coding categories were derived from the perceived audience for the posting (Discourse Audience Function) and the function of the posting (Discourse Function). The Discourse Audience contained five categories:

1. Group
2. Self
3. Specific group member
4. Instructor
5. Other

The Discourse Function indicated the function of the discourse. It contained nine categories:

1. Rumination
2. Storytelling
3. Argumentation
4. Social Interaction
5. Procedural/Logistical
6. Acknowledgement
7. Reference/Resource
8. Inquiry
9. Other

Using the codes generated from the rubrics, we each coded one subsection (one class section) of the data separately to determine interrater reliability. The result was 95% agreement. Researchers then coded the data together, resolving all disagreements through discussion. The remainder of the data was then coded by one researcher and with the other double checking the coding. Resulting data gathered from the Discourse Audience and Discourse Function was analyzed using descriptive statistics. What we learned from the analysis is that all the posts could be coded into one of the categories provided by both the Discourse Audience and the Discourse Function. This was essential as we discussed that criteria we needed to include as we developed the rubric. For a more detailed description of the results please see our article (Larson et al., 2004–2005). When we finished the pilot study, we realized what we were really trying to find out was if learning was occurring and if knowledge was being created when students participated in online discussions. In an attempt to begin to address this issue, we decided that the creation of a rubric to score online postings might provide the answer. The criteria for the rubric were derived from the pilot study and these were paired down to the Online Postings Discourse Functions Rubric (Table 1). Since the Discourse Audience Function did not help us in determining if learning was occurring, we did not use this in the formation of the rubric.

data sources

The sources of data were the university preservice teacher education students and their text based online shared reflections posted electronically in the discussion board of Blackboard an e-learning environment. More specifically, the subjects were 165 university preservice students from six sections of the language arts methods course in the Spring 2004, who participated in the Chapter One OVCS as part of the course assignments. The data collected was 662 text messages from discussion threads that lasted for 21 days.

study findings and conclusion

Random selection of OVCS responses was made by utilizing the first number of each entry in the random selection number from Fisher and Yates (1974). Random numbers were assigned to the postings, and 20 of the postings were sampled for testing interrater reliability. Initial statistical analysis utilized Pearson-r and Spearman-rho to establish a reliability threshold between two judges. Table 2, *Rubric Scoring Results for 2 Judges* shows the results. Rumination and storytelling were significant at the 0.01 level and reference-resource was significant at the 0.05 level.

After we finished analyzing the data using two judges, the researchers increased the data set to include six judges. The 20 rubric scores from the six judges were analyzed using SPSS statistical software. To establish a reliability threshold for the rubric, a Cronbach's alpha coefficient was conducted (Crocker & Algina, 1986). Four different Cronbach's alpha analyses were run individually on each of the rubric criteria (Table 4). There is much controversy about setting reliability benchmarks and the researchers acknowledge the subjectivity; however, Table 3, proposed by Shrout (1998), was used to discuss the confidence level.

To test the interrater reliability of the rubric, a Cronbach's alpha coefficient was computed. In the four analyses, the Cronbach's alpha showed the reliability of the instrument to be substantially significant (Shrout, 1998) in two criteria of the rubric (Table 3). The Evocation criterion was highest while the Storytelling was lowest. At the substantial level were the highest coefficient value evocative (.8642) and the second highest value reference-resources (.8309).

In order to determine a possible cause of the lower coefficient values, the researchers conducted an analysis of the data by removing the

Table 2. Rubric scoring results for two judges

Statistical Analysis & Number of Judges	Pearson-r 2 Judges	Spearman-rho 2 Judges	Significance Pearson-r & Spearman-rho 2 judges
Rubric Criteria			
Rumination	.626	.601	0.01 level
Storytelling	.706	.611	0.01 level
Reference-Resource	.477	.483	0.05 level
Evocation	*****	*****	*****

Table 3. Reliability coefficient benchmarks

Coefficient Value	Benchmark Interpretation
0.00 to 0.10	Virtually none
0.01 to 0.40	Slight
0.41 to 0.60	Fair
0.61 to 0.80	Moderate
0.81 to 1.00	Substantial

(Shrout, 1998)

judge with the lowest coefficient value for each of the criteria (Table 4). The only significant change that occurred was that the rating for storytelling moved up to the moderate category. The value for rumination remained the same while the scores for reference-resource and evocation increased slightly. This could indicate that if one judge did not have a clear understanding on how to rate a posting, it could have a significant effect on the coefficient value.

Based upon the interrater data and subsequent discussions among the judges, there appeared to be a difference of opinion about the meaning of the discourse functions used as rubric criteria. This occurred particularly with the discourse functions of rumination and storytelling. There was disagreement, for example, among the judges in determining if a posting demonstrated a new idea or in-depth thinking. In order to determine whether a student was posing a new idea or greater depth of thinking, the judge needed to have a grasp of the student's prior knowledge. Without knowing the student, it created a kind of "best guess" scenario on the part of the judge. As with any authentic measures, reliability and validity are increased with a greater knowledge of the population being evaluated.

With the storytelling function in the rubric, there was a difference of opinion about whether the student was allowed to only recount their own experience or whether they could tell another related story. In other words, the question of "whose story" became an issue that created a difference in scoring. Couldn't a student posting retell someone else's story to make a point and satisfy the discourse function? This problem was due to the wording in the rubric that exclusively called for "personal examples." Possibly a clearer wording would be to call for "specific narrative details" rather than "personal examples."

Table 4. Rubric scoring results comparing values for six judges and five judges

Rubric Criteria	Cronbach's Alpha Coefficient 6 Judges	Cronbach's Alpha Coefficient Value 6 Judges	Cronbach's Alpha Coefficient 5 Judges	Cronbach's Alpha Coefficient Value 5 Judges
Rumination	.7256	Moderate	.7256	Moderate
Storytelling	.5984	Fair	.6809	Moderate
Reference-Resource	.8209	Substantial	.8309	Substantial
Evocation	.8642	Substantial	.8821	Substantial

futur E tr Ends and applica tions

Solutions and Recommendations: Applying a Rubric to Classroom Practice

Evaluating the quality of online discussion board postings is not only challenging in terms of interrater reliability, but it also poses logistical problems for an instructor. A single class of 30 students can easily create several hundred postings in response to a prompt and in response to each other. It is quite easy for an instructor to be overwhelmed by the large number of online discussion board postings. It is not realistic to apply a rubric score to every posting in a threaded discussion. The following are some practical suggestions on how to foster quality discussion online and to utilize a discourse functions rubric without evaluating each and every post.

1. Begin with a prompt that calls for an open-ended, substantive response. Consider calling on students to state and justify an opinion or to tell their own stories.
2. Establish rules for discussion such as the following:
   A. Write a substantive response to the prompt then respond to at least three other student postings.
   B. When writing a substantive response be sure to ruminate about the topic in-depth or ruminate about a new, related idea; tell about your experiences related to the topic in story form; and reference your ideas from sources within or from outside the class readings.
3. Make the rubric explicit to students ahead of time. Discuss the criteria with them to clarify what you are looking for in their postings.
4. Participate in the online discussion as instructor and codiscussant. The presence of the instructor in the discussion tends to elevate the attention of the students.
5. Apply the rubric selectively, rather than to every posting. For example, evaluate the students' initial postings in response a prompt and read the other postings to ensure on-topic discussion. Another way to apply the rubric selectively is to ask the students to copy one of their responses and submit it for evaluation. Yet another way would be to select one posting from each student across prompts. For example, if four prompts initiated threaded discussions, the instructor would divide the class into four groups and then pull postings from one fourth of the students in the first prompt, the second forth in the following prompt and so forth.
6. Assign small group leaders to monitor and evaluate their group's discussion according to the rubric criteria. With multiple prompts, rotate small group leaders to give everyone a chance to take on a leader's role. Group leaders could then submit an evaluation report to the instructor (see sample group leader's evaluation report in Table 5). Another arrangement would be with each rotation to evaluate the group leader's performance. For example, a class of 20 students could be divided into five groups with four students in each group. Let us call them groups A, B, C, D, and E. Each group would have a leader and three discussants. The same prompt would be given to each leader who would foster discussion and call for rumination, storytelling, and references. Once a discussion had run its course, each leader would fill out an evaluation of the discussion based upon the rubric (Table 1). This way, the instructor is grading a manageable five assignments. The group would rotate leaders

Table 5. Online discussion leader's evaluation form

Discussion Leader's Name:_____Date: _____

Group: A B C D E **Prompt:** 1 2 3 4
Names of discussants in your group:

_____
_____
_____
_____

Directions: Use the rubric in Table 1 to score each of your group's postings according to stated criteria. Calculate your group's average score for each criterion. Select the best example for each criterion, and copy/paste that example in the textbox provided. Include the name of the discussant whose exemplary posting you selected.

1. **Rumination**: Group Average Score _____ Copy and paste in the textbox below your group's best example of a posting using rumination.

2. **Storytelling**: Group Average Score _____ Copy and paste in the textbox below your group's best example of a posting using storytelling.

3. **Evocative**: Group Average Score _____ Copy and paste in the textbox below your group's best example of a posting an evocative posting.

4. **Reference, resource**: Group Average Score _____ Copy and paste in the textbox below your group's best example of reference, resources.

Calculate the overall average score: _____

four times, each time with a new prompt, so that every participant would be in the leader's role.

Recommendations for Future r esearch

The authors have two recommendations for further research: how to further increase the effectiveness of scoring online discussions, and how to increase the quality of students' postings. This chapter was the first step in understanding the complexity of assessing online discussions. The authors realized that the judges needed a clearer understanding of the rubric and how to consistently score the postings. When the judges discussed the range of the scores, it was apparent the judges needed a clearer understanding of how to score some of the posts. To increase the judges' understanding, it might be helpful to provide several rubric scored postings accompanied by a detailed explanation the scoring.

Once the reliability and dependability of the rubric is established, the researchers want to examine how the rubric could be used as a formative assessment tool to provide feedback to both the student and teacher. One of the authors of this chapter teaches part-time at the master's level in a completely online program in educational technology. Throughout the program, the students participate in weekly online discussions. These discussions are scored using the same rubric throughout the course of the program and the students receive a weekly score on their posts. In the future, the authors are interested in examining the effect of instructor feedback on the quality of online postings. It would also be useful to examine the effect that instructor's participation has on the quality of the online discussions. By examining and analyzing instructor posts, it might be possible to determine what "kind of postings" might increase students' critical thinking skills. Another area that might affect the quality of the postings is the discussion board prompt itself. Overall, if the prompt is more open-ended and written in such a way that it encourages higher order thinking skills, student responses may show greater depth. Also, prompts should be worded in a way that encourages collaborative problem solving and knowledge construction.

conclusion

The chapter looked at OVCS model where the students first view video clips of actual classroom footage and then they react to the clip by posting their response to the discussion board. Our aim was to provide the reader with an assessment tool for readily evaluating the quality of online discussion postings. We also provided some practical advice on ways help manage the scoring of large numbers of student generated posts.

The burning question is whether students are demonstrating their learning via online discussion. We consider this chapter the first step in beginning to answer this question. In our quest to determine if learning is occurring, we think supplying a reliable instrument to evaluate learning is essential to answering this question. In addition, if the rubric is reliable and dependable, it can supply both formative and summative evaluation which can be useful when reporting student progress through an individual course or through an entire degree program. For example, if program coordinators were trying to determine the strengths and weaknesses in their students that were measured by criteria that were rated in the rubric, coordinators could do an analysis of all the students' scores on those particular criteria. This criteria analysis would help to determine program strengths and weaknesses. Program coordinators could then make adjustments in the program curriculum to address the overall strengths and weaknesses of the entire student population enrolled in the program. The aggregate data could also be used when reporting to accreditation agencies.

In addition, a well-crafted rubric can have two functions for the student participant. The primary function is to reliably evaluate, in this case, discussion board postings. The secondary function, though indirect, is just as vital. It is to communicate clearly with the participants what is required in order to write a quality online posting. Simply being able to state to a class of students that their online discussion should entail rumination, storytelling, be evocative, and reference or resource material from the course and beyond is helpful and raises the level of online interaction.

By creating an OVCS for the preservice elementary language arts methods course, this model could be replicated and also applied to other courses in credential programs, and to create through the preliminary study of student reflection and interactivity, an innovative, technology based method which will enable students to visualize, analyze, reflect, and interact on best

practices in language and literacy education. Although this study is limited to one large urban university, this study could be expanded to include the other 90 colleges and universities in 34 states, who utilize the language arts methods textbook for preservice teachers in their classes. Even if the reader does not utilize the OVCS model, the rubric could easily be used by any instructor that integrates online discussions in his/her classes.

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k Ey t Erms

Critical Reflection: Critical reflection refers to a person's ability to reflect critically on his/her experiences, integrate the knowledge acquired from these experiences with the previous knowl-

edge, and then be able make an informed decision based on insights he/she gained from the new and previous experiences.

Discussant: The discussant is one of the several people participating in an online discussion group. Groups may or may not have an appointed group leader.

Discussion Board: The discussion board allows students to post threads (comments or responses) to forums usually created by the instructor. The posted threads (comments, responses) can be viewed and responded to by the instructor and other students enrolled in the course.

Interrater Reliability: Interrater reliability is the degree of agreement among judges when they are rating rubric criteria. The score shows how much the ratings of the judges agree. Scores can range from a 0.00 to a 1.00. A score of 1.00 indicates 100% agreement of the judges. A score of 0.00 indicates 0 % agreement of the judges. A 0.00 score could mean that either the rating scale is defective or the raters need to be re-trained in the meaning of the rubric criteria.

Online Video Case Studies (OVCS): An OVCS refers to a Web-based case study model that is composed of video clips of teachers (written about in an accompanying textbook) actually teaching, teacher interviews, responses of preservice teachers to video-clips posted online, and online interaction between students and with the instructor.

Posting: A posting is a message or response that is uploaded or "posted" hence the word posting, to an electronic discussion board.

Prompt: A prompt is a statement or group of statements about a specific topic, constructed to stimulate reflective thought. In the case of OVCS, the online discussions usually begin with a teacher posted prompt.

Rubric: A rubric is a scoring instrument that lists the criteria for a piece of work or artifact. In the case of OVCS, the rubric for a quality posting will list the content the student must include to receive a certain score or rating. Rubrics help the student understand how discussion board postings are evaluated. Generally, rubrics specify the level of performance expected for several levels of quality.

Rumination: Rumination is a long thoughtful consideration of an idea or thought.

Storytelling: Storytelling is a narrative or story that uses personal examples or narrative details.

Chapter XXVII
Instrumental and Social In.uences on Adoption of Collaborative Technologies in Global Virtual Teams

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ABSTRACT

Recent advances in Web-based technologies along with investments in international outsourcing and offshore locations have unquestionably increased the importance of global virtual teams. However, because global virtual teams have their members dispersed in different countries and rely extensively on electronic communication to exchange information, complete tasks, and coordinate activities, their implementation is accompanied by challenges beyond those found in traditional teams whose members often meet face-to-face in the same cultural context. One such challenge has to do with cross-cultural collaboration. Although there is a sense that collaborative technologies offer the essential tools for supporting collaboration, it is unknown whether virtual members will actually adopt collaborative technologies in a cross-cultural setting. To gain knowledge about this potential endemic aspect of cross-cultural teamwork, one needs to examine the factors that in.uence the adoption of collaborative technologies in global virtual teams. Drawing on the work of organizations, cognitive theory, and information systems researchers, this study offers a framework that describes the key components underlying collaborative technology adoption in global virtual teams by integrating both social and instrumental aspects of group work.

INTRODUCTION

Recent advances in **Web-based technologies** along with investments in international outsourcing and offshore locations have unquestionably increased the importance of global virtual teams. This . atter and more team-based form of organizational work allows managers of globally dispersed teams to assemble individuals of differing expertise who are not physically and locally available. However, because global virtual teams have members dispersed in different countries and rely extensively on **electronic communication** to exchange information, complete tasks, and coordinate activities, their implementation is accompanied by challenges beyond those found in **traditional teams** whose members often meet face-to-face and in the same cultural context (Kankanhalli, Tan, & Wei, 2007; Maznevski & Chudoba, 2000). One such challenge has to do with cross-cultural collaboration. When working in global virtual teams, cultural values, beliefs, and behaviors of team members may be so different and disparate that they can hurt cooperation and ultimately result in lowered levels of collaborative technology adoption. Thus, although there is a sense that collaborative technologies offer the essential tools for supporting globally distributed teamwork, it is unknown whether virtual members will actually adopt such technologies (Munkvold, 2005; Quresha et al., 2006; Rutkowski, Vogel, van Genuchten, Bemelmans, & Favier, 2002; Saunders, Van Slyke, & Vogel, 2004). This study addresses some of these issues.

Drawing on the work of organizations, cognitive theory, and information systems researchers, this study offers an integrated framework that describes the key components underlying the adoption of collaborative technologies in global virtual teams by integrating both the social and instrumental aspects of teamwork. The framework advances research by examining the following question: ***What are the factors that in. uence collaborative technology adoption in global virtual teams?*** The next section discusses the background of this research. Then, the following section presents the focus of the paper followed by a discussion of the framework and its propositions. The final section discusses the main contributions of this study.

RESEARCH BACKGROUND

Organizational theorists (e.g., March & Simon, 1957; Rogers, 1995) and MIS scholars (e.g., Daft & Lengel, 1984; Fulk, Schmitz, & Steinfield, 1990; Karahanna, 1999; Zmud, Lind, & Young, 1990) have long been concerned with the understanding of IT adoption. Two major schools of thought have offered alternative views on this topic: a) the **instrumental school** and b) the **social constructionist school**. Typically, models rooted in the instrumental school suggest that technology directly and positively influences organizational productivity as long as people objectively (or rationally) evaluate and select the technology best aligned to their skills and the requirements of the task. While this view has yielded extensive literature on IT adoption, the social constructionist school argues that such technological determinism fails to recognize that "behavior occurs in a very social world which is far from neutral in its effects" (Fulk et al., 1990, p. 117). In other words, IT adoption is not always as simple and rational as it could be because it is a complex, subjective, and evolving process that is subject to social influences. The **social constructionist view** suggests that people's subjective interpretations of their work, the organization, and technology help determine IT adoption. While each of these two schools offers important analytical tools with which to examine technology adoption in organizations, recent theorizations suggest that, in the real world, both instrumental and social aspects of teamwork coexist, making them difficult to distinguish (Fulk, 1993). In other words, social behaviors and subjective interpretations, as

much as objective perceptions of technology, help determine IT adoption in organizations.

The model developed in this study integrates both instrumental and social views in an effort to examine the adoption of collaborative technologies in global virtual teams. Specifically, the model includes users' perceptions of self-efficacy, which is an indicator of the instrumental view and cultural differences, which is in turn an indicator of the social view. ***Global virtual team*** refers to a group of people who work on interdependent tasks guided by a common purpose across space, time and organizational boundaries with extensive support of **collaborative technologies** to communicate and interact over the Web. Examples of collaborative technologies include Web-based systems such as instant messaging, group calendars, video-conferencing, email, and knowledge-management repository systems. In the following section, I will present a research model that explains the impact of such views on global virtual teams.

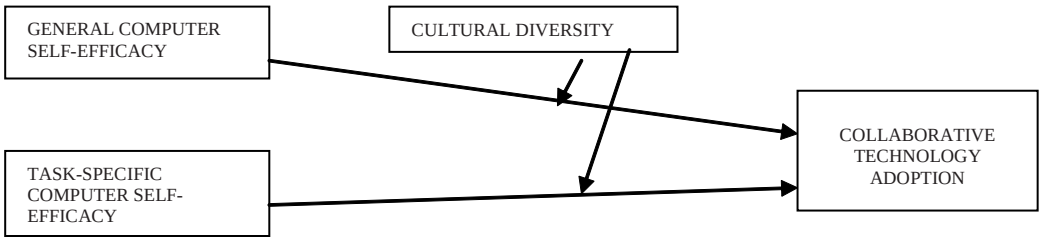
MAIN FOCUS OF THE PAPER

The Instrumental View of Collaborative Technology Adoption

Self-efficacy refers to an individual's belief in his or her own capability to perform a specific behavior (Bandura, 1986) and is a critical predictor of future intentions (Bandura & Cervone, 2000; Fernandez-Ballesteros, Diez-Nicolas, Caprara, Barbaranelli, & Bandura, 2002; Marakas, Yi, & Johnson, 1998). Recent work in the MIS area defines computer self-efficacy along two dimensions: 1) General computer self-efficacy, which is "an individual's judgment of efficacy across multiple computer application domains," and 2) Task-specific computer self-efficacy, which refers to "an individual's perception of efficacy in performing specific computer-related tasks" (Marakas et al., 1998, p. 128). The first dimension captures an individual's experiences developed over time within a diverse domain of computer-related tasks, whereas the latter is an assessment of an individual's perception of his or her skills in performing a task using specific computer-related applications.

There is strong empirical support for the influence of general computer self-efficacy on decisions involving computers and IT adoption (e.g., Agarwal, Sambamurthy, & Stair, 2000; Compeau, Higgins, & Huff, 1999; Hsu & Chiu, 2004; Igbaria & Iivari, 1995, Marakas et al., 1998). For example, when observing almost 400 IT users over a one-year interval, Compeau et al. (1999) found strong support for the significant influence of self-efficacy on individuals' reactions to information technology. In another study, Marakas et al. (1998) indicated that users who have had negative general computer-related experiences are likely to hesitate to use new computer applications. Conversely, individuals who perceive themselves as capable of managing IT across multiple computer domains are more inclined to adopt new technologies. Furthermore, Agarwal et

Figure 1. Collaborative technology adoption in global virtual teams



al. (2000) found a significant positive relationship between software-specific self-efficacy and software usage. Finally, recently, Hsu and Chiu (2004) have empirically shown that general Internet self-efficacy—an indicator of general computer self-efficacy—plays an important role in shaping an individual's positive attitude towards adoption of e-services. Taken together, these studies suggest that general computer self-efficacy is positively associated with IT adoption. Hence:

Proposition 1: *General computer self-efficacy is positively related to the adoption of collaborative technologies.*

Prior studies have indicated the positive impact of task-specific self-efficacy on technology adoption (Eastin & LaRose, 2000; Hsu & Chiu, 2004; Thompson, Meriac, & Cope, 2002). Thompson et al. (2002) found that task-specific self-efficacy positively influences online search performance. Similarly, when examining the adoption of **e-commerce activities**, Eastin and LaRose (2000) found that Internet self-efficacy helps predict online shopping. Finally, Hsu and Chiu (2004) found that Web-specific self-efficacy—an indicator of task-specific self-efficacy—directly and positively influences individuals' attitudes and intentions towards the adoption of Internet-based services. Thus, the more people believe they are capable of performing a task-specific technology, the greater the likelihood of technology adoption. Hence:

Proposition 2: *Task-specific computer self-efficacy is positively related to the adoption of collaborative technologies.*

The above propositions capture the instrumental view of collaborative technology adoption. This view suggests that people's judgments about IT adoption primarily are guided by cognitive evaluations of how capable they are of effectively using a specific technology to accomplish a given task. However, as discussed earlier, decisions toward technology adoption also are influenced by social aspects of group work (Barling & Beattie, 1983; Lent, Brown, & Larkin, 1987; Stumpf, Brief, & Hartman, 1987; Taylor, Locke, Lee, & Gist, 1984). The following section discusses the mediating role of culture—an indicator of the social view—in collaborative technology adoption.

The Social View of Collaborative Technology Adoption

Culture has been studied in various areas including marketing (Aaker & Maheswaran, 1997; Clark, 1990; Tse, Lee, Vertinsky, & Wehrung, 1988), international business (Bhagat, Kedia, Harveston, & Triandis 2002), and management (Hosfstede, 1991). According to Hofstede (1980), culture is the collective programming of the mind that builds on shared norms and values. Thus, it is a mechanism of collective sense-making that binds individuals in groups and distinguishes one group of people from another. While several classification schemes have been proposed to study culture (e.g., Adler, 1993; Hall, 1976), most of the cross-cultural research has adopted Hofstede's (1980, 1991) taxonomy. It categorizes national cultures along five dimensions. 1) Individualism/collectivism refers to the value of an individual's rights, characteristics, and identity. It describes whether the common values and beliefs of a society emphasize the need of an individual or the need of a group. 2) Uncertainty avoidance refers to the degree of tolerance of the ambiguous, unknown, and unfamiliar. 3) Power distance refers to the degree of tolerance for social hierarchy and class structure. 4) Masculinity refers to the degree of competition and assertiveness in a society, and 5) Confucian dynamism emphasizes long-term plans over short-term goals and strategies. Recent studies have applied such a framework to examine IT adoption in cross-cultural contexts (e.g., Hewett, Money, and Sharma 2006).

The link between self-efficacy and culture has been supported in a number of empirical

studies in organizational areas (e.g., Earley, 1993; Hampton & Marshall, 2000; Schaubroeck, 2000), including recent work in the MIS field (e.g., Hardin, Fuller, & Davison, 2007). For example, Earley (1993) found that individuals from individualist cultures reported a positive relationship between self-efficacy and individual performance conditions, while individuals from collectivist cultures reported a positive relationship between collective efficacy and in-group conditions. In another study, Schaubroeck (2000) reported that individuals from different cultural backgrounds exhibited varying behaviors when working in teams. Extending these notions to the study of globally dispersed teams, Hardin et al. (2007) found that individualist cultures reported higher values of team efficacy in comparison to collectivist cultures. Taken together, these studies suggest that higher levels of cultural diversity are likely to influence the link between self-efficacy and IT adoption. Hence:

Proposition 3: *Cultural diversity will moderate the relationship between self-efficacy and adoption of collaborative technologies.*

The three aforementioned propositions suggest that self-efficacy (defined in terms of general computer self-efficacy and task-specific computer self-efficacy) positively influence collaborative technology adoption. That is, individuals make decisions on whether or not to adopt a technology based on the extent they perceive themselves capable of using that technology to work on the task (i.e., the instrumental view). When examining these relationships in cross-cultural settings, however, cultural background (i.e., the social view) influences the strength of the link between self-efficacy and IT adoption. The next section discusses both the theoretical and practical contributions of this study.

FUTURE TRENDS

Investments in IT infrastructures and international outsourcing initiatives have unquestionably increased the availability of IT technologies worldwide; however, much of the literature on the use of collaborative technologies deals with teamwork in a single country. This study develops a theoretical framework distilled from the work of organizations, cognitive theories, and information systems to explain the forces underlying collaborative technology adoption in teams with globally dispersed members who rely extensively on technology-mediated tools to communicate, interact, and transact business. This is a critical issue because a number of nations are increasingly becoming main destinations for offshore IT investment. As the number of offshore locations increases, managers need to know how to maximize the benefits of global virtual teams by appropriately assessing workers' skills and the cultural aspects of offshore destinations.

In an attempt to explain the challenges and issues of global e-collaboration, we have suggested an integrative model that includes both instrumental and social processes likely to influence collaborative technology adoption in global virtual teams. This approach is of utmost importance to management scholars and practitioners alike. From a theoretical view, prior research has primarily relied on models that emphasize individuals' cognitive decision-making processes and organizational structural factors at the expense of social aspects (such as culture) that may be equally relevant in the process of technology adoption in a cross-cultural setting. For example, Dasgupta, Granger, and McGarry (2002) have suggested that an individual's decision to adopt a technology is dependent on their perceived ease of use and the perceived usefulness of that technology. Thus, although their model incorporates individual cognition, it does not account for the social mechanisms through which cognitive limitations

lead to technology adoption and acceptance. In another study, Bajwa, Lewis, Pervan, and Lai (2005) examined the impact of organizational sides, centralization of decision-making, degree of integration, and infrastructure connectivity on collaborative technology adoption behavior. In other words, they have focused on organizational structural factors and IT structural attributes rather than the social factors inherent in team working relationships. Collectively, these studies have not included the social fabric of teamwork, which reflects the actions and interactions that take place between people situated in culturally diverse settings. In a Web-based environment, where individuals from different nationalities are brought together to work on a common project, cultural differences are critical in that individual cognitions and behaviors—through which decisions about adoption necessarily occur—are shaped by social influences—that is, by the attitudes and behaviors of others with whom they work. This study incorporates these social aspects.

For managers who need to assemble international teams whose members are located in different countries, I have illustrated that different personal values, beliefs, and behaviors among virtual team members may eventually affect their willingness to cooperate with one another, thereby influencing collaborative technology adoption. Therefore, managers of global virtual teams may benefit from a deeper investigation of the cultural factors that moderate the influence of self-efficacy highlighted in this research. The explosive growth of the World Wide Web has undoubtedly enabled a number of technologies (i.e., Web-based systems, computer mediated communication tools, video-conferencing systems, etc.) to change the way people work, communicate, and coordinate their activities across companies and countries. To the best of our knowledge, this research is the first attempt to offer a set of propositions that capture the effects of self-efficacy along with culture on collaborative technology adoption in global virtual teams.

CONCLUSION

My aim in this article has been to provide a theoretical model that explains collaborative technology adoption in global virtual teams. The model advances research by explicitly incorporating both the instrumental and social aspects of group work. In terms of the model described above, if only self-efficacy and the instrumental view primarily govern the IT adoption process, parties are likely to guide their behavior based on how well the collaborative technology matches their skills and the requirements of the task. However, because they operate in a globally dispersed context where team members are likely to exhibit different personal values, beliefs, and attitudes, cultural diversity can fundamentally change the impact of self-efficacy on collaborative technology adoption. I hope this study will help academics and practitioners interested in examining the critical aspects of global e-collaboration.

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KEY TERMS

Asynchronous Collaborative Technologies: Allow geographically dispersed teams to work on a common task but at different points in time. These technologies are particularly useful tools for teams located in different time zones and include Web-based collaborative tools such as email systems (e.g., gmail, hotmail, and yahoo), document management technologies, knowledge-management repository systems, intranets, listservs, group calendars, and newsgroups.

Collaborative Technologies: Technologies that support collaborative efforts among multiple geographically dispersed teams when carrying out their tasks and social needs over the Web. They can be synchronous or asynchronous.

Culture: The collective programming of the mind that builds on shared norms and values (adapted from Hofstede, 1980).

General Computer Self-Efficacy: "An individual's judgment of efficacy across multiple computer" (adapted from Marakas, et al., 1998).

Global E-Collaboration: The process of information sharing, communication, and coordination between geographically dispersed teams in two or more countries working together toward a common goal using collaborative technologies over the Web.

Global Virtual Team: A group of people who work on interdependent tasks guided by a common purpose across space, time and organizational boundaries with technology-supported communication substantially more than face-to-face meetings (adapted from Maznevski & Chudoba, 2000). Typically, these teams are located in two or more countries.

Synchronous Collaborative Technologies: Allow teams to communicate and exchange information in a real time fashion. Examples of synchronous collaborative technologies include Web-based tolls such as chats, instant messaging, electronic meeting systems or group decision support systems (GDSS) that support same time meetings, voice over IP, and videoconferencing systems.

Task-Specific Computer Self-Efficacy: Refers to "an individual's perception of efficacy in performing specific computer-related tasks" (adapted from Marakas, et al., 1998).

Chapter XXVIII
Collaborative Synergy and Leadership in E-Business

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ABSTRACT

Logically, it makes sense that organizations can be successful if their employees collaborate effectively, in a synergistic manner. Economically, e-businesses around the world leverage the Internet for efficient collaboration while in parallel many companies now use enterprise applications for process automation and knowledge sharing. From a human resource perspective, it is argued professionals must inspire and influence their e-business teams to virtually collaborate and synergize across physical organization boundaries using transformational leadership principles. Rationally, investors in e-business need proof that applying knowledge sharing and transformational leadership theories will facilitate team collaboration and synergy and therefore improve organizational performance. Empirically, this e-business industry study develops a statistically significant path model using multivariate linear regression (n=3995), revealing transformational leadership and knowledge sharing factors are mediated by a latent construct of collaborative synergy, which predicts project performance and stakeholder satisfaction. Rival theories are evaluated to stimulate future research.

INTRODUCTION AND RATIONALE

This empirical study answers the general hypothesis: what factors are significant when professionals successfully lead teams to collaborate and synergize across organizations in e-business projects? Given that "collaboration" is "an interactive process that engages two or more participants who work together to achieve outcomes they could not accomplish independently" (Salmons & Wilson, 2008, p. xxxiv), while "organizational synergy" is "an open, integrated process (operational, procedural and cultural) that fosters collaboration and encourages participants to expand connections beyond typical boundaries and achieve innovative outcomes" (Salmons & Wilson, 2008, see Preface

p. xxxiv), then it is proposed the interaction of these theories in contemporary e-business project teams (within and between organizations, including partners) becomes "collaborative synergy." It is argued that collaborative synergy is an unobservable predictive mediator of organizational performance when skilled e-business professionals apply knowledge sharing and transformational leadership principles.

E-business is an important dimension of current organizational business process automation whereby mature companies of all sizes strategically leverage Internet-enabled enterprise computer software to effectively and efficiently transform resources to produce and supply products or services to their clients and partners around the world. The term e-business is defined here as doing business online and thereby leveraging the Internet/digital economy as a business process tool to virtually interact with staff, partners and marketplace clients (Kalakota & Robinson, 2003, 2001). Professionals in e-business will have applied practice in the mainstream "e-business domains" such as Supply Chain Management, Enterprise Resource Planning, Client Relationship Management, Human Resource Management/ Workflow, Executive Information Management, Advanced Strategic Planning/Optimization, and e-Procurement (Bigwood, 2004; Moitra & Krishnamoorthy, 2004). These are the generic e-business software names but not all system vendors utilize these titles.

Skilled project leaders are required to manage e-business team collaboration (Cowley, 2003; Golob, 2002; Lampel, 2001) of which minimum corporate hiring criteria include MBA degrees and Project Management Professional certification plus at least five years applied leadership experience (Labrosse, 2007; PMI, 2007). Due to the challenging e-business project demands, professional leaders are often outsourced because the required leadership and project management skills are difficult to develop (Bone, 1996; Parise & Sasson, 2002; Slowinski, Hummel & Kumpf, 2006). People management is a key success factor because e-business project managers lead multidisciplinary, virtual, collaborative teams, having multiple cultures (Manning, 2003; Trompenaars & Woolliams, 2003). Leaders are further challenged to manage e-business project teams that span departmental functions, beyond country boundaries, that frequently include international partners and vendors (Grant & Baden-Fuller, 2004; Powell, Koput & Smith-Doerr, 1996). E-business projects are complex since the applications must accurately and securely interconnect organizational data, processes, rules, and people across the Internet, introducing unknown risks that could potentially constrain performance.

Research Objective

It is argued that the transformational leadership and knowledge sharing theoretical constructs can be integrated as a single analytical model, using measured project leader (survey) items to explain how two unobserved latent factors (herein referred to as synergy and collaboration) mediate project outcome variables. The research hypothesis is that in e-business projects, the perceived transformational leadership and knowledge sharing factors will have a covariance, that is mediated by an unobservable latent construct of collaborative synergy (team collaboration and synergy), that in turn explains (predicts) the dependent organizational performance variables of earned value and stakeholder satisfaction.

BACKGROUND AND LITERATURE REVIEW

A literature search using the chapter keywords and index terms did not reveal any empirical studies that specifically investigated both transformational leadership and knowledge sharing, within contemporary e-business projects, during 2000-2007. Some of the recent fugitive literature including conference papers and books such as Kalakota and Robinson (2003) discuss some ap-

plied transformational leadership principles or some knowledge collaboration factors in successful e-business companies, but not both theories. There were no empirical studies of collaborative synergy or related constructs found in e-business or other industries.

The literature review discusses the major components of the analytic model underlying this study, starting with transformational leadership, then knowledge sharing, in terms of how the factors theoretically relate to unobserved collaborative synergy in teams, and organizational performance. The literature review closes by citing contemporary empirical studies that demonstrate evidence of these principles and models. A subsequent topic critically reviews rival theories in the literature, then suggests improvements and future research issues.

Transformational Leadership, Collaboration and Synergy

Transformational leadership theory was most fully conceptualized by Burns (1978) as "leaders inducing followers to act for certain goals that represent the values and the motivations—the wants and needs, the aspirations and expectations—of both leaders and followers" (p. 19). Bass (1997) expanded on this by arguing transformational leaders have the ability to arouse or alter the strength of needs which may have lain dormant, and he developed the Multifactor Leadership Questionnaire (MLQ) construct and survey. Yukl added that "transformational leadership involves the influence by a leader of subordinates…to empower subordinates to participate in the process of transforming the organization" (Yukl, 1989, p. 269). Researchers continued to test and refine the transformational leadership and MLQ, confirming the link to organizational effectiveness, as well as the importance of trust and modeling in team collaboration and synergy (Bass & Avolio, 1993).

Bass and Avolio (2004) used the MLQ to confirm Burns' original claims that a transformational leader does not motivate with a task-reward approach (as a transactional leader does); rather, transformational leaders motivate by modeling, creating synergy, cultivating vision and meaning, among followers. Others verified this through empirical studies (Bass, Waldman, Avolio, & Bebb, 1987; Podsakoff, Todor, Grover, & Huber, 1984; Schein, 1991).

In MLQ, leadership is categorized by two predominant styles: transformational and transactional, described by three latent factors (with several subscales), and three outcomes (Bass & Avolio, 1995; Podsakoff, MacKenzie, Moorman, & Fetter, 1990; Schein, 1991; Yukl, 1989). The transformational leadership construct is generally described as having six factors categorized into transformational or transactional styles, but additionally including a non-leadership (lassie-faire) management approach (Podsakoff et al., 1990). The contemporary transformational leadership scale (TLS) is listed in Table 1, with a brief explanation of each key factor. The factors and variables in Table 1 are prefixed with a number (#) to illustrate their linkage to Table 2 and Figure 2 of subsequent sections (for consistency and to facilitate the reader's interpretation of upcoming results).

The rationale for using TLS in this study is succinctly explained, to close this topic. TLS is not the only construct that could be used in this study (other models used by the author were cited)—and as will be discussed, alternative perspectives exist. The two key reasons why TLS is used are: (1) it is theoretically and statistically credible in a way that reduces team perception biases, and (2) based on the author's technology experience and studies, the factors are needed due to the complexity of the online e-business context.

Knowledge Sharing, Collaboration and Synergy

This section explains the knowledge sharing principles, in terms of how this construct relates to e-business team transformational leadership, as

well as to unobservable (but important) collaborative synergy. The topic closes with a discussion of how knowledge sharing can be measured, in terms of a knowledge sharing process and context. Although "online" is not part of the literature's definition for knowledge sharing, the logical assumption is asserted that the virtual context of e-business projects facilitate the application of this theory.

A generally accepted construct of organizational collaboration and synergy underpinning this research is the dynamic knowledge creation/sharing model (Nonaka, Toyama, & Konno, 2000). Albeit the terms "creation," "sharing," "transfer," and "collaboration" often are used in the literature to explain the construct of knowledge sharing, technically, all are part of the definition referenced here. The well-known contemporary knowledge creation model (Nonaka & Teece, 2001) describes a four-phase cycle: socialization, externalization, combination, and internalization. This knowledge creation cycle accounts for how individuals and teams create and share knowledge, from tacit (cognitive perspectives) to explicit (described in words and discussion forums to document and share), and then back to tacit again as individuals apply (and improve) the organizational knowledge during the course of their project. Knowledge assets (team experiences, synergy, concepts, routines/culture, tangibles) form inputs, act as moderators, and become outputs of the knowledge creation process, all of which takes place in a context or "Ba." For this research, "Ba" is a shared e-business virtual knowledge collaboration and team synergy phenomena, influenced by strong transformational leadership.

Nonaka and colleagues (2000) further describe "Ba" as having Japanese etymological origins, a

Table 1. Transformational leadership factor subscales

- Transformational leadership factor:
  - #1. Vision articulation: inspirational motivation (vision) - leading through a visionary approach; raising workers' expectations and beliefs about the mission and goals through appeals to their emotions; inspire and synergize others with leaders' plans for the future
  - #2. Intellectual stimulation - leading by appealing to workers' sense of inquiry; challenging them by questioning assumptions and encouraging creative problem solving
  - #3. Individual support (individualized consideration) - leading by focusing on the individual and providing coaching and mentoring
  - #4. Role modeling (idealized behaviors) - leading by acting as an influential positive role model
  - #5. Goal setting and promoting - encouraging followers to share a common vision and goals, foster collaboration among work groups
  - #6. High expectations (idealized attributes) - leading by means of charisma; behavior that encourages a follower to trust in the leader.
- Transactional leadership factor [subscale collapsed in Figure 2 as "#7. Contingent rewards & punishment"]
  - contingent reward - providing reward in recognition of effort and/or achievement of goals, or conversely, discipline for non-achievement
  - active management by exception - concentrating on occurrences which deviate from expected norms, such as irregularities, mistakes, exceptions and failures to meet standards.
  - passive management by exception - taking action only when things go wrong.
- Non-leadership factor (lassie-faire leadership) - doing nothing, letting things take care of themselves, failing to provide leadership [this is not found significant in e-business and is not retained in Figure 2].
- Leadership performance outcomes of:
  - effectiveness - extent to which leaders see themselves as being effective in achieving outcomes, goals and objectives [captured in Figure 2 as "#8. Deliverable Performance" and "#10. Earned Value"]
  - extra effort - extra effort that is exerted by followers as a result of leadership [implied in Figure 2 as "#9. Knowledge Growth" through collaboration]
  - #11. Stakeholder Satisfaction – organization, team, leader sense of self-satisfaction resulting from their leadership behavior and activity [as explained later, leader self-reports are excluded in this variable].

shared knowledge sharing ontology of cognitive reflection and knowledge-in-action; "not just physical, but a specific time and space"(Nonaka & Teece, 2001, p. 24). Participants of the "Ba" shared context don't belong to it—no membership is needed as strictly defined in a Community of Practice (Wenger, McDermott, & Snyder, 2002)—instead team members "relate to it, using it as a place to inter-relate for creating knowledge" (Nonaka & Teece, 2001, p. 24)—inferred here as synergy and collaboration. Nonaka and colleagues further describe the synergistic process of collaboration as "coherence among the Ba is achieved by means of organic interactions among Ba based on the knowledge vision rather than a mechanistic concentration in which the center dominates; in organizational knowledge creation, neither micro nor macro dominates—rather, they interact with each other to evolve into a higher self" (Nonaka & Teece, 2001, p. 28). The relaxing of membership, and emphasis on collaboration as well as synergy, are relevant to explain the unobserved latent constructs of collaborative synergy from TLS.

Extensions to this theory suggest that synergy, innovation, and collaboration take place in the knowledge creation cycle through a self-transcending process, which has been described as: "not yet embodied" (Sharmer, 2001), "reflection-in-action" (Schön, 1989; Senge, 1999), "personal mastery" (Senge, 1999), "pure experience … action intuition" (Nonaka & Teece, 2001). These extensions to the "Ba" are mentioned here as they add descriptive meaning to the unobserved latent constructs of team collaboration and synergy (and because readers may be more familiar with these terms). As noted earlier, the interaction of transformational leadership and knowledge sharing in terms of team synergy and collaboration can still be explained by the Community of Practice theory (Wenger et al., 2002). Nevertheless, transformational leaders in e-business must guide inter-organizational teams that are informally solidified by their virtual collaboration and synergistic contributions within the "Ba," towards their mutual goal of knowledge and deliverable creation.

In closing this topic, it is argued that in the e-business project "Ba," transformational leadership integrates with knowledge sharing to give rise to collaborative synergy, which promotes effective team performance. TLS by itself (without knowledge sharing) may not explain how collaborative synergy mediates team performance, and the resulting stakeholder satisfaction. Transformational leadership is the ability to translate knowledge into action, by influencing and promoting team collaboration and synergy towards desired organizational performance (Bass & Stogdill, 1990). An alternative perspective is that knowledge collaboration requires promoting and modeling [two key factors of transformational leadership] for knowledge creation and sharing (Nonaka et al., 2000; Quinn, Faerman, Thompson, & McGrath, 1996). Other researchers have come to this same conclusion that transformation leadership is a required soft-skill for efficient team collaboration, effective decision making and for generating organizational synergy (Senge, Dow, & Neath, 2006; Sheard & Kakabadse, 2004; Straus & Milton, 2003; Yukl, 1998). Therefore, this study uses both TLS and knowledge sharing factors to predict outcomes.

Empirical Evidence of Transformational Leadership and Knowledge Sharing

There is statistically significant evidence showing transformational leadership promotes team collaboration and synergy, and this improves organizational performance (Bass & Avolio, 1995; Podsakoff et al., 1990; Schein, 1991; Yukl, 1989). In turn, leadership has been proven to be a key factor in promoting knowledge sharing, collaboration, and team synergy (Mumford, Scott, Gaddis, & Strange, 2002).

Empirical studies have shown transformational leadership is a critical competency for guiding collaborative project teams toward effective

organizational outcomes (Cowley, 2003; Strang, 2005; Zhu, Chew, & Spangler, 2005). Furthermore, transformational leadership was found to be significant in promoting knowledge creation, sharing, facilitating collaboration in community of practices, and for achieving organizational synergy across multi-disciplinary project teams (Avolio & Bass, 2004; Bass & Avolio, 1993; Strang, 2003, 2007).

It has been argued there is a relationship between transformational leadership, e-business team synergy and collaboration (Stahl, 2000), which increases (enhances) the project deliverables, and thus improves organizational performance. When professional knowledge workers collaborate and synergize, they increase their trust and task effectiveness, which improves project deliverables. It is argued these high quality project deliverables ultimately improve the overall program and organizational outcomes. Transformational leadership is needed to facilitate this knowledge sharing/collaboration and synergy/trust-building process at the project and program levels. The transformational leadership must be far-reaching enough to guide all internal, inter-organizational, and external (partner) resources associated with the project, program and/or organization—thus the Internet can often be leveraged for this purpose of reaching many and distanced e-business resources. Contemporary online methods for professional team collaboration are e-mail, community of practice forums and synchronous discussions—some of these eCollaboration tools are embedded in commercial e-business systems such as GE's Extranet and IBM's WebSphere (Kalakota & Robinson, 2003).

Recent empirical research illustrated that effective project managers (measured in terms of team perception and organizational outcomes) exhibited a high degree of transformational leadership attributes (Strang, 2005; 2007). A study of e-business students demonstrated likewise (Jung & Avolio, 2000). In a case study of four organizations (including 3M) that regularly complete successful e-business projects, Melum (2002) found that leadership, knowledge sharing, and collaboration were important skills recognized and promoted in their management development programs. In a quantitative study of managers across 2,500 successful e-business industry firms, "six competencies appear to constitute the most critical: leadership skills, customer focus, results oriented, problem solver, communication skills, and team worker" (Abraham, Karns, Shaw, & Mena, 2001, p. 847).

In an e-business study of Asian, American and UK executives from service, manufacturing and construction sector e-businesses (Zhu et al., 2005), transformational leadership was found to be significantly related to knowledge collaboration and synergy ($n=170$, $r^2=0.38$, $p<0.01$), described by Zhu et al. as "capital-enhancing human resource management" (p. 49). Also, transformational leadership was associated with successful organizational outcomes ($r^2=0.30$, $p<0.01$), using the MLQ leadership assessment instrument (pp. 49-50).

Knowledge sharing and transformational leadership are both critical for effective team collaboration and organizational synergy (Mumford, 2004), and to create successful organizational outcomes (Lin & Tseng, 2005; Nonaka et al, 2000). Transformational leadership is especially critical in E-Business contexts (Kalakota & Robinson, 2003; Plessis & Boon, 2004), because contemporary business projects are often complex and their stakeholder membership spans the defined organizational boundaries (Hayes, 2001).

An empirical study of new product development by project leaders managing 69 e-business programs in the Mexican oil industry recognized the need for inter-organizational collaboration but emphasizes "there is evidence that the success rate of alliances is less than 50 percent" (Cáñez, Puig, Quintero & Garfias, 2007, p. 50). This finding highlights the need for a leader to take a structured approach for technology acquisition (that is argued here can be generalized across organizations even those managing non e-business projects).

ISSUES, CONTROVERSIES AND ALTERNATIVE THEORIES

As pointed out, while it is generally accepted that leadership, collaboration, and synergy are related and positively associated with successful e-business project performance and client satisfaction, there are differing views on what effective leadership is, and consequently how to evaluate it. For example, the literature contains broad definitions of effective leader traits, such as: cognitive ability, intelligence, emotive, affective ability, technical knowledge, and functional capability. There are other constructs capable of assessing some of the transformational leadership subscales (Yukl, 1989), namely the Leadership Practices Inventory (Kouzes & Posner, 1988), which was successfully applied in similar e-business studies (Strang, 2007). To fully endorse the philosophy of this research handbook, the ensuing topics reveal critical problems and alternative perspectives, then suggests resolutions, encouraging future research to replicate, refute, or extend these ideas.

Assessment Construct Technical Issues

MLQ-5X (Bass & Avolio, 1995) is the generally accepted instrument used to measure transformational leadership (Avolio, Bass & Jung, 1999; Mumford et al., 2002; Yukl, 1998; Zhu et al., 2005). Bass and Avolio (1997) report that the MLQ-5X scale Cronbac alphas range from .74 to .94 for validation and .73 to .93 in the cross validation; inter correlations among the five transformational scales were high and positive. The MLQ consists of 45 descriptive items that uses a 5-point Likert type scale ranging from 0-4. On this scale a "0" represents "Not at all," a "1" denotes "Once in a while," a "2" indicates "Sometimes," a "3" signifies "Fairly often," and a "4" represents "Frequently if not always." According to Bass and Avolio (1995) the 45-item scale successfully identifies five of the six subscale variables in transformational leadership (explained in Table 1), namely: (1) idealized influence/attribution, (2) idealized influence/behavior, (3) inspirational motivation, (4) intellectual stimulation, and (5) individualized consideration. However, there is no empirical evidence or research guideline from studies applying transformational leadership (MLQ or TLS constructs) with knowledge sharing, collaboration, and synergy for virtual teams within e-business type projects.

Recently the critical post-modern movement has challenged the traditional leadership constructs, and suggested there are problems measuring the transformational leadership factors. One recent criticism of the transformational leadership construct is that it is unclear what is being "transformed" in projects (Lincoln, 1998). Also, critics point out that transformational leadership is measured using positivist methods—this is a contrast to the normal qualitative grounded-theory building approach that was used with traditional leadership taxonomies, which used participant-observation in case studies instead of self-report surveys (Yukl, 1989).

There are also technical problems asserted for the transformational leadership construct. It is argued here that from a statistical standpoint, the scales in the MLQ (Burns, 1985) are not interval (or ratio) so the outcome variable is not discrete or continuous, which is necessary for assuming a normal distribution (to apply parametric methods). To resolve this problem the scales must be interval, ranging from 0 to 10 (or higher). However, MLO has been proven statistically valid and reliable so any change to it would require replications with confirmatory factor analysis, but theoretically that reduces credibility since it becomes a new instrument.

Furthermore, the MLQ has received some criticism for inconsistencies with sample groups in distinguishing between transformational and transactional leaders (Bass, 1993). As well there are reports of inconsistency in replication of the data. Some researchers concluded the MLQ failed to support first and second order confirmatory factor analysis (Lincoln, 1998); however, when

a reduced form of the MLQ was employed, this resulted in construct and predictive validity. Avolio et al. (1999) came to a similar conclusion in a study involving 3786 respondents in 14 independent samples, using various versions of the MLQ, including the MLQ-5X. Avolio et al. (1999) conducted an initial survey and replication of mid-managers, concluding that reducing MLQ items to five factors resulted in "a high degree of consistency in estimates of reliability, inter correlations and factor loadings when comparing the initial with the replication sample results" (p. 13).

A significant problem with surveys, including the MLQ, is they are self-reported, and thus can be biased if subjects are self-evaluating their behavior and/or performance. Although the MLQ can use reverse-coded items (questions worded such that low performance is the highest scale), these can be recognized and falsified by subjects. The remedy to this problem is to include items that independently assess the subjects' desire to "look good" (or in the case of peer assessment, the petition to make a friend look good). It is now customary to include all or part of the Social Desirability Scale (Marlowe-Crowne, 1960) in transformational leadership surveys. The SDS is a 33-item self-reporting scale, which requires the subject to read a statement and respond either "true" or "false," depending on their agreement or disagreement with the items. The internal consistency of the scale is good at .88 and the test-retest correlation is .89 (Crowne-Marlowe, 1960). The SDS has proven reliable in replications and similar studies to identify self-report measures that are faked, inflated, and/or deflated, such as when a peer dislikes a leader (Carless, 1998; Tichy & DeVanna, 1990; Yukl, 1998).

The resolution to many of the MLQ criticisms discussed above is to apply the Transformational Leadership Scale (Podsakoff et al., 1990). TLS uses reverse-worded items across the six transformational factors. The TLS factors are: articulates vision, provides appropriate model, fosters acceptance of goals, high performance expectations, provides individualized support, intellectual stimulation, plus the transactional constructs of contingent reward and contingent punishment with laissez-faire behavior (Podsakoff et al., 1984). These are synchronized to Table 1 and Figure 2 (discussed later). Self-reporting bias in TLS is eliminated here through triangulation of evidence (peer not self-reports), and by adding several SDS items, which also partly checks common method variance (Podsakoff et al., 1990). In this study, as will be noted in Figure 2, the non-leadership (lassie-faire), contingent reward and contingent punishment subscales are collapsed into one. In this design, the numerical TLS scales were converted to an interval range from 0 to 10 to improve its statistical design (as per discussed technical flaw). Instructions on the survey maintain MLQ consistency and intent by advising subjects: "0" represents "Not at all," a "1-4" denotes "Once in a while," a "5" indicates "Sometimes," a "6-9" signifies "Fairly often," and a "10" represents "Frequently if not always."

Relevant Alternative Theories and Perspectives

The most relevant and plausible alternative approach for modeling e-business collaborative synergy is Yukl's (1998), very credible Multiple-Linkage Model (MLM), that builds on the Path-Goal (Silverthorne, 2001; Shamir, House & Arthur, 1993) concept. MLM includes leadership substitutes as situational latent variables that reduce the need for leadership, indirect longer-term situational variables that can constrain or neutralize leader behavior, and direct short-term intervening variables, namely: subordinate effort, role clarity, task skills, work organization, cohesiveness/cooperation of team, resource availability/support, and external coordination (Yukl, 1998, pp. 276-283). In fact this model has been studied by the author in similar contexts and found significant to a certain extent (Strang, 2005), but the context was not isolated to e-business projects (this is hypothesized here to increase the need

for transformational leadership). Charismatic leadership is a plausible factor measured in the Path-Goal model but it is not relevant for the context of the current e-business study since it infers principles of perceptual defenses and projection. For example, projection is a perceptional distortion of the tendency to relieve a sense of guilt or failure by attributing personal attitudes or feelings to another person—this is not likely to explain unobserved synergy or collaboration in e-business projects.

Leadership Substitutes Theory (Kerr & Jermier, 1978) is unique in that is does not explicitly use intervening variables. Instead, two situational variables are specified which the leader has no control over, but according to the theory, the leader must be aware of, when applying supportive or instrumental (task-oriented) behaviors, and as such it is difficult to measure. Kerr and Jermier (1978) were able to show how certain factors in team projects substituted for transformational leadership, such as when team members know how to do the job well, or the work is very repetitive. Kerr and Jermier (1978) also defined neutralizers, whereby the leader has no authority to evaluate or reward performance. This theory has been argued to be a relevant construct for explaining when leadership is not needed in virtual teams and/or specialized situations, but as discussed earlier, e-business needs a high degree of transformational leadership due to the context complexity.

Transformational leadership has been argued to be less effective than transactional leadership in contexts that require time-critical team management, such as in military, emergency, and medical operations (Yukl, 1998). This is understandable. The focus of this research is on e-business projects that do not carry this degree of urgency. Thus, it is argued the utility of the model that will be developed is that it will be generalizable to non-critical projects (e-business) that are higher in number and need as compared with emergency situations.

There is opposition in the literature concerning the ability to predict good project outcomes using knowledge sharing and transformational leadership factors. Allee (2000) defines a relevant knowledge capital taxonomy that includes factors of business relationships, internal structures, human competence, social citizenship, environmental health, and corporate identity that can predict team performance without assessing or considering leadership, synergy or collaboration per se. However, her interesting work lacks the empirical analysis (it is mostly theoretical with case studies of qualitative comments). Social capital network theory has been described as a way to measure the impact of group synergy using relationships (without involving leadership), to predict outcomes. Social capital network theory is explained as: "the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit" (Nahapiet & Ghoshal, 1998, p 246). Nahapiet's work is good yet theoretical (without empirical evidence). There are well-known variations of knowledge creation/sharing constructs that mention possible synergy and collaboration variables, such as the knowledge management model (Wiig, 1997, 2002). Skyrme (1998) proposed an excellent measurement methodology for assessing organizational synergy and knowledge collaboration, using the intellectual capital model, but transformational leadership factors were not included. None of these alternatives include both transformational leadership and knowledge sharing factors that would be relevant for e-business project outcomes (goal-setting, synergy, etc.).

The Community of Practice (CoP) is another relevant and plausible theory that could explain an e-business project as a collaborative synergy model. CoP members are not a team but they do have a group identity, a subculture, yet there is no official leader to promote synergy (Wenger et al., 2002). In comparison, the shared "Ba" context is a place where collaborative synergy is created (which is also the locus of control), its boundaries are fluid (changed by the participants), it is always evolving (with no historical element nor identity),

and its membership is dynamic—composed of any combination of individuals and organizations, including CoPs (Nonaka et al., 2001). Other researchers, namely Seely-Brown and Duguid (2001), emphasize the shared practice and social identity of a CoP can replace a leader's synergistic influence. In a CoP, over time participants develop a common outlook and understanding of the world around them, they share the same sort of judgment, and look to the CoP as place to engage in learning, rather than knowledge sharing and collaboration per se (Brown & Duguid, 2001). A debatable aspect of CoPs is there may be some hierarchy and dependence on organizational authority, which would be contrary to TLS and the latent collaborative synergy construct hypothesized here. Also there is no organizational structure or bureaucratic boundary constraining the knowledge sharing and collaboration in the "Ba" context (Grant, 2001), so "Ba" is favored here over CoP.

There are also alternative views that transformational leadership, knowledge sharing, and collaboration have a gender-specific dichotomy (Boje, 2001), which could mediate synergy, yet Burns (1978) and Bass (1985) contend there are no gender differences. Barker and Young (1994) identified a feminist underpinning to transformational leadership in organizations, while Collins (1986) and others took a similar critical post-modern view. For example, qualitative studies have shown women develop a feminine style of leadership, characterized by collaborative-like behaviors of caring and nurturance, while men adopt a masculine style of leadership, which may promote synergy but is not collaborative-like since it is dominating and task-oriented (Feldman, 1999). In an empirical study of 345 metropolitan branch managers, Carless (1998) found self-ratings by female managers indicated they perceived themselves as more likely to use transformational leadership than male managers. Furthermore, female managers were more likely than male managers to report that they take an interest in the personal needs of their staff, encourage self-development, use collaborative decision making, give feedback and publicly recognize team achievements. Female managers reported they use more interpersonal-oriented (synergistic) leadership behaviors, compared to male managers (Carless, 1998). This rival dimension was analyzed in this study using MANOVA, to examine the gender groups, in terms of the outcome independent variables, but the result was not significant ($p>.01$).

Culture is another much-debated dimension in transformational leadership. Well-known contemporary multi-cultural research (Manning, 2003; Trompenaars, 1993) indirectly investigated cultural perspectives of certain transformational leadership attributes (e.g. inner/outer directed regarding goal-setting and synergy influence). Tierney (1993a, b) investigated the way in which people of various cultural backgrounds are socialized into power structures. Furthermore, the critical post-modern movement advocates more research is needed into transformational leadership attributes such as: race, social class, gender, and sexual orientation (Boje, 2001).

A significant constraint with the alternative leadership and knowledge sharing perspectives discussed above (except culture) is their empirical analysis in the literature predates the emergence of e-business projects. It was argued that e-business subject matter, culture, and online tools necessitate high levels of transformational leadership using influence and electronic communication skills. Although transformational leadership and the TLS also predate e-business as defined here, this theory has been studied empirically in the e-business domain (Hayes, 2001; Kalakota & Robinson, 2003; Plessis & Boon, 2004), but without knowledge sharing principles.

RESEARCH DESIGN, METHODS AND DESCRIPTIVE STATISTICS

In this study, 3995 North American e-business industry participants were surveyed during 2005-

2007, to document and evaluate the 412 project outcomes, and the team perceptions of their 412 project leaders. The 412 projects were reduced from 443, and 3995 valid subject responses were reduced from 4725, due to incomplete projects, insufficient team size, non-response, outliers, and/or bias factors affecting statistical reliability. The design and methods are explained next, followed by the exploratory descriptive statistics.

Research Design and Methodology

The choice of analytic design and methodology warrant explanation to establish credibility and to allow the scientific community of practice to replicate or extend this research. Structural Equation Modeling (SEM), a variation of Multiple Linear Regression, was chosen as the methodology. The key purpose of SEM as I applied it here was to examine the covariance relationships between the transformational leadership and knowledge sharing factors (independent indicators). It was theorized transformational leadership and knowledge sharing were mediated by a latent variable construct of collaborative synergy. In turn, it was theorized the latent variable construct produced a casual predictive influence on the deliverable performance ratios and stakeholder satisfaction (quantitative dependent variables). In practice, latent constructs remain unobserved phenomenon (with no scale identified), but they can be related to the factors and variables in a model as regression equations, using "maximum likelihood techniques" via SEM in LISREL.

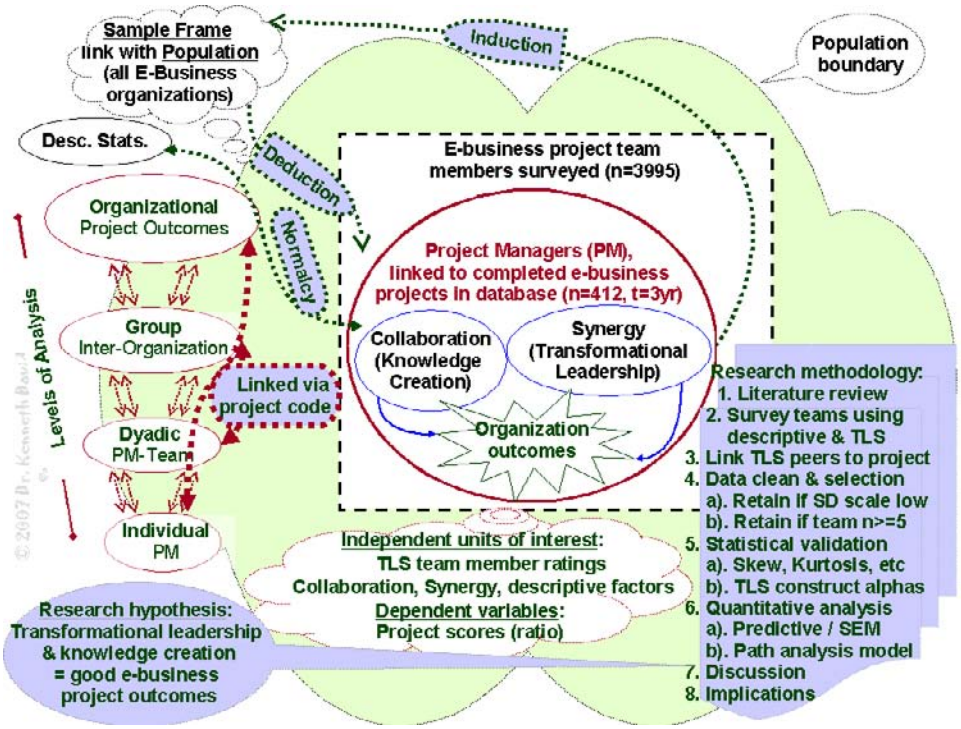
SEM is appropriate for this type of psychological research where the focus is on the perceptions of the individual in terms of covariance between the independent and dependent variables of the same observed subject, to reduce the error term of the causal relationships in multiple linear regression (Keppel & Wickens, 2004, pp. 306-322). In this study we are measuring leadership factors perceived by each team member, hypothesized to be unobservable collaborative synergy, which predicts e-business project outcomes. In particular, the reason the latent construct of collaborative synergy is proposed, is that it is hypothesized that the transformational leadership and knowledge sharing constructs do not solely explain the phenomenon, because in e-business projects that have good leaders, a hidden (as yet uncategorized) synergy takes place, which improves the deliverable quality and subsequent stakeholder satisfaction. As discussed earlier under the topic of empirical studies, studies prove that good leadership enhances deliverable outcomes, but the hypothesis is that the hidden interaction of team synergy and collaboration make the significant difference in e-business projects, and once replicated, this can be leveraged by other practitioners or disciplines. The merits of using the TLS construct have already been discussed, but what can be technically emphasized is the application of the multivariate model (as compared to univariate). This means patterns of covariance and correlation differences in the subscale factors (from Table 1), per observation record, are used to adjust the means and standard deviations, in order to absorb individual unexplained variability. This is recommended instead of estimating confounding variance within and between groups (Keppel & Wickens, 2004, pp. 375-380). The statistical standard error term is reduced by factoring unexplained variability between indicators perceived by each person, to increase the "explained" cause-effect variance, to create a more robust model. Mediation was chosen over moderation because the former proposes the strength of the relationship among the indicator factors thereby influences the degree of effect on the independent variables, as compared with the latter perspective that a specific factor influences the degree of effect between indicators and dependent variables (Barron & Kenny, 1986). As noted, moderation (specific latent factors) was the approach used by Yukl (1998) in his Multiple Linkage Model of leadership, and that was statistically significant for his data.

It was necessary in this research to connect the SEM "path model" to the transformational leadership and knowledge sharing abstract model

in a way that identifies the collaborative synergy phenomena. As applied in this research, the mediators are the latent construct of team collaboration and synergy that represent the "degree" of transformational leadership and knowledge sharing factors perceived by team members, which in turn, affects the "strength" of the relationship between the team collaboration and synergy, predicting deliverable performance as well as stakeholder satisfaction. The next steps in the methodology were: diagram the hypothesized model, as shown in Figure 1, create the hypothesized path model in LISREL, conduct the multivariate analysis described above, then revise the path model using factor analysis to fit the theory to the data as described by Ullman and Bentler (2003, pp. 607–634). The final path model is a structural model fitted with the data, shown in Figure 2. The factors are numbered in the figures and tables for easy cross-reference.

Proper ethics were applied. All e-businesses, project teams, leaders, and partners consented to the research as long as the identities of all companies, people, and the project names would remain confidential. A knowledge database was utilized to store the survey and project results, whereby all factors and variables were recorded in a format to facilitate analysis with SPSS and LISREL. Once the e-business organizations consented to participate, primary database keys were defined to link the project outcomes to the leadership data. Master records were established to capture project id, name, leader, team members, and so on. TLS was configured to be issued to the team members using the project name and project id so that the incoming results could be accurately cross-referenced back to the project via primary key. E-business projects are complex and intensive: no leader or team member worked on more than one project at a time (statistical non replacement). In early 2005, the database was initially populated

Figure 1. Research design and methods overview



with completed projects that had already been recorded in terms of their outcomes, then the team members were surveyed with the TLS (and these results were also recorded in the database). On an ongoing basis, as projects were completed, the outcomes were recorded in the database, then the team members were surveyed with the TLS (and outcomes entered into the database).

Exploratory Data Analysis

The project leaders were not asked to complete the self-report of the TLS. Only the formal and informal (including partner) team members were invited to complete the TLS. On average, the e-business project teams had 16 surveyed members. Each TLS was reviewed for accuracy, completeness, and low scores on SDS items. Any TLS results that did not pass this quality assurance were subsequently discarded. Since the planned factor analysis relied on goodness-of-fit (Chi Square-based) distribution tests require expected frequency values n>0 on all cells as well as n>=5 on at least 80 percent of all cells (Bluman, 2004, p. 568; Levine, Stephan, Krehbiel, & Berenson, 2005, p. 469). Subsequently, any completed "project" having less than five valid team member results was discarded—this meant that for the particular project id, all TLS records, project leader, and linked project data was completely removed from the database (again the data related to that specific project id).

Once the data gathering phase closed in early 2007, the TLS results were analyzed on a project level, using a confirmatory factor analysis, to first confirm internal consistency and reliability (i.e., Cronbach's alpha), and then the inter-rater agreement (Jöreskog & Moustaki, 2006; Jöreskog, Sörbom, & Wallentin, 2006). Cronbach's alpha was used because it provides an estimate of reliability based on average correlation among items within a test. Inter-rater (inter-observer) reliability is the extent of correlation between the observations of two or more team members whom would have assessed the same e-business leader (Avolio & Bass, 2004; Dyer, Hanges, & Hall, 2005). In other words, it furnishes an assessment of how well TLS items vary together (Keppel & Wickens, 2004) in each factor subscale. Results with insufficient reliabilities, or inter-rater requirements, were discarded (and project data removed from analysis). Outliers were discarded using IQR*1.5 ± quartiles 1 and 3 as the cut-off fences (Bluman, 2004). With the above quality assurance completed, the final dataset contained 3995 records.

The results of a customary exploratory data analysis (EDA) on the leadership factors, which now included the project outcome variables (n=3995), confirmed normality assumptions. The key EDA descriptive statistics are listed in Table 2. The only statistics of minor concern were high kurtosis values for "#1 Vision/Synergy," "#6 High Performance Expectations," "#7 Non-Leadership/Contingent Rewards/Punishment," as well as "#8 Project Deliverable Performance." Typically the kurtosis should be less than or equal to ±3 (Tamhane & Dunlop, 2000, p. 118). Nevertheless, a higher value simply indicates more concentration of values about the mean (peaked distribution). The standard error and deviations are low for all factors and variables; the Pearson skewness is generally below the recommended benchmark of ±1 (Bluman, 2004, p 293), so overall this sample approximates a normal distribution. The sample dataset contained 61 percent males and 39 percent females.

As explained above, a confirmatory factor analysis was conducted on the TLS fields to determine if the surveyed items supported the TLS psychometric properties (factor subscales), using latent variable analysis in LISREL (Jöreskog & Moustaki, 2006), following a procedure similar to that which Dyer and colleagues (2005) applied on their GLOBE project leader study (n=13,412). The analysis was first performed without the "non-leadership" items combined, then with no significance noted, the subscales were collapsed into one variable (#7) to facilitate further analysis. The inter-rater coefficients and factor

Table 2. Exploratory data analysis (descriptive statistics)

Measure	Demographic		Transformational Leadership Synergy Collaboration Factors							Project Outcomes			
Sample Size=3995	Age	Yrs Exp.	#1 Vis.	#2 Int.	#3 Ind.	#4 Role	#5 Goal	#6 High	#7 Con.	#8 Perf.	#9 Know.	#10 E.V.	#11 Satis.
Mean	40.91	15.97	7.61	5.67	5.4	6.04	6.57	4.59	2.39	0.960	0.180	0.740	0.910
Median	41	16	8	6	6	6	7	5	2	1.000	0.130	0.660	0.900
Standard Error	0.169	0.167	0.015	0.017	0.029	0.019	0.028	0.015	0.012	0.001	0.002	0.003	0.001
Standard Deviation	10.68	10.55	0.93	1.05	1.86	1.18	1.77	0.94	0.77	0.076	0.121	0.159	0.043
Kurtosis**	-1.25	-1.29	5.10	3.25	-1.20	0.30	2.47	4.87	9.13	8.78	0.310	-1.15	-0.53
Skewness**	-0.03	0.004	-0.56	-0.72	-0.13	-0.814	-1.91	-0.64	-1.31	-2.22	1.405	-0.13	1.116

** $p < .01$ (2-tailed)

covariance's confirmed the TLS instrument was internally valid and reliable in this study. The proof is: χ^2=875.44, goodness of fit index = .75, root mean square residual = .04, and no significant covariance between the seven TLS factors. Since large samples can result in misleading Chi Square indicators, additional statistics were calculated according to the recommendations of Dyer and colleagues (2005, pp 153-155). These indicators were all above .70 indicating a good dataset fit with the TLS construct. The proof is: comparative fit index (CFI)=.95, adjusted CFI= .91, root mean square error of approximation=.05, standardized root mean square residual=.04, r^2=.71. The above results are similar to significant transformational leadership studies that used the TLS items as the analytical model (Avolio & Bass, 2004; Bass & Avolio, 2000; Dyer et al., 2005; Mumford et al., 2002; Zhu et al., 2005).

The following outcome (ratio type) variables were then calculated, on the project and organizational level outcomes—again these are cross-referenced here to the upcoming Figure 2 variables (to assist the reader):

- "#8. Timely/Quality Deliverable Performance" = an earned value score calculated for each significant project deliverable, then averaged for the project—"earned value" is explained in more detail below;
- "#9. Usable Knowledge Growth" = number of new knowledge database documents on the Intranet for this project, as finalized by the Quality Assurance Manager, divided by the pre-existing number of documents, to create a relative index—these documents are user guides, business rules, and so on;
- "#10. Project Revenue/Cost Earned Value" = all the earned value scores from every #8 deliverable, reduced by the project overhead cost factor representing indirect expenses such as shared systems;
- "#11. Reflective Stakeholder Satisfaction" = a subjective rating (ratio variable) from the project sponsor (individual level of analysis but reflecting project leader), once the project was completed, to indicate their overall satisfaction with the project and in particular how well the e-business project leader handled stakeholders (in terms of applied transformational leadership, and team synergy skills).

The "earned value score" is a compound ratio type variable representing earned-value, a generally accepted indicator to accurately assess project performance (PMI, 2004). This score was calculated by interacting three variables in the project database: Cost Performance Index (CPI),

Schedule Performance Index (SPI), and Scope Defects Index (SDI). CPI and SPI were calculated at the end of the project as specified by the Project Management Body of Knowledge (PMI, 2004, pp. 173-174) – these are earned value ratios of overall project team performance, whereby amounts "equal to or greater than one indicates a favorable condition" (pp. 356, 374). The SDI is a ratio calculated using the formula: WD +1 / (WD + SCR) x 2 + 1, where "WD" is the total Work Defects and "SCR" is the Scope Change Requests that were raised to the project sponsor to resolve a non-conformance that required additional resources and/or time (unplanned re-work). Obviously it is desirable to have the highest value of one for SDI, indicating good scope management. All three ratios were then multiplied together (CPI x SPI x SDI) to form an unbiased overall "earned value score". The difference between "#8. Timely/Quality Deliverable Performance" and "#10. Project Revenue/Cost Earned Value" is that the latter variable (#10) reflects the overhead cost of running the entire project and is usually a lower ratio. These four variables were merged into the main dataset, using "project id" as the primary key for the many-to-one link, to provide the dependent variables (project outcomes) associated with each TLS record.

ANALYSIS, DISCUSSION AND LIMITATIONS

The SEM approach was used in LISREL to calculate a structural model by taking multiple passes at all records in the database, to first capture covariances, correlations, and descriptive estimates of normality. Then a second pass was made through the records, specifying the polychoric correlation matrices as input to adjust individual means and standard deviations, using the weighted least squares regression method, thus absorbing human differences of e-business team members that have no relevance to the TLS factors and latent construct being modeled. The final pass through the database was to examine the indices to determine if any adjustments were necessary to the structural model (no adjustments were needed). The Pearson correlation coefficients for the TLS subscales are listed in Table 3, with the important correlations bolded for emphasis.

The correlations were significant ($p<.01$) and the t-test statistics were all greater than the multiple regression design benchmark of ±2 (Carlson & Thorne, 1997, p. 106), with some t-tests reaching +18 ($p<.01$). Most of these correlation coefficients indicate support for the general hypothesis that the transformational leadership factors of vision articulation, role modeling, and goal setting contain an unobserved latent construct of collaborative synergy, and most strongly relate to the outcome variables of performance and stakeholder satisfaction. Specifically, "#1 Vision Articulation," a key element related to team synergy, was highly correlated with "#2 Intellectual Stimulation" (.78) as well as "#6 High Performance Expectations" (.95), moderately with "#3 Individual Consideration" (.44), "#4 Role Modeling" (.40), and "#11 Stakeholder Satisfaction" (.45). It was surprising that #1 correlation was minor with "#8 Deliverable Performance" (.16), which carries through to the related "#10 Earned Value" (-.03) albeit a negative correlation was not anticipated.

The same could be pointed out for the negative correlation between "#1 Vision Articulation" and "#9 Knowledge Creation/Growth" (-.43), but this is rationalized as many e-businesses categorize knowledge sharing documents differently and if no emphasis is placed on creating new electronic information then the growth will be lower as it was measured here (by counts of new documents on the e-business project intranet). In fact, several correlations between "#9 Knowledge Creation/Growth" were negative, such as "#2 Intellectual Stimulation" (-.39), #6 High Performance Expectations (-.41), and "#7 Contingent Reward" (-.32). These correlations suggest an inverse relation to knowledge sharing, especially factors #1 and #2.

Table 3. Pearson correlation coefficients for TLS factors and outcome variables

Correlation	*Age*	*Exp.*	*#1 Vis.*	*#2 Int.*	*#3 Ind.*	*#4 Role*	*#5 Goal*	*#6 High*	*#7 Con.*	*#8 Perf.*	*#9 Know.*	*#10 E.V.*	*#11 Satis.*	*Method*
Age**	1.00													
Exp.**	**.99**	1.00												
#1 Vis.**	.00	.00	1.00											
#2 Int.**	.03	.02	**.78**	1.00										
#3 Ind.**	.07	.07	**.44**	.19	1.00									
#4 Role**	.11	.11	**.40**	.39	.22	1.00								
#5 Goal**	-.06	-.05	.01	.05	.00	.19	1.00							
#6 High**	.00	.00	**.95**	**.86**	**.49**	.37	.11	1.00						
#7 Con.**	.10	.10	**.70**	**.59**	.19	.31	.08	.07	1.00					
#8 Perf.**	.04	.04	.16	.20	-.02	.21	.35	.21	**.42**	1.00				
#9 Know.**	.03	.03	**-.43**	**-.39**	-.18	-.18	.10	**-.41**	-.32	.11	1.00			
#10 E.V.**	.04	.04	-.03	.03	-.37	-.05	.02	-.04	.32	**.51**	-.22	1.00		
#11 Satis.**	-.09	-.09	**.45**	.28	.07	-.24	-.25	**.40**	.05	**.33**	-.12	**.40**	1.00	
Method**	-.01	-.02	.11	.08	.05	.04	.07	.17	.03	.00	.00	.00	-.01	1.00

*** $p < .01$ (2-tailed). "Method" = common method variance and Social Desirability Scale.*

A final anomaly with "#1 Vision Articulation" was the high correlation with non-leadership "#7 contingent rewards/punishment" (.70), which can be attributed to team members feeling a sense of control in leaders that have a well organized and communicated vision. Several of the correlations with "#6 High Performance Expectations" were not earlier hypothesized, especially with "#2 Intellectual Stimulation" (.86), but these could be a result of the way e-business project leaders document and reiterate scope boundaries during meetings.

There were a few generally expected correlations, but these are important normal project management benchmarks. First there was the expected strong correlation between "#8 Deliverable Performance" and "#10 Earned Value" (.51). Also "#11 Stakeholder Satisfaction" was moderately correlated with "#8 Deliverable Performance" (.33) as well as "#10 Earned Value" (.40). Age is highly correlated with experience (.99). For reliability and validity, "common method variance" was measured in TLS using the "social desirability" (SDS) and reverse worded items (Podsakoff et al., 1990), resulting in all correlation coefficients being < .2 (Table 3).

The maximum likelihood regression method was used in LISREL to estimate path model parameters, first using the covariance matrix, then with the polychoric correlation matrix, as input for loading, according to the procedure established by Jöreskog and Moustaki (2006) and Jöreskog et al. (2006). Several path analysis iterations were generated, each using covariance or correlation matrices, with the best model shown in Figure 2, using "highlights" to relate the structural model to the theory (t-test statistics are not listed but all are > ±2). Figure 2 shows the latent factors #1 to #7, relationships, and outcome variables #8 to #11. This path model shows the predictive influence of the TLS factors through the latent collaborative synergy construct, represented by factors #1 through #7. In particular, factors #1, #2, and #5 relate to synergy, and factors #4 and

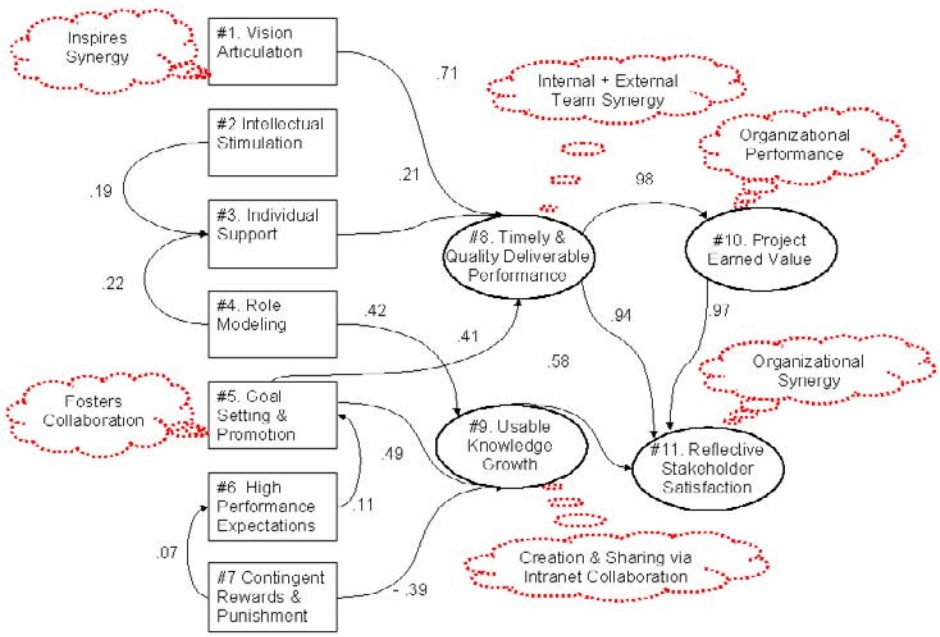
#5 correlate with collaboration (#7 has a negative influence on collaboration). The collaborative synergy latent construct contains internal covariance (#2 and #4 onto #3, as does #7 with #6). The quantitative outcome variables are: "#8. Timely/Quality Deliverable Performance," "#9. Usable Knowledge Growth," "#10. Project Revenue/Cost Earned Value," and "#11. Reflective Stakeholder Satisfaction."

The path model in Figure 2 shows the regression coefficient for the transformational leadership factor of "#1 Vision Articulation" positively and significantly predicting "#8 Deliverable Performance" (.71). This factor #1 is the main TLS synergy component (albeit that is asserted herein since other researchers not the TLS authors isolated that). The "#5 Goal Setting" was also a significant predictor of "#8 Deliverable Performance" (.41) and even more so of "#9 Knowledge Creation/Growth" (.49). Somewhat impressive is the "#4 Role Modeling" factor as it predicted "#9 Knowledge Creation/Growth" (.42). As expected, there was a negative relationship between the "#7 Contingent Rewards & Punishment" factor in terms of predicting lower "#9 Knowledge Creation and Growth". Some factors had a minor predictive effects on one another (such as #3, #4 on #3, and #7 on #6).

Several TLS factors had "between effects" meaning outcome variables predicted one another. For example, "#8. Timely/Quality Deliverable Performance" clearly predicted #10 (.98) and #11 (.94). Variable "#10 Project Revenue/Cost Earned Value" was able to predict "#11 Reflective Stakeholder Satisfaction" (.97), while "#9 Usable Knowledge Growth" had a moderate yet significant predictive relationship with "#11 Reflective Stakeholder Satisfaction" (.58). "#11 Stakeholder Satisfaction" was determined as the terminal path outcome.

Overall the path model indicates a statistically significant predictive mediating relationship explaining 51 percent of the variance between the transformational leadership factors of the collaborative synergy latent construct, and the quantitative outcomes. Specifically, the TLS

Figure 2. E-business collaborative synergy path model



*** p<.01 (correlation was significant for all latent constructs, variables and t-tests).*

factors of "#1 Articulates Vision" (synergy) and "#5 Goal Setting" (collaboration) predicted "#8 Deliverable Performance," while "#4 Role Modeling" (collaboration) and "#5 Goal Setting" (collaboration) factors had a moderate predictive effect on "#9 Knowledge Creation/Growth."

Limitations

The major limitation with this study is that the TLS construct was not designed to assess knowledge sharing factors, and this is the first documented application to assess the collaborative synergy latent construct. Nevertheless the TLS factors that contained specific words that referred to knowledge sharing, synergy, and collaboration, were significant in the path model, with respect to the latent construct of collaborative synergy, and to predict the four dependent variables. Notwithstanding this statistical evidence, "#9 Knowledge Creation/Growth" is not a perfect quantitative measure of knowledge sharing or collaboration because it was a frequency created by counting the production of online e-business knowledge artifacts (such as dialog, documentation, etc). This limitation was argued to be somewhat overcome in this study because the TLS questions in the "#5 Goal Setting Knowledge" factor assessed team member perceptions of knowledge sharing, unobservable in the collaborative synergy latent variable relationships, but measurable by the "#9 Usable Knowledge Growth" and "#11 Reflective Stakeholder Satisfaction" (dependent outcome variables).

During post-hoc analysis, rival theories were re-examined to determine if knowledge sharing might have been documented while this research project was in progress. It had been noted that other researchers attempted to capture knowledge collaboration as "knowledge transfer" (Abou-Zeid, 2002) but his qualitative taxonomy would be difficult to apply in measuring e-business project outcomes. An interesting study measured human capital enhancement from transformational leadership (Zhu et al., 2005) but the outcomes were participant job satisfaction, not organizational performance or stakeholder satisfaction (no dependent effect triangulation).

CONCLUSIONS, IMPLICATIONS, AND FUTURE DIRECTIONS

This chapter makes a contribution to research and practice in several ways. A critical literature review (including rival theories and approaches) encourages further research, the transformational leadership construct is improved, and the empirical methods are explained to facilitate further research. Most importantly, a statistically significant model was developed to answer the research hypothesis. The conclusion is that in e-business projects, the perceived transformational leadership and knowledge sharing factors have a covariance that is mediated by an unobservable latent construct of collaborative synergy, which in turn predicts the dependent organizational performance variables of earned value and stakeholder satisfaction.

The chapter was written to apply the philosophy of this research handbook, namely to share knowledge with practitioners and to facilitate further empirical work. The chapter commenced with a logical discussion of the business rationale driving this study, thereby citing current empirical evidence in support of transformational leadership and knowledge sharing in e-business projects. The literature review focused on the two main theories underpinning the study: transformational leadership and knowledge sharing, starting with succinct descriptions of the relevant constructs, followed by the integration of both, in terms of collaborative synergy. The literature review closed with strong empirical evidence that both transformational leadership and knowledge sharing factors improve project performance, with traceability to collaborative synergy. Alternative theories and perspectives were disclosed, including rival leadership and knowledge management taxonomies. Several controversial issues were

revealed, namely, TLS limitations, culture, and gender, in the transformational leadership and knowledge sharing constructs. The TLS was statistically improved using an interval scale, and the reliability was increased by adding social desirability bias items to detect positive or negative team member inflations of their leader's perceived behavior. Although gender was found statistically insignificant in this study, culture was not addressed, but the theoretical starting points for both culture and gender were cited to allow (and encourage) other researchers to further explore those factors.

The research design and methods were explained (aided by a conceptual diagram) to allow researchers to replicate, refute or extend this study. The rationale for the choice of design and methods in this study was articulated. All procedures were explained, ending with descriptive statistics to verify the normality of the sample, and to confirm the validity of the TLS (using confirmatory factor analysis). The data gathering was rigorous because triangulated evidence was obtained from multiple sources, namely team member perceptions, project sponsor satisfaction, and three quantitative metrics from the organizational level. The measurement model was robust in that it used four continuous-data-type dependent variables, while the TLS interval factors were used to estimate collaborative synergy mediation. Technical aspects of the multivariate linear regression were revealed, including generally-accepted techniques and their benchmark measures, both cited to credible literature sources for research methods and for similar empirical studies.

This study created a statistically significant structural equation path model demonstrating that the transformational leadership and knowledge sharing factors in e-business projects are perceived by teams as mediated through an unobserved latent construct of collaborative synergy that can predict performance and client satisfaction. The *a priori* credible Transformational Leadership Scale was applied to a large North American e-business industry sample (n=3995), using an improved interval response range, and this was reliable through a confirmatory factor analysis. The structural equation modeling approach implemented the maximum likelihood regression method to estimate the path model parameters from a polychoric correlation matrix as input for loading. The path model was statistically significant ($p<.01$), explaining 51 percent of the covariance between the transformational leadership and knowledge sharing factors, mediated through the collaborative synergy latent construct, to predict four dependent variables of deliverable performance and client satisfaction. The model specifies that all of the seven factors must be managed by e-business leaders.

Implications

From a deductive perspective, the study replicates the transformational leadership scale (proven in the literature), but in the e-business context. The results suggest management and staff across any industry, must chose (or train) their e-business project leaders carefully. E-business project leaders should know about the transformational leadership and knowledge sharing factors—how to identify them, how to apply all of them, and especially how to influence their teams with both sets of theories, in a way that mediates the collaborative synergy to increase performance. It is critical from the model that collaborative synergy is mediated by the leader managing all of the factors, in a manner individualized for each team member, (including reducing "#7 Contingent Rewards" because it has negative correlation). Individual perceptions and styles will differ so the leader must adjust his/her behavior to match the team member. In terms of priority, e-business project leaders need to put the highest effort into "#1 Vision Articulation" and "#5 Goal Setting" because these two have the most influence on the outcomes. The other factors cannot be ignored—they covary in a way that mediates the collaborative synergy phenomena. Therefore the leader should also

apply high levels of "#4 Role Modeling" with "#3 Individual Consideration," yet in doing so, she/he must apply factors of "#2 Intellectual Stimulation," as well as "#6 High Performance Expectations." Care must be taken when using these behaviors as they correlate with the other factors, only indirectly mediating collaborative synergy. Finally, e-business leaders should reduce the perception of "#7 Contingent Rewards," as this has negative effects on collaborative synergy. As discussed, alternative theories of leader substitutes or neutralizers are not effective in e-business projects.

From an inferential stand point, the path model might be generalized to projects within any industry that mirrors the characteristics of these 412 e-business projects, namely those in which the leader's age range is 31-59, years of experience range is 5-33, the work involves complex information technology, plus the team size is 10 or more (including contract workers and corporate partners), with team age ranges of 22-58, dispersed to different physical locations, with online access and the need for electronic collaboration during tasks.

FUTURE RESEARCH DIRECTIONS

E-business projects contain culture and gender attributes—both should be studied with respect to their relationship of transformational leadership, knowledge sharing, and latent collaborative synergy, as there was strong evidence cited in the literature that these factors may confound the TLS measures. Both culture and gender will be assessed by using the contemporary multi-cultural construct (Manning, 2003; Trompenaars, 1993) because one of the dimensions is "masculinity/femininity." More quantitative evidence of the relationship between knowledge sharing and collaborative synergy is needed (the predictive influence on the outcome variable was significant, but more exploration of the latent construct will be performed). Future studies will further isolate the knowledge sharing factor of e-business project leadership. One of the limitations here is that this study did not capture tacit (internalized) knowledge sharing, since it counted the externalized outcomes on the intranet. This will be accomplished by measuring team perceptions of tacit knowledge sharing. Finally, the TLS factors and collaborative synergy latent construct were modeled from the perspective of the 3995 team members—future research will expand the data gathering to all stakeholders.

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KEY TERMS

E-Business: Business process automation whereby mature companies of all sizes strategically leverage Internet-enabled commercial enterprise computer software to effectively and efficiently transform resources to produce and supply products or services to their clients and partners around the world. Doing business online and thereby leveraging the Internet/digital economy as a business process tool to virtually interact with staff, partners and marketplace clients (Kalakota & Robinson, 2003); professional leaders in e-business will have applied practice in managing "e-business projects" such as Supply Chain Management, Enterprise Resource Planning, Client Relationship Management, Human Resource Management/Workflow, Executive Information Management, Advanced Strategic Planning/Optimization, and/or e-Procurement (Bigwood, 2004; Moitra & Krishnamoorthy, 2004).

Collaborative Synergy (in E-Business): An interactive process that engages two or more participants who work together to achieve outcomes they could not accomplish independently, in an open, integrated process (operational, procedural and cultural) that fosters knowledge collaboration, influenced by a transformational leadership that encourages participants to expand connections beyond typical boundaries and achieve required e-business project outcomes.

Transformational Leadership: Theory conceptualized by Burns (1978) as "leaders inducing followers to act for certain goals that represent the values and the motivations—the wants and needs, the aspirations, and expectations—of both leaders and followers" (Burns, 1978, p. 19). Transformational leaders have the ability to arouse or alter the strength of needs which may have lain dormant (Bass, 1997). "[T]ransformational leadership involves the influence by a leader of subordinates…to empower subordinates to participate in the process of transforming the organization" (Yukl, 1989, p. 269). Transformational leaders motivate by modeling, creating synergy, cultivating vision and meaning, among followers (Bass et al., 1987; Podsakoff et al., 1984; Schein, 1991).

Articulating vision (for synergy in e-business transformational leadership):

- Leader has a clear understanding of where e-business project is going based on company vision
- Leader paints an interesting picture of the future of the e-business team
- Leader always seeks new opportunities for the organization during and beyond projects
- Leader inspires and synergizes others with enthusiastic vision [very important in e-business projects]
- Leader is able to influence others to get them committed to the e-business project vision (Avolio & Bass, 2004; Bass & Stogdill, 1990; Podsakoff et al., 1990).

Role modeling (in e-business transformational leadership):

- Leads by "doing" rather than simply "telling"
- Provides a good model for others to follow
- Leads by example—collaborates [very important in e-business projects] (Avolio & Bass, 2004; Bass & Stogdill, 1990; Podsakoff et al., 1990).

Goal-setting (in e-business transformational leadership):

- Fosters collaboration among work groups [very important in e-business projects]
- Encourages employees to be "team players"
- Gets the group to work together for the same goal
- Develops a team attitude and spirit among employees (Avolio & Bass, 2004; Bass & Stogdill, 1990; Podsakoff et al., 1990).

Intellectually stimulating teams (in e-business transformational leadership):

- Challenges others to think about old problems in new ways
- Asks questions that prompt others to think
- Stimulates others to rethink about the way they do things
- Suggests ideas that challenge others to re-examine their basic assumptions about a project (Avolio & Bass, 2004; Bass & Stogdill, 1990; Podsakoff et al., 1990).

Individual support (in e-business transformational team leadership):

- Leader acts only after considering others' feelings
- Leader shows respect for others' personal feelings
- Leader behaves in a manner thoughtful of others' personal needs
- Leader treats others after considering their personal feelings (Avolio & Bass, 2004; Bass & Stogdill, 1990; Podsakoff et al., 1990).

High performance expectations (in e-business transformational leadership):

- Leader shows a lot is expected from employees
- Insists on only the best performance
- Leader will not settle for second best performance (Avolio & Bass, 2004; Bass & Stogdill, 1990; Podsakoff et al., 1990).

Contingent rewards and punishment (in e-business transformational leadership):

- Always gives others positive feedback only when they perform well
- Gives other special recognition when their work is very good
- Commends others when they do a better than average job
- Personally compliments others when they do outstanding work
- Frequently acknowledges others' good performance
- Indicate disapproval if employees perform at a level below their level of capability
- Leader shows displeasure when employees' work is below acceptable standards
- Lets employees know about it when they perform poorly
- Reprimands employees if their work is below standard
- Points it out to employees when their work is not up to par
- [very important to AVOID these behaviors in e-business projects] (Avolio & Bass, 2004; Bass & Stogdill, 1990; Podsakoff et al., 1990).

Non-leadership (in e-business transformational leadership):

- Using substitutes and/or neutralizers for leadership—although as discussed in this chapter, this theory was further proven in recent studies to be distinct from non-leadership (Mumford & Licuanan, 2004);
- Laissez-faire, managing by exception or not managing at all
- Allowing teams to be completely self-directed without planning to do so
- All the above are important to AVOID in e-business projects (Avolio & Bass, 2004; Bass & Stogdill, 1990; Podsakoff et al., 1990).

Chapter XXIX
Overview on Information Systems and Tools for Collaborative Enterprise:
Business Impacts and Managerial Issues

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ABSTRACT

Recent industry and business trends can be described as shorter life cycle, increased speed to market, customizability, and a wide variety (rather than mass production) of products. In order to cope with the new environment, business organizations in the supply chain need to communicate, collaborate, and share information as efficiently as they can. There are a variety of collaborative information systems and tools that are actively being used in the enterprises that make collaborative efforts among supply chain partners using digital technologies. In order to maximize business impacts of those collaborative tools, proper policy, and support from users and management are required. Understanding of the managerial issues of the collaborative information systems and tools regarding deployment and usage is also important for successful deployment. We provide an overview on functionalities of the collaborative tools, their business impacts, and managerial issues that need to be addressed to maximize their effectiveness.

INTRODUCTION AND BACKGROUND

Recent industry and business trends can be described as shorter life cycle, increased speed to market, customizability, increased value per cost and a wide variety, rather than mass production, of products. In order to cope with this new environment, collaborating business organizations in the supply chain and R&D (research and development) need to communicate, collaborate, and share information as efficiently as they can in order to obtain or maintain their competitive edge. In addition, business-to-business (B2B) and business-to-customer (B2C) electronic commerce is getting more and more popular, and their market size is increasing at about 25 percent per year (Laudon & Traver, 2007a), which intensifies the trends. It is worth mentioning that B2B market size is about 10 times bigger than B2C, which might be the opposite of what people see. It can be said that it is due to the businesses' efforts to make their activity as competent as possible to flourish or just to survive in the fast paced market. The new business environment combined with e-commerce requires fast and timely communication among businesses and customers. Collaborative efforts among businesses using digital technologies are often referred as "*collaborative commerce*" (Turban, King, Viehland, & Lee, 2006a), and it includes supply chain activities such as collaborative production planning, forecasting, automatic ordering, and order fulfillment, and research and design of products, and so on. Companies that exercise collaborative commerce can be referred as *collaborative enterprise.*

There are a variety of collaborative information systems and technologies supporting efficient communication, collaboration, sharing information, and integration of applications within intra-business and inter-business environments. Additionally, it is very usual that adopting and deploying such an information system requires proper understanding, planning, and strong support from the management. After an information system is deployed, impact on the business cannot be maximized without proper policy and support from users and management. We provide an overview of these collaborative information system and tools with focus on their functionalities, business impacts, and managerial issues for understanding and successful adoption of the collaborative technologies in enterprises.

This paper is organized as follows: in the next section, we discuss a variety of IT tools and systems that help organizations collaborate by allowing them to interact with each other and/or providing timely information. For each of the tools and information systems, we will provide a definition, functionalities, impacts on business, products on the market, and possibly short case studies and a management viewpoint. Then we finish the paper with summary and conclusion.

COLLABORATION TOOLS AND SYSTEMS

There are a variety of IT tools and systems aimed at facilitating communication and collaboration, while they provide dissimilar features coming from different objectives. Some of tools were developed as communication tools, some others as integration tools to facilitate communication among information systems or streamline workflows, synchronous collaboration tools, enterprise application integration, mobile communication, and so on. Based on their features and objectives, we group them into several categories and present individually.

Unstructured Collaboration

Information tools that support *unstructured collaboration* provide communication and collaboration mechanism among human participants in ad-hoc manners. Frequently, technologies originated from Computer Mediated Communication (CMC)

tools facilitate such collaboration. CMC tools refer to computer applications that facilitate communication among human participants. They can be divided into *synchronous* and *asynchronous* based on whether they require presence of participants at the time of communication or not.

Asynchronous CMC Tools

Asynchronous CMC tools, which include *e-mail* and *discussion board*, allow communication to occur at the pace the participants want. They don't require immediate attention from participants, and users can focus on important tasks without being distracted by trivial communication needs. In other words, participants have freedom to initiate, respond or ignore messages without consideration of other participants. On the other hand, it may be problematic to get timely communication and collaboration, due to the freedom. Especially with discussion board that does not have targeted participants, it is possible that communication is not efficient or timely without active and willing participants. To lessen this problem, e-mail is frequently accompanied by a tool or client application that alerts delivery of new incoming messages.

There are two types of e-mail clients: application-based fat client and Web-based thin client. Fat clients provide a variety of function to send, receive, and manage e-mails by communicating with an e-mail server. It requires to be set up with e-mail server(s) and allows received e-mail messages to be downloaded and managed on a local computer. Thin client has ability to send, receive e-mails anywhere there is Internet access and a Web browser. Discussion boards are usually Web-based applications.

Office applications, including word processor, spreadsheet, and presentation, are also collaboration tools that help co-authoring of document, worksheet, and presentation slides. Microsoft® Office suite provides collaboration features such as commenting, change tracking, version tracking, and document protection. Using the features, co-authors of a document can review, update, and comment with an ability to figure out updated parts. In addition, they can protect some part of the document from unwanted updates. The collaboration features allow collaborators to work on office files offline asynchronously, and the files can be exchanged using other CMC tools. Web-based office suites, such ThinkFree, fOFFICE™, and Google™ Docs, are offered free or at a fraction of cost of Microsoft® Office. Some of them are mature enough to be used in office environments, and they provide online collaborative features that are not available Microsoft® Office. For example, ThinkFree and Google™ Docs facilitate online collaboration by allowing users to invite collaborators to view or edit a document through e-mail from their Web sites.

The practical usage of e-mail is familiar to everyone. However, using e-mail in the 21st century carries an increasing amount of management overhead that is essential to maintain the usefulness of this tool:

- **Unsolicited "junk" e-mail:** Even the smallest of businesses must filter unwanted messages—usually by using professional filtering services or spam filter hardware/software that intercept messages at the corporate firewall.
- **Storage management and telecommunication costs:** e-mail messages often carry large attachments (uncompressed images, video, programs, etc.) that burden the telecommunications network and require storage management strategy and corporate policy to enforce.
- **Virus and spyware management, and social engineering:** Still the most popular way to introduce a virus onto a corporate network is via e-mail. There are a variety of ways computer virus can spread using e-mail. One way is that an attached malicious code is activated to contaminate a computer when an

email that includes the code is opened. Spyware is a hidden computer application that can be infected through e-mails or visiting Web sites. They can capture keystrokes and communication messages from the infected computer, and degrade or disable computers and network, which can be disastrous to businesses. Many of security vulnerabilities use "social engineering" technique, which involve fraud or misrepresentation, to make people believe some false information. For example, a message from PayPal.com says recipients can claim a certain amount of money and asks them to log on a spoof PayPal.com Web site. No e-mail system can serve a business without virus and spyware management software installed and annual subscriptions paid for the latest virus and spyware signatures. Social engineering can be remedied by continuous education and phishing filter.

- **E-discovery:** Recent federal legislation requires business to produce electronic records to respond to legal action. *E-discovery* refers to any process in which electronic data is sought, located, secured, and searched with the intent of using is as evidence in a civil or criminal case (SearchSecurity.com, 2005). Businesses that do not have an e-mail archival and retrieval strategy, policy and procedures with a service level agreement may find themselves out of compliance with regulations [Federal Rules of Civil Procedure (FRCP) 26(b)(1)] for e-discovery.
- **SOX compliance:** If a company use e-mail as a workflow tool for the routing and approval of documents that authorize capital or expense spending, they might put their e-mail system within the scope of the SOX 404 regulation in Sarbanes-Oxley Act of 2002. The company would have to demonstrate the necessary procedural and maintenance controls, and review to satisfy auditors that unauthorized personnel could not break security and create the opportunity for question of the legitimacy of an electronic signature.

Wiki is a rather new type of asynchronous Web-based collaboration tool. Wiki allows users to update the content of a Web page with or without authorization. It is frequently used in research and education fields, and Wikipedia is one of the most successful examples. At the time of writing, Wiki technology is the current revolution in CMC. The enterprise is still trying to figure out how to release the advantage of this type of collaboration and knowledge management—knowledge building—into the workplace. One thing is certain. The way management measures workers' contribution to the success of the business will have to change to encourage sharing of valuable knowledge through Wiki.

Beyond the challenge of managing the infrastructure, there is still the challenge of managing *how* the tool is used in the business. There are common problems that businesses and end users face. Some can be addressed by company policies—most cannot, and should be accepted as a hazard that comes with the tool:

- Volume of messages
- User-to-user expectation of time to respond to a message
- Length and detail in the message
- Determination of the roles of the recipients prior to opening the message (information only or action required)
- Accountability for information (is it enough to send an e-mail message to hold someone accountable for an action?)

Management should recognize the only way to enforce policies to get greater value from a CMC tool, like e-mail, is through periodic refresher training to establish an e-mail culture within the company. The training will have to remind everyone of the agreed "rules of the road." This

periodic training tailored to expectation set forth by management should build up an intuitive sense of when to pick up the phone, stop by someone's desk, schedule a meeting, send an instant message, or send an e-mail.

Synchronous CMC Tools

Synchronous CMC tools provide instantaneous and spontaneous communication and require participants to be online at the same time (CMC Resource Site, 2002). The most frequently used synchronous CMC tool is *Instant Messaging* (IM) that facilitates a live interactive discussion by providing exchange of text messages and binary files among participants in real-time. According to a recent study by comScore (comScore, 2006), 49 percent of the European online population (82 million) and 37 percent of North America online population (69 million) used IM at the same timeframe. AOL®, Yahoo!®, and Microsoft® are the top three service providers and they are dominating the market. IM is mostly based on Peer to Peer (P2P) technology and requires installation of client provided by the providers. IM provides more interactive and responsive communication compared to e-mail, but having many participants can degrade efficiency of communication for some participants.

Instant messaging, while widely used over the Internet, presents two challenges for businesses. First, there can be age/generation gap among users. A workplace that intends to use IM as an efficient tool to facilitate communication and productivity has to overcome the age/generation gap among users. The generation that grew up with IM feels very comfortable using this technology and the evolving shorthand communication associated with it. Participating in multipoint multithreaded conversations over IM in the workplace should feel very comfortable to those entering the workforce in their 20s at the time of writing. Workers of older generations do not have the same experience and may not have the same skill or desire to use the tool in the same way. Second, legal requirements should be met in order to use IM communication as a corporate communication. IM communication is subject to the same e-discovery requirements and requires cataloging, archiving and searching capabilities to meet legal requirements as e-mail. Furthermore, businesses must block the use of public IM services over the Internet as this would circumvent the use of the corporate IM service that provides the safeguards for compliance.

Electronic teleconferencing is the use of electronic communication technology that allows two or more people in different locations to have conference at the same time (Turban et al., 2006b). There are several types of teleconferencing. The oldest and simplest is teleconference call, in which several people from multiple of locations can talk to each other in one telephone conferencing session, even though it is not considered a computer mediated communication. *Videoconferencing* is more advanced technology in which participants can see and hear each other. In its early form, videoconferencing was simply a TV session between two or more places using expensive proprietary platform that transmitted compressed video and audio through ISDN (Integrated Services Digital Network). More recent form of videoconferencing is *Web conferencing* that makes use of affordable and standardized technologies—the Internet and desktop computers—to facilitate audio and video transmission, sharing of data, pictures, graphics, and even computer screens among participants. Among the more than 100 products in the market, the leaders are WebEX™ and Microsoft® NetMeeting, Citrix® GoToMeeting®, and Macromedia Breeze.

The benefits of Web conferencing include increased business efficiencies, speeding up the process of organizing meetings and decision making, and cutting travel expenses. Frequently, it also is used as a marketing tool to give presentations and discussions to potential customers without a sales representative on site. However, a Web conferencing becomes very ineffective

and a waste of time to many of participants from broader geographic range when efficient meeting practices and discipline are missing (Austin, Drakos, & Mann, 2006).

In the business environment, Web conferencing capabilities are typically used for two, very different, kinds of Computer Mediated Communication:

- **Open collaboration:** Typically used for remote workers to review a document in the shared space with the ability to take control of the document at either end of the conference to contribute to the target document such as spreadsheet and presentation slide. Almost always in conjunction with a telephone connection to discuss what is being developed in the shared space.
- **Mediated participation:** Ad hoc or unstructured group meetings with the purpose of the (one way) sharing of information with recipients within the company's network. These could be internal meetings with participants in different locations. Always used in conjunction with a voice carrier either through the same conferencing facility using Voice over Internet Protocol (VOIP) or traditional telephone aka "POTS"—Plain Old Telephone System.

Another kind of conferencing tool is referred as Group Decision Support System (GDSS). Whereas Web conferencing is typically geared toward one-to-many meetings (speaker to audience), GDSS is designed to facilitate many-to-many collaborative communication efficiently (Austin et al., 2006). For example, GDSS gives directions and training to the facilitator of a conference to enforce efficient meeting practices and discipline so that a meetings can make a fruitful outcome. The main features of GDSS include assisting agenda setting, brainstorming, voting, surveying, workflow management, anonymous or named discussion, decision making, training and guiding facilitator before and during meetings, and creation and management of meeting outputs consisting of content created by participants. GDSS can be used in a traditional meeting or together with many different collaboration tools including e-mail, Web conferencing, and instant messaging. Because of this, it is expected that some Web conferencing tools will incorporate some features of GDSS by 2008 to complement lack of meeting management (Austin et al., 2006). Market-leading GDSS packages include GroupSystems, Facilitate.com, WebIQ, and MeetingWorks.

Structured Collaboration

To keep up with the fast-paced business environment these days, information should seamlessly be shared with collaborating businesses so that decision making and actions can be done quickly. The information sharing not only includes human communication, but also communication among information systems and among information systems and humans. While unstructured collaboration tools assist human-to-human communication/collaboration in an ad-hoc manner, a framework or business process automation tool can allow information systems and humans from collaborating parties to communicate and collaborate with each other. In this section, we discuss frameworks, automation systems, and business initiatives that facilitate such collaboration.

Team Workspace Tools

Asynchronous tools that provide shared work repositories with access control and data management capabilities have both met existing demand and by their very existence, created *new* demand in the workplace. As the name of this category suggests, these tools provide a group of users with a shared workspace for individuals and team members to share the authoring and review of documents in a controlled way. Simple tools are nothing more than repositories for files with an

intuitive file structure. More sophisticated tools provide version control and workflow management. Examples include EMC²® *eRoom*, Microsoft® *Windows Sharepoint Services* (WSS), IBM® Lotus® *Quickr*, and *Team WorkPlace* (formerly QuickPlace).

This capability fits well with organizations that use a team-based approach for work. More and more, knowledge workers are asked to collaborate in work groups and cross-functional teams. These teams need a place to share works in progress and results among the team members.

Use of these tools carries the risk we have outlined earlier in this paper around compliance. In addition to this, these tools allow data repositories to grow uncontrolled. The many small data stores require policy and management such as storage, backup, and so on. If allowed to grow in number without bound, medium sized enterprises can quickly find themselves with hundreds of islands of information. Lack of management in this area could work against the enterprise's need for consolidated data in warehouses and business intelligence tools.

Use of these tools requires a certain amount of culture change to achieve the greatest impact to the business. Organizations that are considering adopting this type of technology will benefit by defining metrics that measure the benefits achieved and holding themselves to measure these benefits periodically, such as at three months and six months and then annually for the first three years.

Work.ow Management System

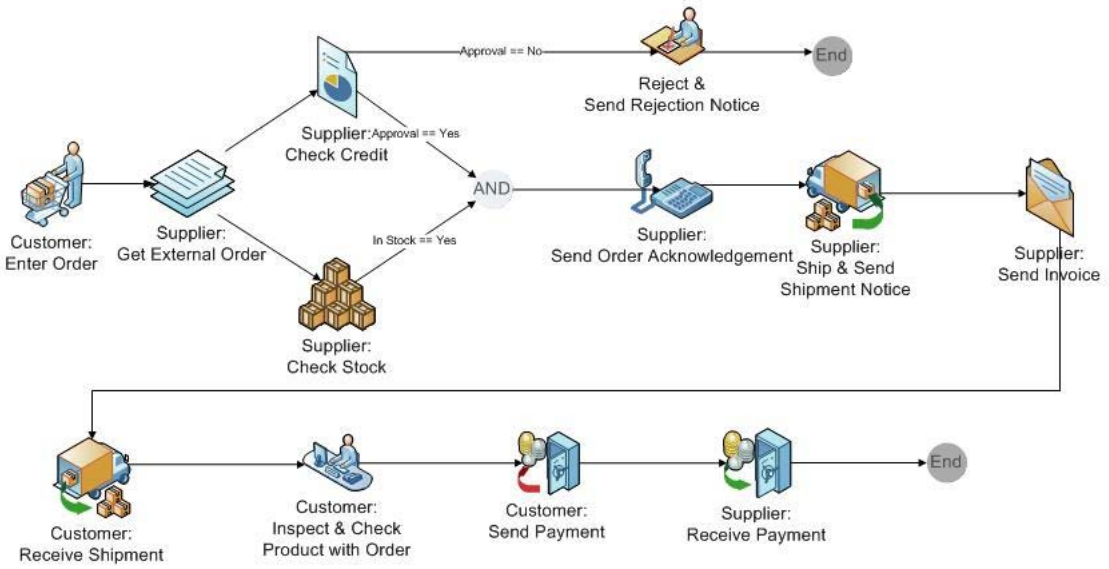
Workflow (or business process) refers to the movement of information and tasks as it flows through the sequence of steps that make up an organization's work procedures (Turban et al., 2006c). Work activities in a workflow can be performed in sequence and/or in parallel and involve people and information systems (Haag, Baltzan & Phillips, 2006). An activity can involve automatic execution of an information system, or manual execution of a program by a human. Workflow Management System (WfMS) is a set of business process automation tools that can design and execute a workflow, and monitor its execution.

In a WfMS, a workflow process is designed graphically using a directed graph of work activities, consisting of rectangles representing work activities and arrows (directed edge) representing sequence of execution. Figure 1 shows a purchase workflow process designed using a workflow process modeling tool.

After a workflow process is deployed, a human or an application can initiate the workflow process. When it is executed, the initiator can monitor the progress of the workflow or be notified when a meaningful event, such as completion of workflow or error, has occurred. During the execution of a workflow, several distributed applications and people may be involved. In fact, WfMS works like an IT integration tool that seamlessly assembles distributed applications and people to collaborate through a workflow process. In addition, it can also be used as a business process reengineering tool. By simulation or analyzing the history of workflow execution, bottlenecks, current and future workload, turn-around time, missed-deadline in a workflow can be identified (Haag et al., 2006).

Due to increased collaboration and required sharing of data and information, a business process frequently involves multiple organizations, within a company or even from many companies. The evolution of the landscape for business—fueled by the innovation that technology has brought—drives the technology even further. Virtual companies can be put together and taken apart in weeks using global outsourcing platforms. An entrepreneur with an idea for a toy, automatic plant feeder or weight loss pill, and financial support to bring the idea to market can rent office space with all of the equipment and support he needs. From there he could outsource

Figure 1. Workflow process designed in a workflow process modeling tool



product design, graphic design for packaging and advertising, product development, refinement and engineering, manufacturing, packaging, supply chain/logistics, invoicing, and billing. The challenge through manufacturing and supply chain process, whether across different companies or within the same company, is that the delivery of information and/or works may take longer than processing the work itself and errors can occur during the delivery. WfMS can execute workflow processes efficiently by automating and expediting the delivery of information and works to the participants of activities as soon as they become available. Benefits of WfMS include the following (Captaris, 2005a):

- Streamline repeatable business process
- Enforces accountability and compliancy
- Saves time and prevents decision-making bottlenecks
- Enables tighter connections with customer and suppliers
- Provides timely and easy access to accurate information across the organization

NewWave Technologies, a full service distributor for document imaging, and automated storage and CD/DVD duplication products, was experiencing difficulty to process returned orders due to its complexity. Employees manage the return process, so called Return Material Authorization (RMA), across multiple departments; and vendors also have to deal with detailed information for timely return of merchandise. Without efficient workflow, materials can easily be misplaced or lost, or return privileges are revoked. The part of the problem was that, to handle returns, resellers and customers should receive return authorization numbers and shipping address, which took days resulting delayed service to resellers and customers. In addition, tracking the returns during the delivery was done by phone calls and emails, and it took long time and efforts. Sometimes, problems with returns resulted in strain on vendor relationship.

Working with BizTech, NewWave integrated workflow management system with its Enterprise Resource Planning (ERP) solution. As a result, while RMAs more than doubled due to its expanded business, processing takes only half the

time. Entering forms now takes a couple of minutes instead of 10 minutes. Upon approval, WfMS sends emails to customers with RMA numbers and return packaging slip. All those activities are all streamlined and automated, saving time and effort by half. If products are not returned in time, WfMS sends e-mail reminders. Real-time status of open RMAs are visible through their ERP and displayed on the corporate intranet powered by MS Sharepoint. (Captaris, 2005b)

Collaborative Supply Chain Management (SCM)

The average company spends almost 50 cents on external purchases, such as goods and services, for each dollar they earned in revenue. In addition, almost all the companies sell their products—goods and services—to customers who are intermediaries or end customers. SCM involves the management of information flows among the organizations in supply chain to maximize effectiveness and profits. Since SCM has been introduced in the early 1990s, SCM has become extremely important for organizations to enhance and manage the relationships among supply chain partners, eventually to achieve operational efficiency and competitive advantages (Haag et al., 2006).

SCM systems help supply chain partners collaborate by collecting, analyzing and distributing transactional information, such as inventory levels of retailers and distributors, order information, logistics information, demand forecast, sales data and history, and manufacturing plan across supply chain. Provided with transparent information by SCM systems, different entities in the supply chain can efficiently plan, forecast and focus on their own business.

According to a survey by Aberdeen Group, top reasons executives are using SCM include cost control/savings, productivity improvements, inventory reduction/improvements, improved visibility into demand/supply, process cycle time reductions, quality improvements, and maintain/gain competitive edge (Haag et al., 2006). In order to fulfill the requirements, *collaborative commerce* pushes SCM a step further by implementing connected business process, collective decision-making, information visibility across supply chain, use of common metrics and lowered barriers of entry for new partners. Reary (2002) describes collaborative commerce as "more than just automation of enterprise-to-enterprise connection—it is a way of establishing and formalizing relationships with suppliers."

Collaborative SCM is often facilitated by a portal where supply chain partners can easily access and share business processes and information at a low cost. One approach to collaborative SCM is a large company implements and operates a portal, which has the most influence on the market and benefits the most from controlling the supply chain. This type of SCM is called *private industry network* (PIN). A supply chain partner will have to get an approval from the owner to join. PINs can be considered as a foundation of "extended enterprise," which describes that firms can extend the boundary and business process of an enterprise to include supply chain partners (Laudon & Traver, 2007b). A PIN is frequently facilitated by its own standards such as Electronic Data Interchange (EDI) to maximize the benefit to the owner. Wal-mart and P&G own and operate their own PIN facilitated by EDI or traditional EDI, which are more expensive than Web technology. Some others, such as Ace Hardware, operate using Internet-based technology. GE, Dell™, Cisco Systems, Microsoft®, IBM®, Nike, Coca-Cola®, Nokia, and Hewlett-Packard are among the companies that operate PIN successfully (eMarketer, 2003).

The other approach is a Web portal owned and facilitated by an industry consortium or 3rd-party. Joining these Web portals is easier than PIN, and Web technology are frequently used for easier access and low cost of operation. Besides, the Web portals frequently provide a variety of

Web-based software solutions to supply chain partners as needed, such as spending analytics, sourcing and contract management, supplier management, reverse auctions, procurement, invoice, and payment management. The software solutions are deployed on the Web, hosted by the third-party owner, when requested by organizations. For the reason, they are called *on-demand* or *Software-as-a-Service (SaaS) SCM*. On-demand SCM platforms help large firms organize procurement process by creating mini-digital markets for themselves. They also help vendors sell to large purchasers by providing software to handle catalog creation, shipping, insurance, and finance. According to an Aberdeen Group study, the half of the survey's participants now use or are considering using on-demand SCM to manage select portion of their supply chain (GSX, 2006). The benefits of this model are described as increased supply chain visibility, low cost of ownership, faster implementation speed and easy, low-cost access to updated versions, concept of community of supply partners, business partner discovery, best practice sharing, data, information and process sharing, and industry benchmarking. Agentrics, Ariba, and PerfectCommerce are examples of on-demand SCM platforms.

Future trend of SCM can be found by what companies want to improve from their SCM. According to a survey by (Aberdeen Group, 2006), companies' top motivations for improving their supply chain process include the following:

- Lower supply chain operating cost - 33 percent
- Meet customers' fulfillment requirements faster and more accurately - 19 percent
- Minimize supply-demand imbalances, especially stockouts - 14 percent
- Streamline fulfillment across multiple channels - 13 percent.

Companies want next-generation SCM that will help them cut costs, while enable them to maintain competitive edge in an era of complex, multi-party relationships and rapidly changing customer needs.

Collaborative Planning Forecasting Replenishment (CPFR)

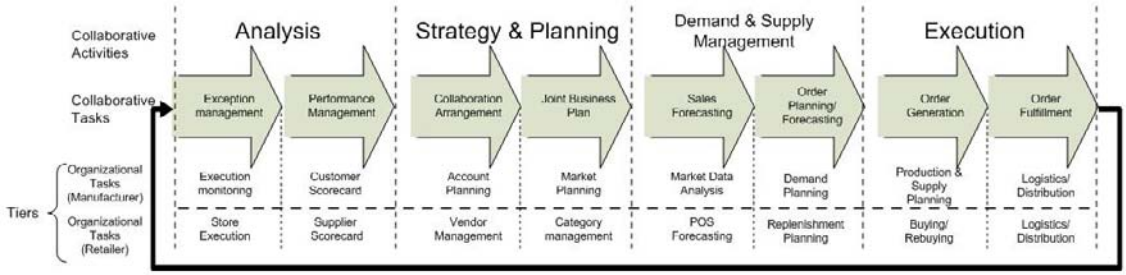
An organization in a supply chain can have its own plan and schedule for their business, such as manufacturing and logistics. However, if there is inefficiency in one part of the supply chain, it is likely to affect the whole supply chain, resulting in excess inventory, low availability of needed items, increased logistics cost, low customer satisfaction, and erratic shifts in supply chains called *bullwhip effect*. In order to address the problem, CPFR was proposed in 1998 by Voluntary Interindustry Commerce Standards (VICS).

CPFR is a business practice guideline and collaboration framework that combines the intelligence of organizations in a supply chain in the planning and fulfillment of customer satisfaction. CPFR connects sales and marketing practices to supply chain planning and execution processes to increase availability of products while reducing volumes of inventory, transportation and logistics costs. (VICS, 2004)

CPFR reference model shown in Figure 2 provides a framework for collaboration, which consists of a cycle of *collaborative activities* performed by manufacturer, retailer, and consumer: *Strategy & Planning, Demand & Supply Management, Execution, and Analysis.* Each arrow in Figure 2 shows *collaboration tasks* that describes the next level of detail. The rings of manufacturer and retailer in the figure show *enterprise tasks* that support the collaboration tasks.

For example, Demand & Supply Management (collaborative activity) is broken into Sales Forecasting (collaborative task), which projects consumer demand at the point of sale, and Order Planning and Forecasting (collaborative task), which determines future product ordering and delivery requirements based on the sales forecast,

Figure 2. Manufacturer and retailer tasks in CPFR reference model



inventory, transit lead times, and other factors. Order Planning and Forecasting task consists of retailer's Replenishment Planning (organizational task) and manufacturer's Demand Planning organizational tasks. By combining the results of these organizational tasks, a collaboration task is accomplished. Collaboration tasks will contribute to a collaboration activity. Collaboration activities comprise a CPFR activity cycle.

CPFR reference model can be extended to involve more than two trading partners. This is called *n-tier collaboration* to refer to the relationships. For example, a ring-shaped layer for suppliers can be added on the outside the manufacturer layer to involve suppliers.

CPFR is a business practice guideline and collaboration framework but not a cure-all for supply chain problems. In the following Hewlett-Packard (HP) case, we can learn that a holistic approach is required to maximize the effectiveness of CPFR. HP was an early adopter of CPFR, but they faced a serious problem in 1999: long leadtimes, highly variable demand, and a high amount of forecast errors. As a result, resellers were not happy with uncertain delivery dates, high inventory and many out-of-stock items, and they could not reliably support promotions with HP products. The sources of the problems were as follows:

- **CPFR not integrated with manufacturing:** CPFR process with major retailers was not working because the planning and forecasting generated using CPFR was not used for the actual planning on which manufacturing worked. All it did was to add a demand signal without any process to integrate the information.
- **Poor quality inventory data.**
- **Slow demand changes:** The factories in Asia worked on a monthly plan, which made demand changes take a long time to be reflected in production plans.
- **Inaccurate demand forecasting:** Accurate demand forecasting at the item level couldn't be achieved. As a result, supply chain had to use expensive mechanisms such as manufacturing more items than needed and expedited shipping in order to cope with uncertain demands.

After identifying the problems, they focused on demand management (all aspects of predicting demand and product allocation), supply planning across supply chain and data quality management. HP revamped CPFR model for precise short-term item-level forecasting. A Newly developed supply/demand match tool (an allocation engine) gave higher priority to resellers' previous commitments than new demands. The factory moved to weekly production measures and weekly delivery plan from monthly. By changing to weekly plan and metrics, they were able to predict when products would arrive and synchronize data with production plan from CPFR. As a result, when allocating

supply, sales force was not limited to quantities in the inventory, but could commit to units not yet produced in Asia. With ability to change production more often, HP was able to achieve increased sales, fewer stockouts, and lower inventory. In addition, having collaborated on forecast and business plans of HP, resellers were able to grow confidence in HP's execution. They said, "you can only synchronize the supply chain by working backward from the customer, understanding demand and all its fluctuations in detail, and focusing on business process instead of technical" (Culbertson, Harris, & Radosevich, 2005).

Sales Force Automation (SFA)

Sales Force Automation (SFA) applications support selling processes performed by a company's sales force by helping salespeople manage leads, prospects and customers through the sales pipeline (Turban et al., 2006d). SFA keeps track of the steps in a sales process that include contact management, sales lead tracking, sales forecasting and order management, and product knowledge (Haag, Cummings & Phillips, 2007). SFAs are not new, however, in the past, they have been delivered as mainframe based or client server *from* the enterprise. This architecture bound the sales force to establishing communication sessions (usually dial-up) in order to use these tools. The advent of SalesForceDotCom (SFDC) brings many changes and advantages.

SFDC is delivered as Software-as-a-Service (SaaS). SaaS allows companies to buy the capabilities of high-end software solutions without investing infrastructure and support and the overhead of maintaining systems. The SaaS model allows software vendors to offer a subscription service at prices that allow them to capture the market from the smallest companies to the largest. Overnight, the playing field was leveled in terms of access to sophisticated, state-of-the-art technology.

The ubiquity of the wireless Internet means that the sales force is virtually always connected. No more returning to home or a hotel at the end of the day to synchronize with the server is required. This virtually constant connectivity, along with workflow and analytical tools built into the Customer Relationship Management (CRM) platform, has created high expectations for sales management. Management at the home office imagines that delivering these tools to the sales force will create an overnight transformation in productivity. Information can flow faster, so management expects the business to be more nimble. The new CRM-enabled sales force will return a minute-by-minute view of sales and pending sales. Instant connectivity will provide up to the minute status on sales call status, promotion effectiveness, competitive information, and sharing of best practices.

It is possible to achieve these goals, but management needs to first address what is in the CRM tool set that benefits the sales person. Often, CRM tools are implemented with the benefit to home office management in mind—a level of scrutiny that typical sales people do not welcome. If CRM tools are used only to monitor performance and don't bring a value to the sales person, the tools are likely to fall into disuse or worse, systems will be populated with marginally accurate information upon which, management could not make quality decisions.

Product Lifecycle Management (PLM)

Increasingly, product research, development and sales are being executed collaboratively around the world, and shorter time-to-market and entering to new market is critical in most industries. In order to address the business needs, a strategic business approach is necessary. Product Lifecycle Management (PLM) is a set of business solutions that support collaborative creation, management, dissemination, and use of product definition information. PLM supports the extended enterprise including design and supply partners, and customers by integrating people, processes, busi-

ness systems and information. It manages all the process and data spanning from concept to end of life of a product or plant (CIMData, 2007).

PLM is not just a product but an information framework to realize the vision stated above. It frequently consists of a variety of solutions including Product Data Management (PDM) with collaboration support, 2D/3D design and visualization solutions, supplier management, system and data integration solution, and decision support system. It cannot be emphasized more that these are not separate but solutions *integrated seamlessly* with each other to provide a PLM framework.

PDM is an IT solution that enables people across departments to readily access the latest versions of detailed product information throughout the life cycle. PDM also facilitates collaboration to support innovation, promotes reuse of designs, and keeps design personnel from working on a wrong version of product data (Aberdeen Group, 2007). Collaborative project management tool, such as PTC® Windchill® ProjectLink (PTC, 2007), enables companies—including their employees, partners, suppliers, and customers—to work together on projects through Internet-based workspaces. Such solution can provide access to projects, project information, tasks, milestones, meetings, schedules, and activity status. Additionally, collaboration part fused with the solution can provide real-time visibility to current documents, information on parts, and plans to accelerate time-to-market, foster innovation through real-time group collaboration, automate key business process and quality management and ensure compliance to standards (PCT, 2007). In order to facilitate the automation of processes, workflow management systems are often integrated. Products such as IBM® Live3D provide innovative synchronous communication tools, which allows collaborative information navigation and search on PLM, 3D image sharing, and contextual buddy list (IBM, 2007).

2D/3D design and visualization solutions include Computer Aided Design (CAD) tools, digital mock-up design tools, image asset management, and search tools, which are frequently integrated with PDM. Supplier management solution does similar jobs to SCM. It allows users to manage information on suppliers and vendors and their supplied parts, view quality history of the parts, inventory history, and stock information.

PLM have to provide a seamlessly integrated view on enterprise information across different departments and organizations. In order to fulfill the requirement, enterprise integration solution, such as Enterprise Application Integration (EAI) and Service Oriented Architecture (SOA), can make it easy to integrate information system and data.

Once again, the above mentioned functionalities and solutions are seamlessly integrated to provide a PLM framework. For example, a PLM can access, display, and update children's bike manufacturing data with parts, 3D visual images of parts and the bike, digital mock-up search, list of approved vendors, inventory history, and current status, quality issue history, and so on, using multiple screens at the same time.

Recently, PLM's main focus has been put on *globalization*, *product and process innovation*, *decision making*, and *compliance*, which are interrelated (Thalbauer & Ohnemus, 2007). In order for a global company to be successful, information technology should support talents scattered around the world to be able to collaborate on research, development and marketing. Information should be shared and synchronized, and relevant processes should be integrated among collaborating organizations such as supply chain, research and development, and manufacturing partners. Consistent information across PLM with enterprise applications such as Enterprise Resource Planning (ERP), SCM, Customer Relationship Management (CRM), legacy systems, suppliers' information systems, production plant systems, and inventory systems are necessary. With the

shared, integrated, and synchronized information and knowledge, teams are joined, knowledge is shared faster, and innovative products and process can be created and delivered. In addition, decision making can be based on more precise knowledge resulting better results.

As a global company enters geographically distributed markets, different rules and regulations apply, making business complicated. One recent related issue is environment-preserving, green products. Environmental regulations are complicated and different from country to country. Products cannot be sold in a country unless its rules are followed. One of the PLM's objectives is to make the products and process comply with regulations so that their products can reach the markets.

The future of PLM can be projected by looking at recent industry trends and requirements on PLM. Even though PLM can be used in most manufacturing industries, a group of industries shows the representative requirements for PLM: high tech electronics, automotive, and consumer products industries. *High tech* industry's overall trends include short product life cycle with a small time span of high margins, fast technology adoption and highly competitive with intense price-pressure. In the *automotive industry*, customers expect increasing functionality at a constant price. New competitors pressure the market with low-cost products, and rapid prototyping. They can achieve these by using PLM tools to provide up-to-date data to design, source, manufacture, and market, which allows them to identify potential problems early in the life cycle. To make the matter more complicated, there are a large number of design, supply chain, and manufacturing partners who need to participate. If an automotive company is to be successful with a PLM strategy, another issue has to be managed carefully: the potentially huge number of possible configurations in a model. *Consumer product* market trends can be summarized as saturated market, shorter product life cycles, explosion of variety of products and brands, customers sensitive to prices, complex compliance for processes, specifications and materials. More than 30,000 products are introduced a year and more than 60 percent fail in the market. Innovations are copied quickly and there is shorter time for high profit (Thalbauer & Ohnemus, 2007).

To cope with the trends and requirements, future PLM will focus on supporting collaboration with external partners in one system to reduce design time improving time-to-market, reduce cost, increase agility, and provide partners privilege to authorize many aspect of information. PLM should connect digital designs generated using 2D/3D authoring tools with production simulation and manufacturing. *Flexibility* is a key for integration so that continuously changing system environment—due to collaboration with business partners and their IT systems, mergers, acquisitions, and innovative processes and ideas—can be facilitated.

Use of PLM should ensure product and process quality, and compliance with development standards, production standards, and target market regulations. PLM should allow the organization to keep up with technology advances and market requirements in the industry while fostering and speeding up innovative ideas and protecting intellectual property (Thalbauer & Ohnemus, 2007). Other conjecture is that use of on-demand, Software-as-a-Service (SaaS) type of PLM will become popular in the near future especially among small and medium enterprises (SMEs). SaaS solution, as in SCM and sales force automation, will allow a global company and its world-wide partners to collaborate on one 3rd-party-hosted Web-based system using standard Internet technology at a low cost. They can add solutions and functionalities to their PLM as needed. Companies will not be required to have an IT team to administer hardware and software to host PLM while performance and service will be reliable. In summary, reliability, flexibility, low total cost of ownership, and high Return on

Investment (RoI) are benefits of SaaS PLM. This will give SMEs competitive edges against larger competitors.

Software-Oriented-Architecture (SOA)

It is consensus that the Web has revolutionized the way we research, do business and live. The contents delivered by the Web infrastructure (Web servers and the Internet) are primarily for humans. The idea of letting computer software exchange information each other using the Web infrastructure, what we call *Web Services*, is changing the way we build and run computer software. The Web Service is the underlying technology of *Software-Oriented-Architecture* (SOA), even though SOA is not limited to using Web Services. Using standardized, platform-independent technology such as the Web and eXtensible Markup Language (XML), Web Services are platform-independent, and they can be used like LEGO® blocks to build a computer application. The idea of software module is not new, but the old idea has been brought to the world of networked computers (Margolis, 2007a).

Using the networked software modules, what we call services, SOA provides an effective medium to build and integrate software modules running on a variety of different platforms and provided by different service providers. It can facilitate collaboration among departments in a geographically-dispersed global company and even business partners. Another benefit of SOA is that companies using the SOA-based software can respond quickly to the changing requirements of marketplace (Margolis, 2007b). In these respects, SOA provides a flexible integration mechanism required for collaborative software discussed in the previous section that discussed PLM. Lopez (2005) reported that SOA adoption rates vary by industry and the highest adoption rates are found in industries characterized by rapid changes and high dependency on information services.

When there are useful Web Services available, sequencing and orchestrating Web Services from many different service providers can accomplish a business process collaboratively. The idea of sequencing and orchestration of services is basically adopted from workflow process, and there is a standard to describe a business process using services, referred as Business Process Execution Language (BPEL) (OASIS, 2007). Currently, IBM® WebSphere, Microsoft® Vista and BizTalk, SAP, Active Endpoints's ActiveBPEL®, Oracle® BPEL Process Manager, and many other software vendors are supporting BPEL. A set of business process execution capability can be used to compose a collaborative computer application.

SUMMARY AND CONCLUSION

We have discussed two categories of collaboration tools used in collaborative enterprises: unstructured collaboration tools and structured collaboration tools. Unstructured collaboration tools are computer-mediated communication (CMC) tools that facilitate ad-hoc collaboration. Asynchronous and synchronous CMC tools including their functions, business impacts and managerial implications have been discussed. Structured collaborations include IT solutions and frameworks that facilitate collaboration across the boundaries of organizations. Team workspace tools, workflow management systems, collaborative Supply Chain Management (SCM), Collaborative Planning Forecasting Replenishment (CPFR), Sales Force Automation (SFA), and Product Lifecycle Management (PLM), including their functionalities, business impacts, case studies, future directions, and management perspectives were given. Service Oriented Architecture (SOA) has been discussed as a flexible and timely integration method.

As a conclusion, we would like to summarize the managerial issues and perspectives on employing collaborative technologies. SFA is an example of a principle that applies to any business

that intends to adopt any new collaboration tool. Delivering the technology platform will change the organization, but without thoughtful planning and policy, the change achieved may not be the one intended.

If a business expects a great value from the implementation of a CMC technology, such as *sharing of best business practices among employees* using Wiki or team workspace tools, it should be carefully considered on whether changes in the business culture will be *delivered* by the technology or merely *enabled* by the technology. To get the greatest value from collaborative technologies, management needs to provide strategy, policy, procedure, training, and values to its employees by using the technology. In addition, the business needs to develop a new way to measure success of workers so that their performance evaluations and use of the technology are consistent with the success of the enterprise. Otherwise, the investment will be just wasted without being used. The stakes are raised even higher for larger companies that wish to revolutionize their way of doing business by adopting PLM tools. Without a strategy to revolutionize the business processes that are enabled by PLM tools, implementing tools alone or with a limited vision of only improving cycle time will prevent the business from maximizing the value of their investment.

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KEY TERMS

Collaborative Commerce: Collaborative efforts among businesses using digital technologies for supply chain activities such as collaborative production planning, forecasting, automatic ordering and order fulfillment, and research and design of products.

Collaborative Enterprise: A Company that exercises collaborative commerce

Computer-Mediated Communication (CMC)Tools: Computer applications that facilitate communication among human participants.

Product Lifecycle Management (PLM): A set of business solutions that supports collaborative creation, management, dissemination, and use of product information including CAD design, parts, suppliers, inventory, and marketing information.

Sales Force Automation (SFA): Applications support the selling process performed by a company's sales force by helping salespeople manage leads, prospects, and customers through the sales pipeline.

Service Oriented Architecture (SOA): A way of organizing software using networked software modules, what we call *services.*

Team Workspace Tool: A type of asynchronous collaboration tool that provide a group of users with access to shared work repositories with access control and data management capabilities.

Work. ow Management Systems: A set of business process automation tools that can design and execute a workflow, and monitor its execution.

Chapter XXX
Trust, Social Networks and Electronic Commerce Adoption

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ABSTRACT

This chapter uses the structural and relational dimension of Social Capital Theory as the lens for examining the factors affecting a Small and Medium Enterprise's (SME) intention to adopt electronic commerce (EC), using a one-shot experimental design. The findings suggest that in terms of the network structure, Thai SME owner/managers predominantly use their strong ties (such as family, relatives, friends) when discussing EC adoption issues. Moreover, trust in social networks (both predisposition to and experience of trust) was found to significantly influence the intention to adopt EC. This means that when Thai SME owner/managers are considering exploiting a potential business opportunity, the trustworthiness of the social network member appears to be more important than their credibility. An important implication of the findings is that, in mostly using their strong ties with family and friends, Thai SME owner/managers may not be obtaining accurate information about the benefits and costs involved in EC adoption.

INTRODUCTION

This chapter uses social capital theory as the lens for examining the factors affecting **Small and Medium-sized Enterprises (SMEs)** intention to adopt **electronic commerce (EC). EC** refers to the trade of information, goods and services using computer networks (Daniel & Wilson, 2002). The importance of **EC** has arisen as part of globalization and it is expected to reshape the way firms conduct business (OECD, 2005). Information technology generally, and the internet in particular, has been a strong driving force enabling globalization because it offers an avenue for efficient business transactions (Tan & Teo, 1999). However, while there have been studies examining the factors affecting the adoption of EC by big business, there has been less research into these issues within **SMEs** (Daniel & Wilson, 2002; Dutta & Evrard, 1999). Within Thailand, **SMEs** are defined as enterprises with fixed assets of 20-100 million bahts and those employing 20-100 employees (Intrapairo & Srivihok, 2003). In addition to these specific dimensions, SMEs often differ from big businesses by being independently owned and operated. Moreover, they are often time poor and, as a result, may focus more on operational activities (Garengo, Biazzo & Bititci, 2005) aimed at survival rather than growth (Gray, 2002).

Researchers have used numerous approaches (evident in the Information Systems (IS) and technology and innovation adoption literature) to identify the factors that may affect a firm's decision to adopt EC. This chapter differs from past approaches in that it uses a **Social Capital** Theoretical framework as the lens for examining the factors affecting SME owner/manager's intention to adopt EC. **Social capital** theory argues that individuals and groups are more productive because of the **social network** relationships that link them (Taylor, Jones & Boles, 2004). This is because the benefit associated with belonging to a **social network** is that it provides access to knowledge and resources that may benefit recipients (Lin, 2001).

Theorists have identified three dimensions of **social capital**. These are the structural, cognitive and relational dimensions, which can be used to explain outcomes in business (Nahapiet & Ghoshal, 1998). The structural dimension refers to the structures embedded within organizations promoting links. Structural **social capital** has been examined by entrepreneurial researchers by analyzing the number of contacts that occur and connect individuals. These connections over time become trusted sources of knowledge and resources because the rules that govern their interactions (whilst usually intangible and non-verbal) also facilitate relationship building (Burt, Hogarth & Michaud, 2000).

The cognitive dimension refers to the shared values, beliefs and norms that bind SME owner/managers together (Nahapiet & Ghoshal, 1998). Hence, examining the rules that govern how relationships amongst SME owner/managers develop is an example of analysing relationships using the cognitive dimension lens (Kessels & Poell, 2004; Nahapiet & Ghoshal, 1998). The development of shared values and beliefs affect relationship building in a number of ways. Once members interact to the extent that the rules about behavior become evident, then the relational dimension of **social capital** develops.

The relationship dimension of **social capital** examines the **networks** in terms of the quality of relationships. Past research suggests that effective relationships are characterised by a high level of **trust** amongst members and that once trust is established, the benefits accrue to members (Adler & Kwon, 2002; Tsai & Ghoshal, 1998). According to BarNir and Smith (2002) and Das and Teng (1998), members who share similar norms and beliefs learn to trust one another. The benefit of this trust for both parties is that governance rules develop about future behavior, which allows members to predict whether other members can be trusted to abstain from using new information for their

personal benefit. When members develop trusting relationships, the environmental and governance conditions are ideal for them to transfer relevant knowledge, information and support (BarNir & Smith, 2002; Hoang & Antoncic, 2003). Therefore **trust** is obviously an important ingredient impacting on the effectiveness of **social networks** within the business world for those SMEs interested in exploring new business opportunities.

There are three reasons for this research. While there has been extensive research on social networks, there has been limited research examining the impact of cognitive process such as trust (O'Donnell, Gilmore, Cummins, & Carson, 2001) on SME owner/managers' perceptions about business opportunities (Brunetto & Farr-Wharton, 2007; Sherer, 2003), particularly in relation to EC adoption (McKnight, Choudhury, & Kacmar, 2002). Moreover, while past research of US firms predominantly asserts the high value of social networks in promoting collaboration amongst firms (Sherer, 2003; Singh, Hill, Hybels & Lumpkin, 1999), the findings from Brunetto and Farr-Wharton (2007a, b) suggests that trust amongst Australian SMEs significantly affected their perception of the value of networks. In addition, whilst there has been some research exploring implementation factors affecting EC adoption within developed countries (such as the US), there has been far less research examining these same issues within developing countries (Da Silveira, Borenstein & Fogliatto, 2001; Straub, Keil & Bremer, 1997).

Hence, this chapter examines the structural and relational dimensions of social capital in order to provide new information about the importance of trust within social networks on Thai SME owner/managers' intention to adopt EC. Thailand SMEs are examined because EC is important for them in promoting and selling their products and services and therefore EC adoption is an important ingredient for driving sustainable competitive advantage (Intrapairo & Srivihok, 2003).

BACKGROUND

The Link between Social Networks and Social Capital Theory

As stated, the basis of **Social Capital** Theory is that the quality of **network** relationships affects the access of members to a range of resources and information (Lin, 2001). The quality of the ties that bind members together is in turn dependent on whether there are established rules and norms about trust, reciprocity and obligations behavior (Adler, 2001). These norms are the basis on which relationships are built because they determine both acceptable and unacceptable behaviors and actions. These invisible bonds amongst members promote the development of trust that, over time, increases the level of information, resources, favours and/or other privileges that can be expected by other members to be exchanged (Coleman, 1988; Tsai & Ghoshal, 1998). In summary, **social capital** results from the formation of effective **social networks**.

There are two types of networks discussed in the entrepreneurship literature. O'Donnell et al. (2001) argue that most entrepreneurial research about networks is either about inter-organizational or social (personal) networks. Casson (1997) defines **social networks** as people who are directly or indirectly linked together in a social group. This is an important issue because past research suggests that one significant place where entrepreneurial firms go to learn about new opportunities are their **social networks** (Shaw & Conway, 2000). **Social network** theory assumes that the relationships between the connected members of inter-organizational networks can be examined as a system because there are specific characteristics evident across systems of people at the interpersonal, group and organizational levels (Scott, 2003). However, the value of information derived within **social networks** is dependent on whether social network recipients acknowledge and use the information in their perceptions related to **EC adoption**.

One factor that affects the impact of information derived from social networks is the quality of **trust** amongst members of the social network and this factor has been identified as significantly affecting entrepreneurial success (Casson, 1997; Hoang & Antoncic, 2003). An effective social network is defined as a "high trust **social network**" (Casson & Guista, 2007) that "either directly or indirectly link together everyone in a social group" (Casson, 1997, 813). Hoang and Antoncic (2003) argue that **networks** can be examined by analysing their three dimensions: network content, network governance and network structure. Network content refers to the quality and quantity of relationships in place to either promote or thwart actors' attempts to exchange information and resources as needed. The first step in this study is to identify the size of the network content using the following research question (RQ) to guide the data collection process:

RQ1 What is the network content of Thai SME owner/managers and how useful are their networks for discussing EC?

The second step in this study is to examine network governance in order to examine the impact of some of the mechanisms used by members to protect themselves in their exchanges with other members. **Trust** between partners is a crucial element in network governance because it affects the quality of information flow and it is examined later in the chapter. The third step in this study is to examine network structure, which refers to the pattern of linkage between actors in particular networks (Hoang & Antoncic, 2003). The linkages can be either direct or indirect in its ties, which in turn affects the strength of ties.

Strength of Ties

Past research suggests that the strength of **ties** amongst members affects the potential benefits resulting from the **social network** (Levin & Cross, 2004). **Social network** theory argues that social capital forms within successful social networks because of the characteristics of both the dyadic relationships in social networks and the overall structure of the social networks (Rowley, Behrens & Krackhardt, 2000). The dyadic characteristics result from the relationship between each pair of actors in the social networks and it can be measured through the differences in tie strengths. Hansen (1999) postulates that the concept of tie strength is characterised by the closeness and interaction frequency of a relationship between two parties. Similarly, Granovetter (1973) argued that the strength of a **tie** is a combination of four properties, namely the amount of time, the emotional intensity, the intimacy and the reciprocal services which characterize the **tie**. Hence, weak ties amongst members are characterised by lower amounts of interaction, emotional intensity, intimacy, and reciprocal services.

Past research has identified that both strong and weak **ties** have advantages, but in different ways. For example, Granovetter (1973) argued that weak ties are more likely to be sources of innovative ideas, whereas strong ties provide increased access and help to members. Hoang and Antoncic (2003) posit that for a network to be effective there must be both strong and weak ties linking individual actors. Strong ties are those amongst friends and family. Weak ties are those amongst business partners and acquaintances. The advantage of weak ties for business is that they provide access to a diversity of information relevant to running a successful business, and are therefore important in explaining entrepreneurial success (Huang & Antoncic, 2003). Batjargal and Liu (2004) also found that weak ties amongst Chinese entrepreneurs had a significant influence on their success because such ties helped to reduce their social risk when seeking access to private equity and venture capital.

Because tie strength is one of the most important network properties believed to facilitate the technology selection process (Suarez, 2005), the

knowledge transfer process (Levin & Cross, 2004) and change management (Tenkasi & Chesmore, 2003), this study examined how many persons the SME owner/manager discussed IT adoption with and the nature of the relationship. Such information was sought because previous research had identified that effective **social networks** tend to influence **EC adoption** in two ways; via the notion of diffusion of innovation (Deroian, 2002) and by providing relevant information for the adoption process (Casson, 1997). From the diffusion of innovation perspective, Roger (1998) argued that the adoption rate of any innovation is dependent on the values, beliefs, and past experiences of the social system. Similarly, Deroian (2002) and Casson (1997) postulated that the key ingredient for technological adoption is a strong network formation that assists members to discuss and collectively evaluate an innovation. Moreover, some researchers argue that these social processes occur more when strong ties exist because members are more likely to have frequent interaction, an extended history, some level of intimacy and sharing, and a history of reciprocity in exchanges that facilitate mutually confiding and trust-based behavior (Levin & Cross, 2004; Suarez, 2005; Tenkasi & Chesmore, 2003). To examine the ties of relevance for Thai SME owner/managers the following research question was proposed to guide data collection:

RQ2: Who belongs to the social networks of Thai SME owner/managers?

The final step in analyzing social networks using Hoang and Antoncic's (2003) three dimensions is to examine network governance. Whilst there are a number of factors affecting network governance, most authors identify the role of trust amongst social network members as a key factor affecting the information and resources they share.

Trust

Trust has traditionally been difficult to define and measure because it is a social phenomenon that has various definitions depending on the context (McKnight et al., 2002). However, Gefen, Rose, Warkentin and Pavlou (2005) have proposed the definition of **trust** in EC as being dependent on one member's belief about another member's intention to behave in a socially acceptable manner. Moreover, Gefen et al. (2005) argued that when people shared common values then they were more likely to be more trusting of other network members. On the other hand, McKnight et al. (2002) argued that trust is a multidimensional construct and should therefore be examined in a multidimensional way. Zucker (1986) argues that there are three forms of trust; characteristic-based trust (based on member's characteristics), process-based trust (based on established history) and institutional-based trust (determined by established practices). Moreover, Fulop (2000) and Bower, Garber, & Watson (1996) also argue that the past behavior of one party affects the present trust levels of the other party. They examined how past behaviors influenced the time taken to develop a trusting and co-operative relationship irrespective of the controls held by each party and found this variable to be important.

In addition, there is support from other researchers about the importance of a member's own predisposition to trust because of their own personal belief systems. For example, according to McKnight, Cummings & Chervany (1998, p. 474), an individual's faith in humanity can produce some level of trust in another person due to the initial novelty of a relationship. They argue that the initial trust is not based on experience or knowledge of the other party, but rather the individual's disposition to trust (meaning "a tendency to be willing to depend on others") (McKnight et al., 1998, p. 474). Brunetto and Farr-Wharton (2007a, b) also found that both predisposition to trust and

experience of trust significantly affected how SME owner/managers perceived the benefits of networks as a source of business opportunities. A later study by McKnight et al. (2002) identified five dimensions of trust, including those previously identified by other researchers (trust based on past experience and predisposition to trust) as well as other trust dimensions such as institution-based trust behaviors that is "the belief that needed structural conditions are present (e.g., in the Internet) to enhance the probability of achieving a successful outcome in an endeavor like EC" (2002, p. 339).

Whilst all five dimensions of **trust** are likely to impact on EC adoption, a review of the literature suggested that there was strong support for focusing on the impact of two of the more commonly used constructs; "Disposition to trust" and "Experience of Trust" on the intention to adopt EC. One way of examining these EC intentions is via a Technology Acceptance Model (TAM).

Technology Acceptance Model (TAM)

The Technology Acceptance Model or TAM is regarded as a relatively robust theoretical model for explaining IT use (Straub et al., 1997). The model assumes that adoption is a function of two independent variables:

- Perceived Usefulness (**PU**) is the extent to which users believe that IT can help them to perform their job better (Straub et al., 1997)
- Perceived Ease of Use (**PEOU**) is the extent to which the prospective users expect that the system usage is free of effort (Davis, Bagozzi, & Warshaw, 1989)

TAM has been widely used to predict the acceptance of users in the technology adoption area (Gefen, Karahanna, & Straub, 2003; McCoy, Everard & Jones, 2005; Veiga, Floyd, & Dechant, 2001). In addition, Venkatesh and Davis (2000) argue that across numerous tests of TAM, PU has consistently been a strong determinant of intention to use a system. One explanation is that PU is a fundamental driver of usage intention. PEOU, on the other hand, exhibits less consistent effect on usage intention across studies. However, Straub et al. (1997) assert that numerous studies have found that PU and PEOU correlate well with IT acceptance across a wide variety of Information Systems. On the other hand, even with the extensive attempts to understand and apply TAM, this line of research has not yet been extended beyond the boundaries of North America (Straub et al., 1997). The hypothesis used to test the relationship between TAM and trust in Social networks is:

H1: *There is a significant positive relationship between* ***trust*** *in the* ***social networks*** *of Thai SME owner/managers and* ***PU****.*

H2: *There is a significant positive relationship between* ***trust*** *in the* ***social networks*** *of Thai SME owner/managers and* ***PEOU****.*

Behavioral Intentions and EC Readiness for Adoption

Several research studies have been conducted to investigate the factors affecting **EC adoption**. The present study uses "**Behavioral Intention**" (BI) and "EC Readiness" as the two dependent variables measuring EC adoption. BI refers to the intention to use EC in small and medium firms in the Thai hospitality industry. According to the theory of reasoned action (TRA), a person's decision to perform a specific behavior is dependent on his or her **behavioral intention** (BI) to perform the behavior (Davis et al., 1989). This attitude is in turn influenced by a specific belief regarding the consequence of a particular behavior. Previous research has already identified that TAM is an antecedent of BI (Ajzen, 1991; Davis et al., 1989).

In addition, a number of researchers have argued that **EC readiness** is not only influenced by the technological perspective; instead psychological constructs such as "trust" within social networks are also important (McKnight et al., 2002). In particular, Wu and Chen (2005) view **trust** as a common mechanism for reducing social complexity and perceived risk of transaction through increasing the expectation of a positive outcome and perceived certainty about the expected behavior of trustee. Similarly, McKnight et al. (2002) postulate that EC is a kind of social medium and the decision to adopt EC not only depends on the perception of the technology but also on the beliefs about the e-vendors (i.e., their trustworthiness). In an attempt to develop an eReadiness model for EC adoption in developing countries, Molla and Licker (2005) identified that organizational factors (such as the presence or absence of adequately trained staff) were more influential than environmental factors (such as market competition) in the initial stage of the adoption process. Once the first stage has successfully passed, environmental factors tend to become more supportive and accelerate the adoption process. The final hypotheses are used to test the impact of TAM variables on BI and secondly, to test the impact of trust in social networks and BI on EC readiness:

H3: *There is a significant positive relationship between* ***TAM*** *and* ***BI****.*

H4: *There is a significant positive relationship between* ***trust*** *in* ***social networks****,* ***BI*** *and* ***EC adoption****.*

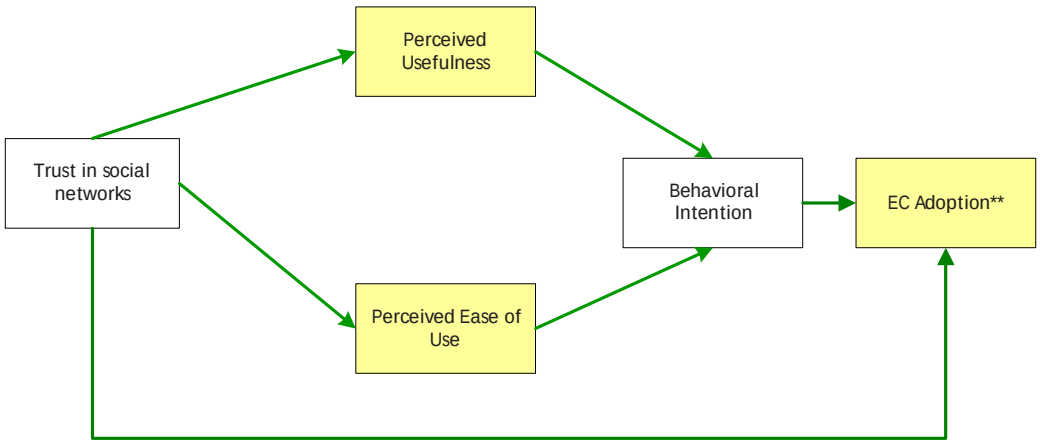
Figure 1 details a summary of the research model examined in this study. The model begins by examining the impact of Predisposition to trust (PT) and Experience to trust (ET) on TAM variables. Then the model examines the impact of TAM variables on BI and finally, the model examines the impact of BI on EC adoption.

METHODS

Context of Study

In the case of Thailand, the Thai Government has introduced a policy aimed at promoting the adoption of EC. The National Information Technology Policy (also known as IT2010) is expected to serve as a blueprint for the country to become knowledge-based and competitive. The policy consists of five main flagships: e-Government, e-Commerce, e-Industry, e-Education, and e-Society (Keretho & Limstit, 2002). However, the

Figure 1. Proposed research model



policy implementation process has been affected by the lack of sufficient IT knowledge within the SME business community, which has in turn made them reluctant to invest in building IT facilities. Moreover, only a very small percentage of Thais have access to the internet at present (Hongladarom, 1999). On the other hand, Palmer and McCole (1999) argue that the travel industry in particular is greatly affected by the proliferation of EC technologies because of the complex nature of travelling products and the different needs of customers. Hence, the context of this study is the impact of trust in social networks on EC adoption intentions of SME owner/managers within the hospitality industry in Thailand.

Thailand has a population of 64.6 million people (2004) and a per capita GDP of $2,419US. SMEs contribute approximately half of all national GDP (Intrapairo & Srivihok, 2003) suggesting that they are indeed a key driver of the Thai economic system. Moreover, previous research suggests that whilst Thai SMEs perceived the Internet as a powerful channel to promote and sell their products and services (Intrapairo & Srivihok, 2003), research by Electronic Commerce Resource Center (1999) using a survey of 656 participants found that only 29 percent of participants had developed e-Commerce capability for business transactions because of a perceived lack of support such as training programs dealing with security systems, technology use, law, and homepage construction. Hence, while Thais were enthusiastic about the potential benefits of using EC, most had not adopted it.

Sample

Purposive sampling: The purpose of this paper is to study the role of **trust** in **social networks** on **EC adoption** for Thai SMEs involved in the hospitality industry. The major reason that this study focuses only on firms in the hospitality industry is because this industry is very sensitive to change in technologies (Palmer & McCole, 1999). Moreover, large foreign hotel chains that have expertise in predominant technologies dominate the Thai hospitality industry. If Thai SME owner/managers fail to adopt new technologies, then they are unlikely to survive. Hence, small and medium-sized hospitality firms (i.e., travel agent, hotel, and resort) are the area of interest of the present research.

Random sampling: The sample frame of the present research is the small and medium hospitality firm in Thailand. The list of Thai Small and Medium Enterprises (SMEs) was obtained from the Association of Thai Travel Agents (ATTA). The questionnaire was written in two versions (English and Thai) because some of the managers were foreigners.

Questionnaires were sent to managers and owners of Thai SMEs via e-mail. However, because only a limited number of SMEs use e-mail, another set of questionnaires were distributed and collected handled by a group of Thai university students. The students were given a list of small and medium hotels, resorts and travel agents with whom they left questionnaires. They returned to collect the completed questionnaires within several days.

Instruments Used

1. **Trust in social network** variables were derived from the work of Brunetto and Farr-Wharton (2007), who had in turn modified the scales used by McKnight et al. (1998) and Zucker (1986). The first variable was "Predisposition to Trust (PTT)". Typical examples of questions used in this scale were "People usually tell the truth, even when they know they would be better off, or gain advantage, by lying" and "Most people can be counted on to do what they say they will do." The second trust variable was "Experience of Trust (ETT)." Typical examples of questions used in this scale were "I have confided in people from my social network

and know that they have not discussed this with others" and "I have talked freely to people in my social network and know that they have listened".

2. **The technology acceptance model (TAM)** was derived from the work of Veiga et al. (2001). The first construct of "Perceived usefulness (PU)" is the measurement of the extent to which people believe that technology could help them perform job better. The question items are adapted from Venkatesh and Davis (2000). Typical examples of questions used in this scale were "Using the EC system improves my performance in my job" and "Using the EC system enhances my effectiveness in my job." The second construct, "Perceived ease of use" (PEOU) is the degree to which a person believes that he or she can use technology with freedom of effort. The question items are also adapted from Venkatesh and Davis (2000). Typical examples of questions used in this scale were "I find the EC system to be easy to use" and "I find it easy to get the EC system to do what I want it to do."
3. **The construct "Behavioral Intention"** measures an individual's intention to adopt EC. The question items are derived from Wu and Chen (2005). Typical examples of questions used in this scale were "Assuming my firm implements EC technologies, I intend to use it" and "Given that my firm implements EC technologies, I predict that I would use it."
4. The last construct **"EC readiness scale"** (Molla & Licker, 2005) is used to determine SME owner/managers perception of their likeliness to adopt EC, hereafter called "EC Adoption." The scale consists of 15 items and evaluates the perceptions of each respondent regarding their own firm's readiness and the country's readiness.

The respondents evaluated the degree of each subscale on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Therefore, a high score would reflect a high level of agreement with the statement.

Analysis

Path analysis is used to test the relationship among variables. Path analysis is an extension version of the regression model used to test the fit of the correlation matrix against two or more causal models that are being compared by the researchers (Schumacker & Lomax, 2004). It is very common in path analysis practice that a number of multiple regression equations are required using observed variables. The present research has used an ordinary least square regression (OLS) approach to perform path analysis. The OLS approach uses multiple regression method from the SPSS statistical package. The key feature of this approach is that it assumes perfect reliability of the instrument (Musil, Jones & Warner, 1998). In other words, this approach assumes the variables are measured without error. The advantage of using path analysis with OLS approach is that it estimates parameters with an independent system that could avoid the problem of multicollinearity (Grapentine, 2000).

RESULTS

Demographics

A total number of approximately 370 questionnaires were handed to the prospective respondents in Bangkok and some major provinces. A total of 298 questionnaires were returned; five of them were incomplete which left the final number of respondents at 293. The gender of the respondents was approximately even with 140 males and 153 females.

1. In terms of their age, approximately
   - 25 percent were below 25 years,
   - 52 percent were between the age of 25-34,
   - 17 percent were between 35-44,
   - 4 percent were between 45-54
   - .5 percent were over 65 years of age.
2. In terms of education levels, approximately
   - 20 percent had completed high school,
   - 17 percent had completed vocational training,
   - 50 percent had completed an undergraduate degree,
   - 12 percent had completed a postgraduate degree,
   - 1 percent had unspecified education levels.
3. In terms of business types, approximately
   - 14 percent were inbound tour operators,
   - 6 percent were outbound tour operators,
   - 7 percent were both inbound and outbound tour operators,
   - 54 percent owned/managed a hotel,
   - 5 percent owned/managed a resort,
   - 5 percent did not specify their business type.
4. In terms of business size, approximately
   - .3 percent had only one employee,
   - 5 percent had between 2-5 employees,
   - 14 percent had between 6-10 employees,
   - 9 percent had between 11-20 employees,
   - 19 percent had between 21-50 employees,
   - 53 percent had more than 50 employees.

Addressing the Research Questions and Hypotheses

The correlations among model variables are presented in Table 1. The correlation matrix indicated that all variables were significantly related to EC adoption and all variables except Experience of trust were significantly related to BI.

SRQ 1: For the first research question *(RQ1 What is the network content of Thai SME owner/managers and how useful is it as a means of discussing EC?)* survey respondents were asked to firstly list the number of people in their social networks and secondly to list the top five people who assisted them in recognizing the importance of EC. The findings suggest that almost all employees (98.94 percent) listed at least one social contact with shown they had discussed the issue of EC (see Table 2). The majority of respondents (49 percent) had network contacts of approximately "3-5" people followed by "6-10" people (17 percent). However, only 71 respondents or about 37 percent of total respondents could provide up to six names with whom they had discussed EC. In contrast, most of the respondents stated that they had discussed EC with up to two named people. Interestingly, more than 80 percent of respondents received an idea about EC from their social networks, however, in response to the question about the importance of the social network in recognizing the importance of EC, the mean was "3.06" (using a scale from 1 to 5) suggesting that social networks were somewhat useful (see Table 3).

RQ 2: To address the second research question (*RQ2: Who belongs to the social networks of Thai SME owner/managers),* SME owner/managers were asked to list the relationship of members in their social networks. Table 4 shows the types of relationships that respondents had with social network contacts. Almost half of the respondents (45 percent) classified their closest network contact as a family member or close friend, which was

Table 1. Correlation matrix and reliability of constructs (alpha scores)

Variables	Mean (SD)	EC Adoption	Behavio-rial Intention	PU	PEOU	Predisposi-tion to Trust	Experience to Trust
EC Readiness	3.63 (.594)	1 (.982)					
Behavioral Intention	3.51 (.468)	.87 **	1 (.901)				
PU	3.6 (.52)	.64**	.57**	1 (.775)			
PEOU	3.65 (.515)	.46**	.324**	.47**	1 (.705)		
Predisposition to Trust	3.49 (.752)	.29**	.14*	.35**	.313**	1 (.733)	
Experience of Trust	3.48 (.73)	.17**	.101	.18**	.33**	.16**	1 (.722)

*** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).*

followed by a colleague (26 percent). A similar pattern occurred with the second and the third person in the network. Interestingly, in addition to the respondents' relatives, friends and colleagues, it was found that customers and suppliers were also identified as a source of EC adoption ideas. In addition, Table 5 presents the characteristics of network relationships between the respondents and their referred people. The result indicated that the social network relationships were strong. More than 60 percent of the referred people in the list were the respondents' well-known contacts.

In summary, Table 2 indicates that approximately 49 percent of respondents had strong social networks comprising between three and five people and Table 3 suggests that they perceived the contacts as somewhat useful. Table 4 indicates that these people were predominantly relatives, close friends and employees of respondents. Even the fifth person listed in their social network (which comprised their customers, suppliers and business partners), was in most cases well known to them (see Table 5).

Table 2. Network contact (bold indicates highest frequencies)

Number of People in Network	Frequency	Percentage
0	3	1.06%
1	3	1.06%
2	48	16.90%
3-5	**140**	**49.30%**
6-10	49	17.25%
More than 11	41	14.44%
Total	284	100.00%

Table 3. Descriptive statistics of effectiveness of social networks

Item	Mean	Standard Deviation
How useful was your social network in helping you recognize the importance of IT?	**3.06**	1.153

Table 4. Type of relationship (bold indicates highest frequencies)

	Relative Friends	Co-founders	Employees	Customers / Suppliers	Business Partners	Industry Specific Persons	Gov Bus Advisors	Fed Bus Advisors
First Person	**44.9%**	9.1%	**25.6%**	7.4%	6.8%	2.8%	1.7%	1.7%
Second Person	**36.5%**	16.2%	**25.8%**	10.2%	2.9%	6.6%	1.8%	0.0%
Third Person	32.5%	15.5%	30.9%	10.6%	6.5%	4.1%	0.0%	0.0%
Fourth Person	12.7%	5.1%	31.7%	17.7%	13.9%	13.9%	3.8%	1.3%
Fifth Person	10.5%	10.5%	10.5%	**22.8%**	**24.6%**	10.5%	3.5%	7.0%

Table 5. Characteristics of network relationships (bold indicates highest frequencies)

	Not At All	Only Slightly	Fairly Well	Very Well	Extremely Well
First Person	9.55%	14.04%	14.61%	**38.20%**	**23.60%**
Second Person	10.59%	16.47%	20.00%	**33.53%**	**19.41%**
Third Person	12.80%	19.20%	24.80%	28.00%	15.20%
Fourth Person	2.70%	13.51%	33.78%	32.43%	17.57%
Fifth Person	14.29%	5.36%	12.50%	**19.64%**	**48.21%**

Hypothesis 1: To address the first hypothesis (*H1. There is a significant positive relationship between the trust in social networks of Thai SME owner/managers and PU),* a regression analysis was undertaken. Previous research had already identified that trust is a crucial factor in facilitating the EC adoption process (Gefen et al., 2003; McKnight et al., 2002). However, the relationship between TAM variables and trust in social networks has rarely been examined in IT adoption research studies. Table 6 presents the regression result for trust in social networks and PU. The result suggests that the hypothesis should be accepted because the variance of trust in social networks significantly accounted for 37.5 percent of Thai SME owner/managers' percep-

tion of the perceived usefulness of EC, however, only the beta score for Predisposition to trust was significant.

Hypothesis 2: To address the second hypothesis *(H2 There is a significant positive relationship between the trust in social networks of Thai business owner/managers and PEOU),* a regression analysis was undertaken. Table 7 presents the regression result of the influence of **trust** in social networks on PEOU. The hypothesis is accepted because 17.6 percent of the variance of the Perception of Ease of Use was accounted for by the trust variables.

Hypothesis 3: To address the third hypothesis (*H3: There is a significant positive relationship between TAM variables on BI to adopt EC),* a regression analysis was undertaken. The findings presented in Table 8 suggest that the hypothesis should be accepted because the variance for PU and PEOU accounted for 33 percent of the Thai SME owner/managers' intention to adopt EC. However, only PU had a significant beta score.

Hypothesis 4: To address the fourth hypothesis *(H4: There is a significant positive relationship between trust in social networks, BI and EC adoption)* a regression analysis was undertaken. The findings in Table 9 suggest that the variance of trust in social networks and Behavioral Intention (BI) accounted for almost 80 percent of EC readiness.

Testing the Model

The model proposed in Figure 1 suggested that ET and PT (trust variables), TAM, BI, and EC Adoption would be significantly related. Figure 2 confirms the model and identifies that **trust** in social networks had significant positive relationships with all variables. Moreover there are significant relationships between all other variables except for that between Perceived Ease of Use and Behavioral Intention.

Table 6. The regression result of predisposition to trust, experience of trust, and PU

Independent Variable	Beta	p-Value	t-Value
Predisposition to Trust	.334	.000	6.043
Experience of Trust	.126	.024	2.273
R-square	37.5%		

Table 7. The regression result of predisposition to trust, experience of trust, and PEOU

Independent Variable	Beta	p-Value	t-Value
Predisposition to Trust	.268	.000	4.950
Experience of Trust	.283	.000	5.240
R-square	17.6%		

Table 8. The regression result of TAM variables and behavioral intentions

Independent Variable	Beta	p-Value	t-Value
PU	.537	.000	9.854
PEOU	.073	.179	1.346
R-square	33.0%		

Table 9. The regression result of predisposition to trust, experience of trust, behavioral intention and EC readiness

Independent Variable	Beta	p-Value	t-Value
Predisposition to Trust	.173	.000	6.394
Experience of Trust	.053	.050	1.964
BI	.844	.000	31.475
R-square	79.9%		

DISCUSSION

This chapter used the structural and relational dimension of **Social Capital** Theory as the lens for examining behavioral factors affecting **EC adoption**. The structural dimension lens provided a framework for exploring how the structure of ties amongst the social networks of Thai SME owner/managers affected the quantity and quality of those networks (see Tables 2,3, 4, and 5). Within this theoretical framework, Hoang and Antoncic's (2003) conceptual dimensions (network content, governance and structure) were employed to guide data collection. The findings suggest that the network content (which is dependent on the number of links with other members) of the majority of the sample averaged approximately three to five members with a further 30 percent averaging at least 6-10 members (see Table 2). In addition, the members of social networks were perceived as at least somewhat helpful in discussing EC adoption issues (see Table 3). Moreover, in terms of the network structure, the findings suggest that Thai SME owner/managers predominantly used their strong **ties** (such as family, relatives, friends) when discussing **EC adoption** issues (see Table 4 and 5). This finding supports previous studies by Casson (1997) and Levin and Cross (2004) that identified that the frequency of contact and the intimacy of the relationships affected the quality of information flow. To explain why strong ties were important to these firm owner/managers, the relational dimension of social capital was used.

The relational dimension lens provided a framework for examining how behavioral factors such as trust can affect the efficacy of the ties in influencing EC adoption. Previous research had already identified that effective social networks are often defined as high **trust** networks because, as Hoang and Antoncic (2003) argue, this means that members perceive that this is the most appropriate governance environment likely to promote infor-

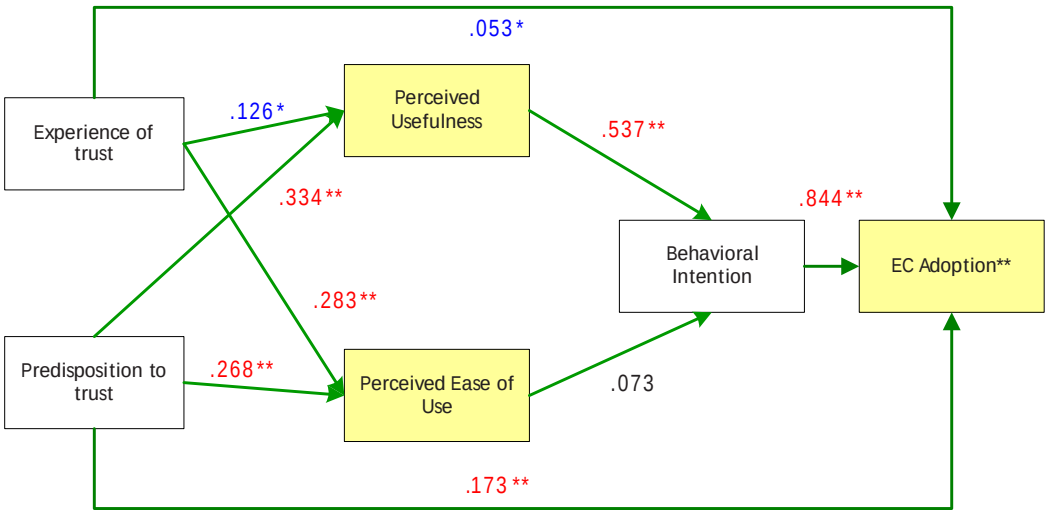
mation flows needed for SME owner/managers to make decisions about adopting EC (although such information may or may not be accurate). Using this framework, the next step was to examine the impact of trust variables within social networks (predisposition to and experience of trust) on EC adoption among Thai SME owner/managers. This led to the development of a model (see Figure 1) summarizing how trust in social networks affected EC adoption by affecting SME owner/managers' perception of the usefulness (PE) and ease of use (PEOU) of the EC. These factors in turn were argued to affect Thai firms' behavioral intention to adopt EC, which also affected their readiness to adopt. The data was analysed using OLS path analysis techniques.

The findings suggest that there is support for the model (see Figure 2). As such, the findings support previous research identifying the importance of trust in business and management on EC adoption (Gefen et al., 2003; Jarvenpaa & Tractinsky, 1999; McKnight et al., 2002) and business relationships (Hart & Saunders, 1997; Kumar, 1996), particularly for those relationships comprising SME owner/managers (Brown & Lockett, 2004). A study by Brown and Lockett (2004) found that trust was important for SMEs to seriously consider in the e-business adoption model in order to avoid the threat of the disintermediation effect. However, no previous research had examined these relationships between SME owner/managers within a developing country such as Thailand (Da Silveira et al., 2001; Straub et al., 1997).

The strongest finding from this research is that **trust** in **social networks** had a significantly positive influence on the EC adoption beliefs of Thai SME owner/managers. Both predisposition to, and experience of, trust were found to significantly influence EC adoption by affecting both TAM beliefs, perceived usefulness and perceived ease of use, BI as well as EC Readiness. Hence, these findings add new knowledge about the importance of trust on EC adoption within a developing country. More studies within other developing countries are required in order to develop a better understanding of the behavioral factors affecting EC adoption generally.

The limitation of this study is that the sample used only represented the one industry in one developing country, indicating that more studies within other industries and countries are required to confirm generalisability. In addition, because the trust development process is time sensitive,

Figure 2. The role of trust in social networks on TAM beliefs and EC adoption intention



future research should add "time" as one key variable in the model. Moreover, future research needs to examine the extent to which EC adoption varies between cities and rural areas because this could also affect people's trust.

CONCLUSION

This study makes several contributions to the social capital, networking and EC adoption literature. In relation to the **EC adoption** literature, the findings demonstrate that predisposition to, and experiences of trust are significant factors affecting Thai SME owner/managers' beliefs about the factors affecting EC adoption. Whilst there has been similar research about the impact of these factors within developed countries such as the USA, there has been limited research examining these issues within developing countries. The findings from this study provide new information about factors affecting EC adoption within the one developing country of Thailand.

The social capital framework proved useful in identifying which variables should be examined in the study. In particular, the structural and relational dimensions of social capital provided a framework for identifying the factors mostly likely to affect the quality of Thai **SME** owner/managers' relationships. The use of the structural dimension of social capital led to examining the importance of the strength of ties amongst social network members. The use of the relational dimension led to examining the importance of **trust** variables for Thai SME owner/managers when considering EC adoption. The findings identified that high-trust family and friend relationships rather than lower-trust business expert relationships (who may have had more accurate knowledge) were important for Thai SME owner/managers when discussing issues of EC adoption. It may be that the reason Thai SME owner/managers used their lower-trust (weak ties) relationships far less when discussing the potential implementation of EC was that they could not control or predict how these members would use the information.

This means that when Thai **SME** owner/managers are considering exploiting a potential business opportunity, the trustworthiness of the **social network** member appears to be more important than their credibility. Hence, the findings suggest that network governance factors (such as trust) strongly determine with whom they discuss such issues. That is, Thai SME owner/managers' perception of **trust** affects their perception of the efficacy of their social network relationships (strong or weak **ties**) (see Table 2 and 3 which identify that family and friends were perceived as only somewhat useful in discussing EC adoption, however, these same people were chosen most often to discuss EC adoption issues with) (Hoang & Antoncic, 2003). This finding supports previous research by Brunetto and Farr-Wharton (2007 a, b) that identified that lower levels of trust in business associates affected the type of information and activities that SME owner/managers' were prepared to share in networks. The implication of these findings is that the trusting behavior of Thai SME owner/managers amongst their business associates probably limits the formation of effective robust information-sharing networks needed to promote active collaboration amongst businesses or EC adoption. Such a finding makes a contribution to the **social network** research literature because the results identify how trusting behavior affects the perceived effectiveness of networks for SME owner/managers.

An implication of the findings is Thai SME owner/managers may not be accessing accurate information about the benefits and costs involved in **EC adoption** using mostly their strong **ties** with family and friends. Therefore there may be a role for government in assisting in the diffusion of more accurate information if that serves the national good. The findings of the present study suggest that it is likely that the Thai government has a major role to play in promoting EC adoption as per IT2010 by providing another source

of information about the issue of EC adoption in order to facilitate a more informed debate. Government sources may prove to be a trusted source of information because they have nothing personally to gain by diffusing the information. Hence, it may be that SME owners/managers are more likely to be prepared to believe information coming from the government; this issue requires further investigation.

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KEY TERMS

Cognitive Dimension: It is a dimension of Social Capital Theory used to provide a lens for examining network relationships by analyzing their shared values, beliefs, and norms.

Electronic Commerce (EC): The trade of information, goods and services using computer networks.

Relational Dimension: It is a dimension of Social Capital Theory used to provide a lens for examining the behavioral factors affecting the quality of network.

Small Medium Enterprises (SMEs): Enterprises with fixed assets of 20-100 million baht and employing 20-100 people.

Social Capital Theory: A theory which argues that individuals and groups are more productive because of the social network relationships that link them.

Social Networks: People who are directly or indirectly linked together in a social group.

Structural Dimension: It is a dimension of Social Capital Theory used to provide a lens for examining the quantity and quality of the links amongst network members.

Technology Adoption: The intention by an organization to invest in, and deploy a "new to the organization" technology.

Trust: Within a network, it refers to one member's belief about another member's intention to behave in a socially acceptable manner.

Chapter XXXI
A Proposition for Developing Trust and Relational Synergy in International e-Collaborative Groups

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ABSTRACT

Trust and relational development represents a critical challenge in online collaboration groups. Often the problem is attributed to several factors including physical distances, time differences, cultures, and other contributing factors. The challenge in virtual teams centers on creating a successful cohort that functions as a team and develops a sense of trust and cohesion in the process of accomplishing respective group goals. However, the lack of trust in online groups hinders relational development. The author contends that while online collaboration can be clouded by problems with trust and relational synergy as a whole, the problem is exacerbated in international online or e-Collaborative groups. The development of trust is essential to relational synergy and warmth that fosters successful task and social goal accomplishment. After reviewing related and extant research in online communication, the author offers some practical suggestions for facilitating and sustaining trust and relational synergy in international online collaboration with information communication technologies (ICTs).

INTRODUCTION

Computer-mediated communication (CMC) mediums such as e-mail and distribution lists are major ways in which business is being conducted in modern organizations (Craig, 2001-2002; Finholt & Sproull, 1990; Yu, 2001). Text-based CMC via e-mail, list servers, newsgroups (asynchronous), and chat rooms (synchronous) provide ways for individuals to be connected to other individuals and groups, and to obtain information or help that would have been difficult or impossible to

obtain otherwise. The dawn of the new millennium has seen increasing globalization wherein organizational communication and group interaction occurs through information communication technologies. Perhaps not surprising, estimates from Gartner Inc. suggest that the amount of time a particular employee will spend with others in different geographical location will increase by 40 percent before 2010 (Solomon, 2001).

BACKGROUND

At the same time, communication technology media are not without their criticism. For instance, online collaboration consists of meetings and interactions that exist through virtual space—that is, where participants interact, using communication technology media. A major criticism of online collaboration medium is the lack of nonverbal cues during interaction. The lack of nonverbal cues is believed to render the technology ineffective especially when compared with a face-to-face medium (Garton & Wellman, 1995; Olaniran, 2007a). While there is other communication technology (i.e., videoconferencing) that offers nonverbal cues via audio and video cues in virtual team collaboration, for the most part, virtual teams operate asynchronously to accommodate different time zones and to foster round the clock organizational applied resources and productivity. As organizations embark on online team collaboration and projects, they find themselves at a crossroad where accomplishing task goals are just as important as achieving relational goals in any given projects. Thus, organizations are challenged to attend to and balance both set of goals if they are to be effective. In an overview of extant literature that reveals findings from original research to explore strategies that users can develop or adapt to overcome the lack of nonverbal cues in the CMC media technology, the intent of this discussion is to improve the potential of virtual communication for constructing relationships. Specifically, the focus is on adapting communication technology media to develop trust and relational synergy in international online collaboration groups.

MAIN FOCUS OF THE CHAPTER

International online collaboration (e-Collaborative) teams represent a way for including employees in organizational participation and decision making processes (Olaniran, 2007a). Although one study showed that employee participation is correlated with commitment and that committed employees are more likely to be intrinsically fulfilled and have positive relational synergy with other employees (Mathieu & Zajac, 1990), one must be aware that commitment to an organization as a whole and commitment to work teams are different ideas (Becker & Billings, 1993; Morrow, 1993).

From most organizational standpoints, the impetus to use virtual teams for group collaboration is often economically driven (i.e., cost cutting, speed, and efficiency); however, there are some key challenges that often hinder success. Challenges in e-Collaborative teams include misunderstandings and conflicts through fragmented communication and difficulties maintaining relational ties among group members. Armstrong and Cole (2002) found that while geographically dispersed groups become integrated over time, they nonetheless experience problems associated with proximity (see also, Crampton, 2002; Olaniran, 1996a; 2001a; Solomon, 2001). Armstrong and Cole (2002) found that national cultures and distances, in general, experience problems that extend beyond miles and time zones even in integrated groups. Thus, they argued that organizational problems sometimes are recreated and reinforced within distributed groups. Similarly, Crampton (2002) contends that working from dispersed locations reduces the situational, and more importantly, the personal information, that collaborators have about one another. Consequently, the lack of this

information affects how group members process information and leads to the formation of *in-groups* and *out-groups* along with the associated behavior tendencies. While the lack of cultural competency can result in attribution errors, additional factors including motivation and other personality factors can also influence attribution processes that lead to errors (Armstrong & Cole, 2002; Olaniran, 2001b). In other words, the development of meaningful collaboration in international e-Collaborative group collaboration transcends cultural boundaries and calls for greater communication competence—that is, the ability to adapt to varieties of situations (Olaniran, 2004).

Olaniran (2004) argues that the challenge facing geographically dispersed international online collaboration teams is further intensified because team members' intra-cultural communication competence does not translate to cross-cultural competence. One reason is that dimensions of communication competence involve two factors, namely, *effectiveness* which is the ability to accomplish goals. The other is the notion of *appropriateness* which is the suitability of a given action in a particular setting (Roy, 2001; Spitzberg & Cupach, 1989). People from different cultures in general use varying beliefs, values, and norms as the foundation for their behavior (e.g., perception and interpretation) of other members' behaviors. As a result, Olaniran (2004) concludes that an appropriateness dimension is the most difficult to achieve in cross-cultural virtual teams especially those involving international collaborators. In essence, there is the need to adapt communication and behaviors in international online collaboration groups. Furthermore, social structure creates unique cultural difference that determines how individuals appropriate or use communication technologies in group interaction. For example, there is a suppression of e-mail use in virtual interactions in East Asian cultures (Lee, 2002). Also, certain cultures, for example the Dutch, prefer more structure in online team collaborations than the U.S. does (Gezo, Oliverson, & Zick, 2000; Kiser, 1999).

Other problems in online international group collaborations include fragmented communication, confusion during teleconferences, failure to return phone calls or respond to inquiries, and members being left off distribution lists. Misunderstandings often intensify ongoing conflicts. Proximity interferes with communication that requires nonverbal cues for clarity (e.g., Armstrong & Cole, 2002; Solomon, 2001). In general, communication technology is believed to decrease social dimensions, group solidarity, and trust which is essential for members to communicate freely and openly (Bal & Foster, 2000; Carleta, Anderson, McEwan, 2000).

One of the challenges of virtual teams is the failure to post or respond to messages when members are geographically distant. For example, Lee (2002) reports that, the value of showing respect is more important than simply getting a job done (i.e., performance). This may explain why Koreans and Japanese employees shy away from e-mail use. Their perception is that e-mail may be perceived by supervisors to be rude, and therefore, they would rather use alternative communication media which may delay feedback but are considered to appropriately convey respect (Lee, 2002). However, given that Western cultures do not share the same perception of respect, such action would be inappropriately perceived, hence resulting in conflict. In essence, the role of culture and the complexity that it creates in international online collaboration projects must be explored as team members work on their respective tasks, while at the same time negotiating and building relationships with co-collaborators.

As might be expected, proximity and culture inevitably interfere with interactions among international online groups. People in collocated virtual groups have greater access to multiple communication media and thus, have the benefit of using multiple channels, which in turn permits a broader range of messages, cues, and at times,

immediate feedback. Armstrong and Cole (2002) stressed this point when they reported that more e-mail messages were sent to collocated group members than to internationally located group members. Specifically, the authors indicated that remote sites fell off the radar screens and were ignored during both telephone and video conferences. Similarly, this condition was referred to as out of sight leading to out of mind neglect (Olaniran, 2004; 2007). In some instances, *time* creates distance, causing problems in finding a time that works for group members located in different time zones.

Notwithstanding, the temporary nature of most international online groups necessitates establishing common history, as well as developing relational synergy that leads to trust building. It has been established that when mediated group members in geographically dispersed groups have limited future interaction, they fail to seek adequate social and contextual information to support their perceptions (Crampton, 2002; Olaniran, 1994; Walther, 2002). As a result, members are unable to draw on experiences with each other in making attributions (Crampton, 2002; Olaniran, 2001b). Such faulty communication leads to overemphasis on task goals at the expense of relational goals in virtual groups. Unfortunately, when this is the case, things go wrong, hence, members are more likely to blame one another rather than focusing on the assessments of situational concerns (Olaniran, 2004).

Very few studies of virtual teams attempt to identify factors leading to communication effectiveness, and the studies that have been done are not conducive to meaningful comparison of the collocated (nearby) to international online groups. Thus it is difficult to compare team member commitment in the micro and macrocosmic settings (Becker, 1992; Matthieu & Zajac, 1990). A conclusion from the studies revealed that socialization from face-to-face encounters among members from formal and informal meetings is transferred to and reinforced in collocated virtual teams, such that team members' commitment to the organization and their work team are positively enhanced (Dodd-McCue & Wright, 1996; Powell, Galvin, & Piccoli, 2006). On the other hand, the shared dependence on communication technologies in international collaborative groups for communication interaction and activity coordination hinders socialization (Ahuja & Galvin, 2003; Chidabaram, 1996; Olaniran, 2004). Trust development and trust building are precluded because time and geographical distance often prevent the use of synchronous communication technologies in some settings. Powell et al. (2006) argue that controls and coordination with which team members are familiar in collocated teams are, at times, lacking in the dispersed virtual environment. The net result is that trust building and trust development prove to be very difficult. The *trust* perception represents a key difference between collocated and dispersed virtual teams, given the role of group structure on team member's commitment. Yet, team members and people in general, seem to trust people rather than technologies (Friedman, Kahn, & Howe, 2000).

Research highlighted and sometimes suggested that face-to-face interaction is necessary for team development in geographically dispersed online groups especially at the inception of the team leading when relationship building, commitment, and increased trust are so critical (Lee-Kelley, Crossman, & Cannings, 2004; Olaniran, 2004). So the very reason for e-communication (circumvention of travel) prevents trust building when it is needed to initiate trust toward relationship building. Thus, having face-to-face meetings may defeat the purpose of online meetings (Olaniran, 2007a, 2007b). Nevertheless, it is hard to argue with the evidence indicating that periodic face-to-face meetings in virtual teams can help increase solidarity, commitment, and relational synergy and development (Byrne & LeMay, 2006; Lee-Kelly et al., 2004; Nandhakumar & Baskerville, 2006; Olaniran, 2004; Powell et al., 2006).

At the same time, Nandhakumar and Baskerville's study (2006) reports the issue of cultural differences such as reinforcement of strong hierarchical norms in organizations that constrain communication interactions across hierarchical levels in spite of the strong effort to promote online collaboration teams' idea of communicating anytime and anywhere. For example, in the study, it was reported that the junior managers and subordinates felt they had to rely on the senior management when they participated in online collaboration teams because senior managers always like to take the lead in discussion against the desires of junior managers.

Similarly, the role of identification is important in work contexts (Jian & Jeffres, 2006). It is difficult for online team members to identify with individuals they cannot trust and the people they perceived as having ulterior motives or different agendas. Furthermore, it will be difficult for online group members to commit to the project or the organization as a whole, especially when they feel that they must constantly second-guess the motives of their fellow participants in virtual teams (Olaniran, 2004).

The choice of communication technologies can also be made in a way that suits the intent of managers and leaders in online collaboration groups. For example a manager may insist on the use of videoconferencing rather than e-mail or other text-based medium to force subordinate members to conform to organizational norms as dictated by the hierarchy. However, when such manipulation or deliberate selection of a communication medium takes place, it can lead to subordinates' interpretation of the move as an attempt to circumvent opinions and further undermine trust in online collaboration teams (e.g., Carlson & Zmud, 1999; El-Shinnawy & Markus, 1997). In other words, when the choice of collaborative technological media by top management fails to meet that of employee's expectation, the trust level will be drastically low. This argument found some justification from the study of different media in organization communication that reports that trust in top management is linked to the quality of information received from top management and supervisors, which in turn is directly linked to the satisfaction with organization and job performance (Byrne & LeMay, 2006). Therefore, one can argue that employees' expectations about norms of how information should be communicated within organization can explain trust and satisfaction with organizations and ensuing communication process in online group collaborations.

In summary, the discussion above brings into the foreground that when looking at the role of communication technologies in international online collaboration within organizations, it is very difficult to assume that communication technology fosters satisfying employee participation. The discussion above illustrates this position with international online collaborative groups. Arguments also establish that there are significant or considerable differences between collocated and international online or virtual teams. The discussion points out that the selection and use of communication technologies often reinforces existing organization norms which are transferred to online group contexts, thus hindering trust and relational development in online groups. This may be the case even when communication technologies allow for multiple social cues including nonverbal (i.e., rich media) such as videoconferencing. The question however, remains, how does one facilitate trust and relational development in international online collaboration teams? The next section of the paper attempts to offer some guidelines and recommendations that could help organizations establish and improve their international e-communication through building trust and relationships.

SOLUTIONS AND RECOMMENDATIONS

In order to facilitate and foster trust and relational development in international online groups, effective organizations with technical expertise to understand the unique characteristics of electronic communication must be established (Olaniran, 2007; Solomon, 2001). Organizations deploying communication technologies for online group collaborations must be able to create a sense of communal experience in order to allow interactions that lead to greater creativity, knowledge sharing, and personal development. They must learn to use the appropriate technology to communicate and collaborate in a manner in which team members feel connected to one another and the task. There are few ways to accomplish this goal.

First, organizations must make a conscious decision about helping members to build trust when interacting with communication technologies. Too often, top management is more concerned about economical and cost savings because of technology than the actual communication process and employees' satisfaction. Therefore, it is recommended that top management be genuine in its decision to select and use communication technology. Successful implementation of communication technologies need not help superiors extend their authority over the subordinates, especially if trust and relational development is a goal within the organization. It is quite important for top management to create an environment that encourages free flow information across the organization, especially in international online collaboration groups where trust is usually suspect. Top management can allow open communication by not creating the impression that they are monitoring subordinate interactions. This may require that top management is not present in some online meetings with the subordinates. Furthermore, management should also give subordinates the latitude to implement some of their ideas and decisions. Specifically, restriction about who gets to participate and how employees participate in online collaboration teams must be scrutinized in a way that enhances trust and members' relations to develop and blossom.

Second, the short term vs. ongoing virtual teams points to the importance of time in trust development. It seems that in theory, on-going virtual team members have greater incentive to build trust with fellow participants. However, this is not going to occur automatically; it takes some work. Olaniran (2004) stresses this point, when he argues that anticipation of future interaction (AFI)—which addresses the need for communicators to behave in certain manner when faced with future meeting potentials, is helpful in relational development. The anticipation of future interaction in deployment of communication technologies for online groups helps facilitate social and relational messages that are essential for trust building and consequently satisfaction (Heide & Meiner, 1992; Olaniran, 1994, 2001b; Walther 1994). Walther (1994) found that anticipation of future interaction predicts relational intimacy or trust more than any other variable. Thus, it is essential that conditions that encourage anticipation of future interaction is established in virtual group when trust is critical to goals or task performances and opportunity for FtF interaction is not available as it is in collocated teams (see Olaniran, 2004). Thus, online group members should be exposed to, and preferably trained in how to develop relationships leading to increased trust in international online collaboration teams where social cues are scant.

Third, there is a need for good leadership and group structure in international online collaboration groups. Olaniran (2004) argues that online groups especially international online groups and members must be aware that a well planned virtual project is still going to face unforeseen issues. Thus, good leadership structure is useful in addressing any unforeseen events (Lee-Kelley, 2002). With good leadership, information regarding potential challenges, attributable to

cultural differences, can be identified and if possible collectively resolved within online groups and organization. Also, the leadership ought to establish protocols in how to address issues and expectations along with offering group members assistance. Efforts to avert individual or liberal interpretations of deadlines and time issues should be in place (Olaniran, 2004; Vroman & Kovacich, 2002). It is important that virtual team members communicate clearly and leave nothing to chance. Online communication of any kind is challenging, let alone when international cultural factors that create ambiguities are added; therefore, augmented levels of accountability, trust, and adaptability are needed in the groups, more so, than in the face-to-face interactions (Roebuck & Britt, 2002). Establishing close personal relationships may require virtual team leaders or facilitators to hold several preliminary sessions in which information exchanges are focused on getting to know other team members before actually working on a project. Also, in preliminary sessions, clarity of norms and addressing cultural biases and key assumptions that could obscure effective communication needs to be a priority of global organizations where cultural differences complicate communication activities (See Olaniran, 2004, 2007a).

The need to include review and feedback opportunities into team structure ensures that members receive periodic updates regarding performance. Along this line, group leaders are to establish criteria for appropriate behaviors in virtual teams. For instance, misunderstandings occur more easily due to lack of understanding of communication rules and protocols required by technology. Good structure on the part of leaders and the team as a whole boosts performances and assists in the development of trust building, which is an important component in virtual teams (Pauleen, 2001). At the same time, individuals who trust one another often put the interest of the group ahead of self and are more socially in tune with other participants. Therefore, trust promotes group members' ability to learn, work, and respect one another, which may be crucial for effective task, conflict management, and overall group satisfaction.

Along with the group structure, there is also the need to use small size groups in international online collaboration projects. Keeping an international online collaboration group size small allows for reduced lurking opportunity and predisposes the group to increased interactivity, which promotes open communication and eventual high relational development (Bell & Kozlowski, 2002). Small size also promotes interactivity that allows team members to engage in "deep dialogue," which encourages a high level of relational trust development as individuals express their feelings with one another in group dynamics (Holton, 2001; Solomon, 2001).

Fourth, satisfaction, which is an outcome variable in virtual teams is usually based on the assessment of aggregate individual perception of feelings (Bailey & Pearson, 1983; Olaniran 1995, 1996a); however, individuals base their perception on the assessment of relationships developed with others in a given encounter (i.e., communication media). When assessment of relationship development is negative, the ratings assigned to satisfaction with the meeting process and the evaluation of accompanying communication medium or media will be negative accordingly. Thus, satisfaction in online collaboration groups involves the degree to which a communication medium is perceived to be helpful in accomplishing both task and relational (social) goals. Olaniran (1996a) in his model of satisfaction identifies two predictors of satisfaction in ICTs which include Ease of use and Decision confidence. Ease of use (EOU) is the degree to which a medium is perceived to be free of effort, and decision confidence (DC) is the degree to which one believes that a solution reached over a medium will solve a given problem (Olaniran, 1996a). EOU in particular, was found to be the strongest contributor to satisfaction in CMC groups (Olaniran, 1996a).

The importance of EOU on satisfaction and relational communication in communication technologies and online collaboration is essential when considering the idea of "immediacy." Immediacy addresses the feelings (i.e., perception) or awareness of group members' accessibility during interactions by virtue of quick message response and the general perception that communicators are in tune with one another's feelings. Immediacy is a critical element in the development of socio-emotional and relational synergy in group interaction (Walther, 1994). The awareness is prompted by the speed of message feedback to individual messages. Different ICTs have different rates of feedback, and for the most part communication technologies aside from videoconferencing have slower rate of feedback relative to FTF. Furthermore, the rate of feedback in asynchronous communication media is further retarded when compared to synchronous communication media (Olaniran, 2001a; Smith & Vanecek, 1990). When an individual lacks the opportunity for immediate feedback to messages, effective clarification decreases. The tendency to over-attribute also occurs and consequently results in attribution error which would cause frustration with the system and the group processes (Olaniran, 1995, 1996a). At the same time, when frustration sets in, overall satisfaction will go down.

Given that silence and delayed feedback negatively impacts performance, and these effect are more pronounced in asynchronous than synchronous encounters, it would seem that the selection of synchronous ICTs can add to immediacy, perceived EOU, DC, and satisfaction (see also Olaniran, 1994, 2004; Vroman & Kovacich, 2002). Satisfaction can still be accomplished in asynchronous CMC, however, virtual participants would have to put in place norms that guide contributions and facilitate immediacy while enhancing DC. Overall, facilitating immediacy improves relational synergy development and consequently, the confidence in group decision.

A key point to bear in mind is that the mere passage of time during online collaborations will not automatically result in good relational communication and relational development. It seems that there is a strong foundation for the interaction of time and anticipation in the differences between asynchronous and synchronous online collaboration. The motivation to engage in information seeking behavior that fosters greater "positive regard" and "friendliness" is higher in synchronous than asynchronous CMC and deserves greater attention. According to Walther (1994), the anticipation of future interaction propels the individual's tendency to engage in relational communication that is socially soothing. It would seem that this effect would be more pronounced in synchronous CMC where such behavior is more likely and evident.

The measure of satisfaction, trust, and relational warmth with communication technologies appears to be done in comparison to other traditional mediums and with the idea that face-to-face represents a baseline from which other communication media are judged. This assessment fails to account for the fact that face-to-face medium is different and is also disadvantageous in its own ways and in certain contexts, even with the presence of nonverbal cues. Given that text based CMC messages lack nonverbal cues, it is essential that online collaboration teams develop mechanisms that allow for relational communication, synergy, and trust to develop gradually and systematically even if it is slower in comparison to other traditional communication media. The cue substitution technique is one way to bring about the gradual development of a lasting relational interaction in international online collaboration teams. With cue substitution, communicators develop different symbols for expressing relational messages in CMC that are otherwise not available due to the lack of nonverbal cues. The cue substitution technique also explains how messages in computer mediated communication can be used to convey social messages in ways similar to those in FtF (Cunha & Cunha, 2001). Furthermore, the cue manipulation technique in

online interaction illustrates users' adaptive use of technology to improvise for the lacking cues in CMC.

The insufficient time, history, and inexperience in electronic groups affect more than productivity and is central to the development of relational dynamics over time. Therefore, it would seem that virtual teams require longer durations to adjust to each other and the dynamics of interaction in electronic meetings in order to develop relational bonds. Hence, project managers are encouraged to use and employ virtual teams in which members' interaction are long-term, ongoing, and provide opportunity for members to work on different projects. This is necessary for inducing the effects of anticipation of future interaction (e.g., likeness, cohesions, and other relational strategies) into a group. However, one must recognize that certain short-term virtual task groups are also inevitable. Thus, when the time is short for virtual teams, exchanging pictures can help give a head start to relational development for participants (Walther, Slovacek, & Tidwell, 2001). Pictures improve affection and social attractiveness in short-term groups with no interaction history. Given that longer term or group history in distributed work groups fosters interpersonally positive relations than shorter ones, it is beneficial for group leaders to manipulate anticipation of future interaction. A simple approach such as informing virtual team members of the possibility of future collaboration could help accomplish the relational benefits of anticipation of future interaction effects. For instance, group members would strive to get to know one another and doing so at a faster pace, they would avoid error attribution, they would work harder, and they would increase self-disclosure activities and personal questions that are essential for the development of trust and relational synergy. Other alternatives might be to incorporate multiple electronic media whenever possible to develop a sense of community.

Teleconferencing and videoconferencing, for instance, allows for voice and video cues that may help the relational development process. Therefore, technology-mediated groups should be augmented with other communication media that are more supportive of social interaction, especially for the introduction of new members and when relationships are being formed (Carleta et al., 2000). However, caution needs to be exercised with videoconferencing. First, different time zones render them problematic. Second, proximity has been found to negatively influence interactivity, such that remote sites were ignored during interactions (Armstrong & Cole, 2002). Third, the need to retain some level of ambiguity in CMC interaction in order to make members function effectively has been stressed (Bal & Foster, 2000; Cunha & Cunha, 2001; Walther, 1994) and should be preserved.

The ability to share feelings and perhaps self disclose at greater levels is critical in developing online trust and intimacy. Along this line, the need to move online communication and relationships to offline is worth further consideration (Carter, 2005). Notwithstanding, this recommendation has significant implications for organizations using computer-mediated communication technologies for international online collaborations. First, the tendency to reduce cost is one of the primary reasons why organizations engage in international online collaborations. This implies that collaboration has to be initiated online; but if at all possible, individuals should be encouraged to take interactions or collaborations offline using other traditional media and travel. Second, if extending online collaboration to offline is aimed at building and sustaining relational trust, then the self presentation in online must be based on or anchored by truth. Otherwise, the absence of truth and candor would hinder the same trust the idea is supposed to enhance. In other words, participants in international online collaboration cannot pretend to be someone different online than who they are offline. Significant care must be taken in the attempt to use offline interaction as a trust building platform especially in

international online collaboration. Carter (2005) expresses the importance of truthfulness in both online and offline identities when she recounts her own experience in *Cybercity* (an online community) when attempting to meet an online friend in person. She stresses that "failure to do so [be truthful] would have destroyed our friendship [relationship and trust] (p. 163).

Furthermore, environmental shifts cannot be discounted. Well planned projects are likely to face unforeseen contingencies and events, which necessitate the need for good or strong leadership structure to stay on top of things (Lee-Kelley, 2002). International online groups cannot afford to omit the process of explicitly establishing norms, determining group goals, and setting clear expectations for team leaders and members. Online group leaders need to be able to recognize problems as they occur and take immediate corrective action similar to traditional communication media. When online team participants are located across time and culture, they usually have to interact asynchronously, it is difficult for leaders to execute managerial tasks. The suggestion is that leaders need to focus on structuring or facilitating activities (Bell & Kozlowski, 2002; Pauleen, 2001). Emphasis on structure in online collaboration provides an advantage that may help enhance not only performance but also the development of trust-building an important component in groups (Pauleen, 2001).

FUTURE DIRECTIONS

In summary, as international online collaboration continues to gain ground, so is the need to cultivate a sense of groupness and a common understanding that demonstrates common goal and collective accountability among participants. In essence, approaches that help e-collaborators to be aware of their interconnectedness as they actively interact with one another are called for. In order to help bring about trust, relational warmth, and organizational synergy, it is imperative that organizations, groups, and individuals alike develop a way that helps communicate and negotiate meaning while avoiding disparate cultural challenges that could derail communication competency. As such, future trends in online collaboration may need to focus on deploying communication technologies (hardware and software designs) that fosters such tendencies. For instance, a one-stop design that offers multiple communication channels both asynchronous and synchronous media is called for.

Furthermore, the option to place multiple communication channels at the hands of international collaborators could help mediate challenges with cultural issues by providing back channel feedback that could foster mutual understanding and at the discretion of the users. It would seem appropriate to begin to explore social software structure such as blog, wiki, picture sharing, videocasting, and videoconferencing altogether to create a sense of community. The approach would help users to choose or select how they plan to negotiate relationships with their co-participants while building trust and relational trust with one another. However the level of control would not be at the hand of a particular individual but rather at the preferences of the users. Similarly, social software structure could help collaborators to develop a sense of community that is neither his or hers, but rather, collectively theirs in the process of group collaboration and in accomplishing organizational goals.

The fact that messages differ and are interpreted differently depending on the socio-cultural contexts requires attention towards mobilization of knowledge that addresses cross-cultural competency. Thus, increased emphasis on language and cultural training is essential prior to embarking on international online collaborations. Also, the shifting and complex nature of workplace through globalization, technologies, and information based economy, requires the need to focus less on homogenized workforce and ideologies to a

more balance and non-Eurocentric or Western ways of knowing. On the contrary, an approach that acknowledges cultural diversities of the workforce and recognizes their implications for international online collaborations is needed. It is argued that social software and individual awareness of each others' differences can allow individuals to address social and cultural needs idiosyncratically. For example, the use of blog among collaborators may help bloggers and their readers to gain deeper insight into a particular culture and without taking away from the task goals, while at the same time, helping people to develop relationships that is based on trust and respects accordingly.

It is important to recognize that not all human needs can be anticipated and designed into communication media. Designers can do their best to anticipate the needs and try to crisis-proof their technology systems. Notwithstanding, users (both novices and experts) need to have a sense of relief in knowing that when trouble arises, it will be addressed with expedience. The knowledge that a technical glitch or difficulty would be taken care of would give users the added comfort that inspires confidence and motivates participation.

As for researchers, there is the need to collect empirical data in attempt to determine how different cultural classifications influence interactions in general, and trust development and relational synergy in particular. While cross-cultural data are difficult to collect, however, consultants and organizational practitioners may be of help in this area because the information gathered can help various organizations while informing the academic community at the same time. Also, while addressing cultural effects in virtual groups, it would help if future research can separate the differences between organizational cultures and national cultures and their interaction effects on trust development in virtual groups. From a research perspective, a mixed methodology, rather than those pitting quantitative analysis over rhetorical and qualitative methods, should be embraced to gain a fuller understanding of the communication and interaction processes as they relate to trust and relational development in these groups.

Finally, emphasis should be given to issues of access to technologies. It appears that systems designers and organizational leaders need to focus on designing and selecting communication media that are easily accessible to all users regardless of users' location and infrastructure. Communication technologies that give potential users options to accommodate various cultural preferences present in a virtual group would also go a long way to assist international online group members and their interactions.

CONCLUSION

Certainly trust is a major contributing factor to developing, maintaining, and solidifying relational synergy and intimacy in online interaction in general and more so in international online collaboration. This research reveals that relational trust and intimacy is not impossible in international online collaboration. However, it will take time and greater commitment on the part of participants, group members, and organizations using international online collaboration to coordinate activities and projects. Research on ideas to foster such relational development and trust in international online collaborations has been applied to real and hypothetical scenarios that merit attention by those interested in improving international and intercultural relations. The paper also addresses critical issues for future considerations by different stakeholders including designers, research and researchers, and the users respectively.

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KEY TERMS

Collaboration: Involves interaction among individuals over electronic technology medium.

Computer-Mediated Communication (CMC): Computer-mediated communication involves communication interactions that exist over computer networks.

Culture: Consists of different value preferences that influence communication interaction and how people create meaning.

Cultural Communication Competence: Focuses on communicators' ability to interact with members of another culture in a way that is both effective and appropriate in terms of goal accomplishment.

Globalization: Involves economic and socio-cultural ideas where organizations are able transcend national geographic and cultural boundaries through convergence of space and time in attempt to accomplish goals.

International Online Collaboration: Involves groups or team of individuals from different countries and national cultures operating in a virtual workspaces made possible by information communication technologies.

Online Interaction: Involves individuals or group engaging in communication process that is taking place over Internet or technology network environment.

Virtual Collaboration: Consists of communication interaction taking place in a virtual space with the aid of communication and information technologies.

Chapter XXXII
Supporting Inter-Business Collaboration via Contract Negotiation and Enactment

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ABSTRACT

The increasing complexity of products and services encourages more and more companies to form collaborative networks. As these companies are independent organizations there often is an issue of governance. We suggest a possible architecture for such a business network that proposes a frame contract as the principal means of coordination and describes how such a contract can be designed and enacted. Often frame contracts are written in natural language which makes it difficult to govern the network effectively and efficiently. We therefore introduce a structured method that can support the design of such an agreement and ensure that its terms are observed in business transactions. We interpret governance as the management of workflows between the organizations, hence the contract consists primarily of business process models. We propose a method to negotiate these models among the member organizations of the network and to enact them with the help of an interorganizational workflow system.

INTRODUCTION

Today there are two seemingly opposed trends in the collaboration between businesses. On the one hand, companies are forced to concentrate on their core competencies and to outsource all activities that lie outside the core. On the other hand customers demand that a supplier covers an increasing range of products and services. They want to buy a complete solution from only one supplier instead of buying bits and pieces from many. This latter point seems to suggest an increased amount of "insourcing." The solution to both is that companies have to engage in

closer collaborations, each concentrating on its area of expertise, but jointly offering a complete suite of related products and services that are well matched (one face to the customer). But this scenario represents an enormous challenge both in terms of organization and regarding the information system support.

Companies that want to engage in a closer collaboration, for example a value network, a virtual enterprise, or the like, bring into this collaboration not only their different organizational cultures but also different, often incompatible, information systems. A successful collaboration therefore requires the alignment or integration of both the business processes and the information systems to a certain degree. In some industries, such as the automotive industry, this can go as far as the customer forcing the suppliers to introduce the ERP system of the customer's choice (e.g., SAP). But on the whole it is more common that the organizations involved will strive for some kind of mutual adaptation of their business processes and information systems. In a very simple case this could be the introduction of a file transfer accompanied by suitable import and export functionalities and some organizational measures for providing and handling the new data. In more advanced cases it will imply substantial reorganization of business processes and changes to existing information systems and/or introduction of new ones.

Our goal is to support the set-up and operation of a business network. The first phase consists mainly of the design of a contract that can be used to coordinate the behavior of network actors. The design process is cooperative, that is, the actors negotiate this contract among themselves. Such negotiations can be either bilateral or multilateral but both types will contribute to creating a common contract that is binding for all parties involved. This negotiation process can also be called a co-design process. Negotiation is a social process that can be supported by a negotiation support system. This eliminates the need for partners to meet face to face and contributes to a flexible set-up of the business network. It implies that the lead-times for setting up the network are relatively short and replacing members that have left and adding new ones can be done with a minimum of effort. These are crucial issues for a business network.

The second phase, operation, consists of enacting the behavior specified in the contract. Here the business logic concerning the coordination of actors is incorporated into the communication network. This phase "translates" from the business network to the communication network by managing the respective message exchange via the technical network and a coordination server. This approach was used to improve governance of an existing network that consisted of three partners: the headquarters of a retail chain in the home textile and home decoration industry, the shops of this chain and a third-party logistics provider. Although this is a minimal case of a business network it nevertheless provides fundamental insights into the workings of such networks. The remainder of the paper is structured as follows. The next section addresses coordination in organizational networks in general and in business networks in particular, which leads to the identification of a suitable class of contracts, that is behavior-based contracts. The following sections study the negotiation process and a language for formulating behavioral contracts. After that the enactment of the formalized contract is treated based on a communication network and a coordination server. The conclusion summarizes the major findings and presenting an outlook on future research.

COORDINATION IN A BUSINESS NETWORK

In a business network, organizations strive for the provision of complex products and services by coordinating their activities in an "intelligent" way.

This implies that the coordination effort is much higher than in a conventional supply chain. In the latter, an individual company can focus on managing the relation to a few immediate major suppliers for creating a product or service. In a business network, this is not enough but coordination is also required among the suppliers. Theoretically we move from a tree structure to a graph topology which implies that we have to hit a new balance between market and hierarchical coordination. The general problem behind this is quite old and several theories have been advanced to explain the use of a particular form of coordination, most notably Agency Theory (Alchian & Demsetz, 1972; Jensen & Meckling, 1976; Ross, 1973; Wilson, 1968) and Transaction Cost Economics (Coase, 1937; Klein, Crawford, & Alchian, 1978; Williamson, 1975, 1981, 1985). Based on these theories the internal and external coordination costs can be determined (Gurbaxani & Whang, 1991). High external costs favour centralization, high internal costs promote decentralization. It is typically assumed that organizations in a supply chain choose their organizational structure and network of trading partners in such a way that the sum of both costs is minimized. There has also been some debate on the impact of information technology (IT). Early work by Malone, Yates and Benjamin (1987) suggested that IT will lower transaction costs and therefore, ceteris paribus, lead to an increase in market coordination. Later work posited that organizations will "move to the middle," that is to "more outsourcing, but from a reduced set of stable partnerships" (Clemons, Reddi, & Row, 1993) if non-contractible issues (e.g., quality and trust) play an important role. Empirical evidence (Holland & Lockett, 1997) shows that companies often operate in a "mixed mode" blending aspects from both markets and hierarchies.

But the majority of these studies were performed in the context of conventional supply chains. In the face of a network topology the balance between hierarchical and market coordination needs to be readjusted: In the absence of a central coordination unit we typically use the contract as an instrument for coordination. Agency Theory suggests two principal forms of contracts, behavior-based contracts and outcome-based contracts. Between an employer and an employee, for example, a contract with a fixed annual salary would be behavior-based as such a contract demands that the agent performs to the best of his capabilities. An outcome-based contract would specify a remuneration that depends on the results that the agent has achieved (e.g., a commission). If the costs for monitoring agent behavior are high, an outcome-based contract is often superior. This is because an unobserved agent is assumed to shirk (i.e., underperform) knowing that he has no consequences to fear. This problem is called moral hazard. An outcome-based contract can be seen as a special case of a behavior-based contract where delivering the outcome is considered to be the only observable behavior of the agent. In addition to that, the costs for monitoring agent behavior have become marginal in many cases due to the omnipresence of information technology. These arguments apply also to the context of business networks. We will therefore focus our investigation on behavior-based contracts.

NEGOTIATION AS A SOCIAL PROCESS

We define negotiation as the process whereby a group of two or more individuals tries to reach an agreement on the performance of future actions. The individuals are human beings that might act on behalf of organizations or on their own behalf. For the purpose of this paper we focus on electronic negotiations, that is negotiations that are supported by information and communication systems. They can be divided into three different types: bargaining, auction, and agent negotiation (Köhne, Schoop, & Staskiewicz, 2005). Auctions are very common, especially in electronic com-

merce. They assume that the traded products or services can be described in detail and are hence comparable. The auction proceeds in the form of a bidding process where potential buyers can make (money) offers for a certain product or service. There are different models to organize the bidding process (Bichler, 2000). A comprehensive classification of negotiations with respect to auctions is provided by the Montreal taxonomy (Ströbel & Weinhardt, 2003). Agent negotiation means that an inanimate agent, that is a software artefact, carries out the process of negotiation on behalf of a principal, typically a human being. The principal delegates the task of negotiating to the agent by providing it with his or her preferences regarding the product or service to be procured. The agent has a certain autonomy to act within the limits of these preferences. Some models for agent negotiation are given in (Dignum & Cortés, 2001). The specification of preferences requires that the product or service in question can be described in detail. Hence both auctions and agent negotiation only work with standardized products / services.

The models we have discussed so far assume that most parameters of the contract are already predetermined and very few can actually be negotiated. Most often the only free parameter is the price. In many cases this restriction is not acceptable, that is we need more freedom in negotiating. This can, for example, happen if the product or service to procure is not standardized so that we have to negotiate many of its parameters. In such a case we need the third model, bargaining. In bargaining we assume that in principal all parts of a contract are negotiable, that is we start with an empty contract (although existing reference contracts or contract templates can be used as a starting point if desired). A number of bargaining models has been suggested such as the Three-Layer Architecture (Chiu, Cheung, & Till, 2003), SilkRoad (Ströbel, 2001), DOC.COM (Schoop & Quix, 2001), MeMo Business Negotiation Support Metamodel (de Moor & Weigand, 2004), Protocols for Electronic Negotiation Systems (Kersten, Strecker, & Law, 2004), and the Generic Model (Mathieu & Verrons, 2002). To find a suitable negotiation model for business networks we must first identify the criteria that it should fulfil. Based on the studies mentioned above we have derived the following criteria: Communication, documents, deontics, and time. The next sections argue for the necessity of these criteria.

Communication

Communication takes place both on the business network level and on the communication network level but the meanings of the term in these contexts differ. In the case of a communication network, communication consists primarily of an exchange of messages between inanimate agents, for example computers, IT systems, or the like. On the other hand, communication in a business network consists of interaction between human beings (actors). Inanimate agents do not exhibit many of the qualities of human beings, such as conscience, responsibility, creativity, and so on. This affects their ability to act as they cannot engage in social action, which requires these capabilities. Negotiating a business contract is an example for a complex social process that involves social actions, for example making commitments. We can therefore say that business communication goes beyond the message passing on the communication network level.

Communication is the primary instrument for social interaction in general and for negotiation in particular. Negotiation consists basically of an exchange of messages between the negotiators. With these messages the negotiators create, modify and extend the contract, for example by making requests or commitments that ultimately lead to contractual obligations. It is therefore evident that a negotiation model for business network contracts must incorporate communication on a fundamental level. The importance of language for social action has been recognized early which

led to the development of several theories, most notably Speech-Act Theory (Austin, 1962; Searle, 1969) and the Theory of Communicative Action (Habermas, 1984).

A system consists of a number of agents (people or organizational units) who interact with each other by communicating. The basic unit of communication is a speech act (Austin, 1962; Searle, 1979). A transaction (Weigand & Heuvel, 1998) is the smallest sequence of actions that has an effect in the social world (e.g., establishing a commitment). It typically consists of two speech acts: an utterance and the response (e.g., a request and the promise). On the third level, the workflow loop or action workflow (Medina-Mora, Winograd, Flores, & Flores, 1992), describes a communicative pattern consisting of two consecutive transactions that aim at reaching an agreement about 1) the execution of an action, and 2) the result of that execution. (Habermas, 1984) has extended this by adding validity claims that embed communication into a social context of power relations. Many of the negotiation models that address the issue of communication are based on these theories such as DOC.COM and MeMo.

Documents

The result of negotiation is a contract, which is obviously a document. Contract and negotiation are duals of each other in the same way that document and communication are. They are so tightly interwoven that it is impossible to separate the one from the other. The contract is a negotiation cast into a document. A negotiation model must therefore provide some mechanism to derive the contract from the negotiation messages in a transparent and traceable way. But documents play an important role already during negotiation. Preliminary contracts (contract versions) are a record of the negotiations that have been made so far. In this sense documents are an embodiment of past communications. We need the contract versions to mark important achievements in contract development, to understand why the contract has developed in that particular way and to go back to an earlier version if something has gone wrong. As this holds for all types of contracts we can conclude that documents must form an integral part of the foundation of a negotiation model for business networks.

Deontics

Deontic logic is concerned with reasoning about obligations and permissions. It has a direct bearing on negotiation as contracts are about determining obligations in exchange for granting permissions. For example, if Henry signs a contract about the sale of a car he enters into an obligation to pay a certain amount of money but in return he is granted the permission to take the car into his possession and to dispose of it in any way he wishes. Deontics trace the status of commitments during the course of a negotiation. As a rule an obligation arises only if all parties agree on it. If Sally commits herself to do the shopping she is not yet under any obligation. Mike might, for example, make a counter-offer to do it for her. Only if Mike accepts Sally's commitment is she actually obliged to keep it. The same holds if Sally requests Mike to do the shopping, which he might simply deny. Only his agreement makes it an obligation. Keeping track of the deontic state is therefore important for any negotiation model as it allows us to assess how far the negotiation process has come, that is which commitments have already been established and which are waiting for approval.

Time

Time restrictions are an issue for many business actions. Some actions are not allowed to start before a certain point in time, others must be finished before a deadline has expired. A particular action might be required to be performed precisely at a specific time or repeatedly in certain intervals.

It is therefore necessary that time restrictions for future actions can be negotiated as they are an important characteristic of the actions. But time-related issues are not only relevant at the level of the business process but also concerning the negotiation process itself. The time order of messages is relevant for the negotiation and the establishments of obligations and there are time limits for the completion of the process. Our negotiation model should therefore offer a language that provides a concept of time.

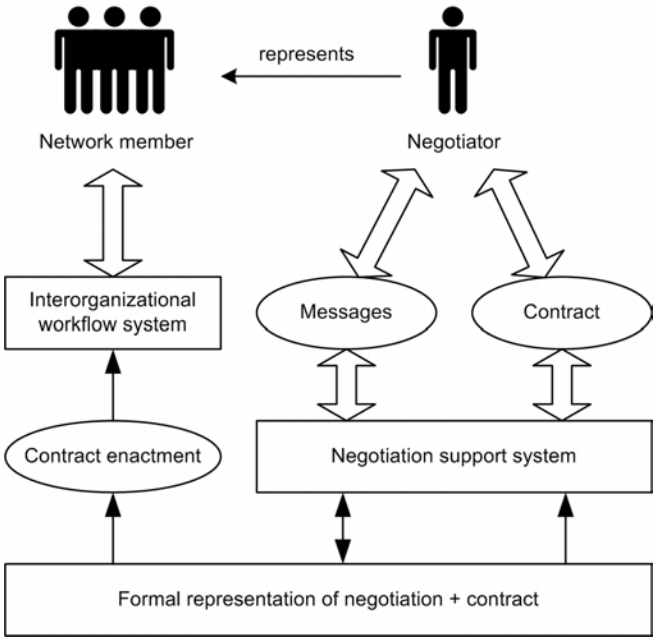
ARCHITECTURE OF A BUSINESS NETWORK

Köhne et al. (2005) performed an evaluation and comparison of 11 negotiation models with respect to 11 criteria among which the above mentioned criteria can also be found. The closest match to the requirements for a negotiation model is represented by DOC.COM (Schoop & Quix, 2001) which fulfills three of the four criteria fully and one, deontics, at least partially. We have therefore chosen to adopt this model for the purpose of our study. As deontics is an important issue we have decided to add respective functionality to the negotiation system. But there is yet another problem that needs to be solved. The objective of DOC.COM is to represent a negotiation about the execution of a process instance, for example the delivery of a particular item on a particular date. But negotiations regarding the set-up and maintenance of a business network concern process types, for example the general business logic of order processing. The resulting contract is called a frame contract as it regulates the interaction among network members regarding a significant number of orders over time. To enable such negotiations we have introduced a meta-layer into the negotiation language. Figure 1 shows the architecture of a system to set up and operate a business network.

A business network consists of a number of members. Each such member is typically an organization (i.e., a business) but could also be an individual who acts as an economic agent. Each member organization is represented by a negotiator who is entitled to carry out such negotiations and to sign a binding contract on behalf of the organization. This negotiator will interact with negotiators from the other members via a negotiation support system (NSS). The NSS consists of a message component and a contract component. The former handles both the translation of "human" negotiation messages into the formal representation in DOC.COM and the presentation of recorded formal negotiations in a human-readable form. The contract component stores the binding negotiations, which together make up the contract and which are also stored in DOC.COM, and represents this contract in a way that is similar to conventional, written contracts. The specific NSS for DOC.COM is called Negoisst (Schoop, Jertila, & List, 2003). The next section describes how negotiation and contract formation proceed.

The left part of Figure 1 shows how the operation of a business network is supported. We assume that the process of negotiation has led to a contract that deals with all relevant issues of the collaboration. This could be the negotiation of a completely new frame contract, that is the set-up of a new business network. On the other hand the negotiation can also be about business network maintenance which involves adapting to the loss of members, incorporating new members, replacing parting members, reacting to changed requirements or the like. The contract under consideration will in any case be subject to enactment which yields a description of the interactions between the members in some kind of workflow language. The choice of this language depends on the workflow system that we choose to coordinate the workflow between members. In principal any workflow system can be used that allows for the

Figure 1. Architecture of a business network



implementation of the workflow patterns identified in (Aalst, Hofstede, Kiepuszewski, & Barros, 2003). Most commercial systems qualify if we allow for workarounds and coding but there is little native support for many of the advanced patterns. Only FLOWer supports directly or indirectly 16 of the 20 patterns. In a prototypical environment it can be useful to employ YAWL (Aalst & Hofstede, 2005) that provides all patterns but one, together with the YAWL Engine. YAWL uses the same serialization language as the negotiation and contract language DOC.COM, that is XML. This facilitates enactment of the contract. YAWL makes also use of XQuery and XPath to extract data from XML input files and for generating XML output. This supports the integration with the enterprise application systems of the business network members, most of which can import and export in XML format. The resulting workflow system is run on a coordination server which can be seen as part of a communication network. An example of this is given in the section 4.3 based on a YAWL implementation. An overview and comparison of other languages for interorganizational workflows is given in (Bernauer, Kappel, Kramler, & Retschitzegger, 2003).

From Negotiation to Enactment

The previous section has described the general architecture of setting up and operating a business network. In this section we describe how the procedures in that architecture are performed and what the results look like. For this purpose we consider a simple negotiation, the corresponding part of the contract and the resulting workflow net (enactment) in some detail. This example represents only a very small part of the case and just serves to illustrate the way our approach works. The complete example is shown in the next section on a more general level.

Our case involves three business partners: A retail chain in the home decoration industry (RetCom), the shops of this chain and a logistics company (LogCom). RetCom want that LogCom take over the delivery of orders for them. Figure

2 shows two steps in the respective negotiation between them and the deontic states that result from them. The representative from LogCom writes an email saying that they need a capacity reservation two weeks in advance of the order to be able to handle it. This is a request and takes us to a new deontic state where a commitment is pending approval. The negotiation support system helps with translating this request from the natural language to the internal, formal representation in DOC.COM:

REQUEST (Reserve_capacity[ORDER], t ≤ DATE[ORDER] – 14)

The keyword REQUEST indicates that LogCom would like to introduce a new action into their collaboration. The propositional content of this message tells us what that action is, namely the reservation of capacity for each order. The request also specifies a time restriction for this action, that is, 14 days in advance of the order date. This message is stored in the message memory of the negotiation system which thereby also stores the respective deontic state so that it can be matched with RetCom's reaction to it. In this case RetCom fully agree with the action that was suggested by LogCom by answering with "O.K." This takes us to a new deontic state where the pending request that was logged earlier becomes a real commitment. Again the NSS will help with translating this to the formal representation:

COMMIT (Reserve_capacity[ORDER], t ≤ DATE[ORDER] – 14)

The speech act COMMIT signals that RetCom agree to fulfil the request. A request that is followed by a commit with the same propositional content and restrictions leads to a binding obligation of the committing party towards the requesting party with respect to the content. An alternative reaction of RetCom could be:

COMMIT (Reserve_capacity[ORDER], t ≤ DATE[ORDER] – 7)

which would be interpreted as: "We agree to reserve capacity but we cannot do it earlier than one week in advance." Such a speech act does not create an obligation but constitutes a counter-offer. An acceptance of this counter-offer by LogCom would then create an obligation concerning the modified terms. In our example the original request is granted and a respective obligation is inserted into the contract:

OBLIGATION (Reserve_capacity[ORDER], t ≤ DATE[ORDER] – 14)

The presentation component of the NSS can at any point in time display the contract that has been negotiated so far in a human-readable form (see Figure 2). In the final step the obligation is translated to a corresponding workflow.

Example

The example in the previous section was on a detailed level but covered only a small part of the case. Here we give a complete account of the case without the details concerning negotiation. We primarily focus on the "old" architecture of the retail network and the result of applying the procedure described in the previous sections with the aim of supporting network governance. We started our project with performing an analysis of the business processes between the companies we have already mentioned. These companies had already an established business relationship that was based on a conventional frame contract. In the analysis we discovered the structure of the collaboration (see Figure 3) and a number of problems such as: broken interaction patterns, missing business rules, unclear communication structures, different contract interpretations and excessive interpersonal communication. As a

Figure 2. From negotiation to workflow net (example)

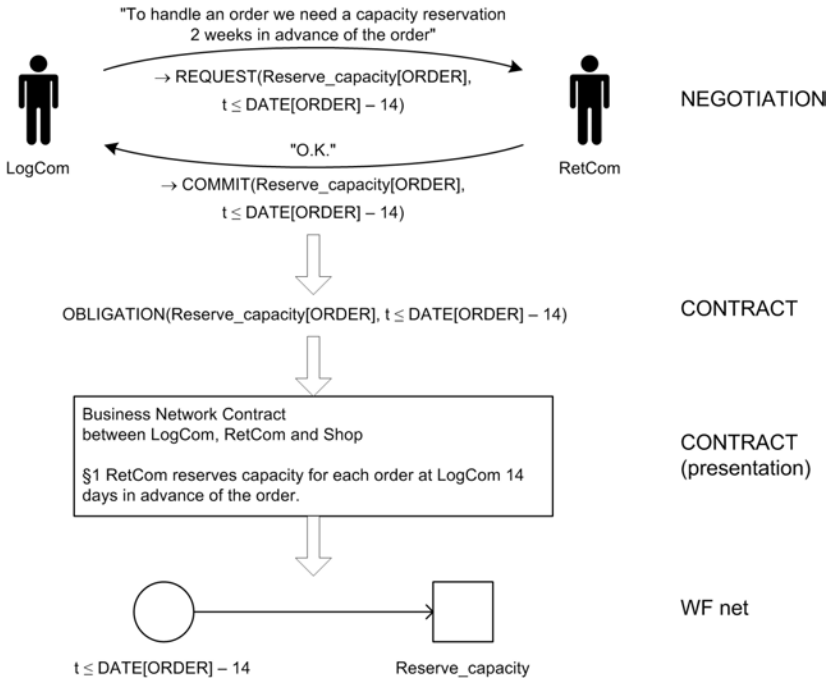
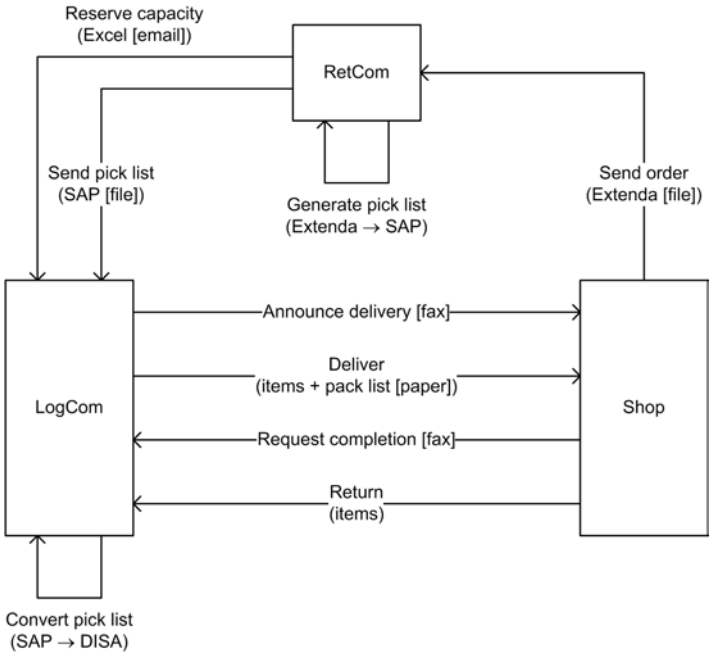


Figure 3. Original architecture of the network



consequence the parties were unsatisfied with the current situation.

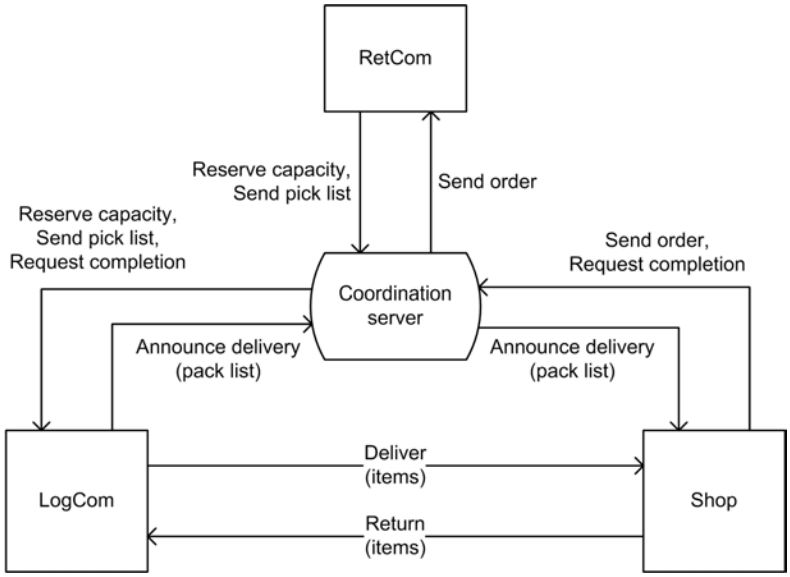
To solve these problems we decided to support the coordination between the network members with the architecture introduced in section 4. We started with negotiating the formal contract. This was done in a seminar where the representatives of each organization were present and the seminar leader manually translated their requests and commitments into a formal representation according to the procedure described above. The reason for this is that the NSS does so far only support bilateral negotiations. We consider this as a technical restriction rather than a conceptual one and it should be possible to extend the NSS to multi-part negotiation. Enactment of the contract was done with the help of YAWL and the YAWL engine which was run on a coordination server that connects all parties. The conversions between the involved formats (SAP, DISA, Extenda and Excel) have been performed with the help of XML Script and the X-Tract XML Script processor. This led to the architecture depicted in Figure 4.

In the revised architecture each business network partner only exchanges messages with the coordination server. This reduces the complexity of the coordination considerably. The server takes care of forwarding messages to the right recipients, converting between formats, triggering time-controlled messages and so on. The business network architecture also offers ways to improve the efficiency of the communication. In our case, for example, the paper-based communication can be replaced by electronic messages, for example concerning the fax containing the pick list. The physical exchange between LogCom and the Shop can in this way be restricted to the exchange of the items themselves.

CONCLUSION

The starting point of this paper is the assumption that a business network consists of a group of businesses that collaborate on an equal footing and coordinate their interaction via a multi-part agreement. Based on relevant theories a suitable type of contract was indentified, that is behavior-based, together with an architecture to negotiate and enact such a contract. Negotiation is a social

Figure 4. Revised architecture of the network



process based on interaction between human actors, each of them possibly representing an organization. The nature of social systems and their processes requires an approach that supports human communication as well as documents (as records of human or artefact activity), deontics (as states in the social world) and time. This leads to the selection of a language for expressing both the process of negotiation and its result, that is the contract. This language is DOC.COM. The enactment of the contract is supported by an interorganizational workflow management system and a corresponding language. For this step a suitable suggestion cannot be made as the commercial systems do not provide sufficient support for all required workflow patterns, and research prototypes do not (yet) possess the maturity and stability required in real-life business applications. The feasibility of the approach was shown by setting up and operating a prototypical business network.

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KEY TERMS

Business Network: An organizational structure of cooperating entities, for example people,

teams, orgnizational units or organizations. The relations between the entities cross structural, spatial and temporal boundaries relying on rich communications networks.

Contract Design: The design of a frame contract that is based on an enterprise model to facilitate writing and enforcing the contract.

Deontic Logic: A logic that is concerned with states of affairs such as permission, obligation, and so on

Enactment: The process of putting the artifact into operation, for example implementing a model or enforcing a contract.

Frame Contract: A contract that regulates the collaboration between the networked entities and supports process integration.

Interorganizational Workflow: A number of coordinated activities among organizations in a network that ensure the fulfilment of the desired business objective.

Negotiation: The (social) group process by which we arrive at a consensus artifact. The artifact can be a model or a contract.

Obligation: A mutually agreed commitment that is established by two or more partners performing matching speech acts, for example a request and a promise or an order and an order confirmation.

Chapter XXXIII
The Limits of Anytime, Anywhere Customer Support

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ABSTRACT

This chapter reviews research in distributed work, relating it to the way organizations manage collaboration between home-based customer support agents. The analysis focuses on the importance of shared identity to development of trust and social capital. The distributed work literature recognizes trust enables knowledge sharing through social exchange and gift giving activity. The discussion outlines two social norms—the norm of beneficence that encourages gift giving and the norm of reciprocity that encourages social exchange. These two norms provide a framework for understanding how knowledge sharing starts and continues in organizational relationships. The chapter next discusses the organizational strategies companies use to implement home-based customer support. The discussion concludes that the available research findings of applied studies of distributed work suggest that the most effective organizational strategy for home-based customer support enables knowledge sharing by blending face-to-face meetings, with other employees and management, and distributed work online.

INTRODUCTION

The "virtual contact center" is gaining a great deal of interest as a way of delivering customer service. Virtual contact center is a term describing self-service resources, such as Interactive Voice Response (IVR) systems, the Web, and home-based customer support agents. Self-service applications are included in the concept of the virtual contact center offered here since IVR systems (Landry, Mahesh, & Hartman, 2005), and e-commerce Web sites, typically provide human backup for failed service requests by customers using a self-service channel (Kotelly, 2003). The

growing sophistication of self-service over recent years resulted in more companies considering implementation of a distributed work organization for customer support agents since self-service channels require 24/7 support and are often characterized by spikes in traffic.

Individuals and businesses have access to increasingly inexpensive and sophisticated broadband networks with the Web and other Internet Protocol (IP) technologies such as voice over IP (VoIP). Indeed, VoIP makes a distributed workforce solution increasingly practical (Rosenberg, 2005), allowing the same message to traverse voice or data channels. Companies are quickly gaining the technical ability to move customer support requests via telephone calls, e-mail, or chat across distances to support agents at distributed locations, aiming to match the customer's request with the skills of available agents, while providing centralized monitoring and intervention capabilities.

Companies are technically able to organize virtual contact centers across continents, corporate departments outside the contact center (i.e., sales, marketing, and product development), multiple contact centers, branch offices, or out of agent homes. The latter are referred to as home-based agents. Managers are able, from distant company offices, to listen to customer calls, even rewind and replay them, monitor keystroke information, and watch screen navigation of home-based customer support agents, just as if the agents are working in a centralized call center. Implementing a home-based virtual contact center is easily the largest challenge facing organizations wanting to take full advantage of distributed work in delivering customer support. This chapter draws from the distributed work literature on knowledge sharing to analyze a range of collaboration challenges facing organizations that implement a virtual contact center using home-based agents.

Traditionally, customer support relied on numerous disconnected systems crossing telephony, information technology, networking, and human resources. Under those conditions, managing distributed customer support was difficult. By necessity, employees in large call centers did most customer support. However, Internet Protocol (IP) technologies give companies a practical choice in taking advantage of the convergence of telephony (voice), data networking, and the Web. As a result, corporate enterprises now have a range of opportunities to incorporate added flexibility to customer support efforts, including virtual contact centers.

We note that, as the availability of broadband networking using Internet technologies increases, the promise of "anytime, anywhere" customer support increasingly appears attainable. However, companies implementing virtual contact centers face a basic fact about distributed work, specifically that the human and organizational challenges faced in employees collaborating, working together, at a distance are equally, or more, daunting than the technical challenges. The analysis in this chapter provides an overview of several companies in the United States that implement virtual contact centers using home-based agents, examining the extent to which the organizational strategies take central findings about distributed work into account.

Customer support agents are able to collaborate now, using technologies such as chat, e-mail, discussion lists, screen sharing, and so on, to share knowledge about problems faced in their work. Nevertheless, the existing research on distributed work discussed below indicates that the likelihood of knowledge sharing between employees collaborating with one another or with management increases under some organizational conditions relative to others. Specifically, it takes longer to develop knowledge sharing practices in organizations where agents do not experience a shared identity because the absence of a shared identity impedes the development of social capital (Hinds & Weisband, 2003).

This chapter provides an overview of the organizational strategies used by companies in

the United States that implement virtual contact centers using home-based agents. The analysis here relates the organizational strategies for collaboration used in home-based, virtual contact centers to the ongoing discussion of social capital and knowledge sharing in the literature on distributed work. The issues covered are relevant whether companies organize their own home-based virtual contact centers, or outsource the work to vendors. Our concern is with how different organizational strategies for collaboration, specifically the **group culture** and **individual contract** strategies, conceptualize the importance of social capital and shared identity to the knowledge sharing activities of home-based agents. Specifically, the analysis here draws from a range of applied research studies on distributed work to outline the approaches used to organize home-based, virtual contact centers, and outlines the challenges faced by each organizational strategy discussed.

BACKGROUND

Observers sometimes fail to distinguish virtual contact centers and telework, or telecommuting. Nevertheless, basic distinctions are important to keep in mind. Research in telework defines it as people working together, collaborating across distances on a temporary basis, as an intermittent, or regular, alternative to going to an office. Perez, Sanchez, Carnicer, & Jimenez's 2002 discussion details the assumption used in the telework approach noting,

Three main types of teleworking are usually found in operation: home-based teleworking, satellite offices, and mobile working. Home-based teleworking refers to employees who work at home on a regular basis, though not necessarily (and, in fact, rarely) every day. Home-based workers who are self-employed or who otherwise have no connection to a central workplace are not considered as teleworkers (p. 276).

In other words, and taking the term literally, if you work at home and never, or perhaps even seldom, go to an office then you are not telecommuting, or teleworking (Bailey & Kurland, 2002). Additionally, Bailey and Kurland (2002) assert that, "telework constitutes an early form of virtual work" (p. 384).

A 2006 International Data Group report indicated that more than 100,000 home-based customer support agents worked from their residences in the United States, with significant growth expected. There are around 4,000,000 customer support agents working in the United States, and International Data Group predicts the number will increase to over 300,000 by 2010 (Schelmetic, 2006). Companies initially used home-based agents to support relatively simple service issues, such as handling customer requests for information or purchases in response to infomercials, and direct response television.

The services of home-based agents are increasingly sold to provide more complex services than the traditional services of inbound or outbound telemarketing. Outsource providers are now selling their ability to support companies' products and services across a range of industries, including finance, retail, travel, insurance, healthcare, and government. Knowledge management has always been an important aspect of customer support (Davenport & Klahr, 1998). Therefore, as home-based agents handle more complex customer support requests, characterized by less routine and more uncertain responses, the importance of corporate culture and knowledge sharing increases and amplifies issues already problematic in centralized call centers (Clergeau, 2005).

The increasing use of home-based agents results from two major developments. First, technologies to support the management of a distributed workforce are increasingly available and affordable. Managers of home-based customer support agents can listen in on service calls, observe keystroke patterns and screen navigation, and dynamically review all the standard metrics

of service delivery including, average hold time, call duration, call resolution, and so on. Although self-direction appears built into the very work of home-based agents, assuming they engage in self-directed work is incorrect. A home-based agent benefits from some very basic advantages such as less commuting and increased flexibility in the work schedule. However, customer support agents working at home are subject to the same management oversight techniques and production pressures as those working in brick and mortar call centers (Ball, 2005). Second, disillusionment with the quality of outsourced customer support in offshore locations is also driving a trend to bring the work back to the United States, that is, homeshoring. As a result, companies are increasingly viewing home-based customer support as an economic way of doing customer support within the United States (Exony, 2007). In combination, the two factors lead an increasing number of companies to consider using home-based customer support as an alternative to the traditional call center.

Vendors, and consultants advocating use of distributed work for customer support contend that telephone and messaging traffic (e-mail, discussion forums, instant messaging, chat, blogs) is merely data on the Internet. The point of view maintains it makes little difference where the agent works, as long as they can access the right data on a secure basis using the Internet. Moreover, proponents contend that the ability to route calls to agents with the knowledge and skills best suited to the problem increases customer satisfaction because home-based agents are more satisfied. Additionally, many advocates of virtual contact centers claim that organizations can take advantage of the "anytime, anywhere" characteristics of the Internet, as a technology that displaces the constraints of time and place.

Vendors selling virtual contact center services typically claim that they are able to recruit home-based agents without regard to geography or locale. However, we know little about the optimum ways to organize virtual contact centers in general, much less home-based customer support in particular. The basic idea is that companies can optimize staffing resources by targeting specific demographic groups such as "stay at home" moms, the middle-aged and retired, and others who are homebound. Moreover, agents are, theoretically, available on a flexible basis to meet spikes in customer contact demand, with companies providing online scheduling for their distributed agents (Ball, 2005).

It is difficult to assess the claims made about the benefits (increased productivity and agent retention) gained when companies implement virtual contact centers using home-based agents. Estimates of employee turnover range from 10 to 30 percent for home-based agents, compared to industry rates often in the 60 to 100 percent range. Though we note that when companies that sell outsource services, like LiveOps, say their annual turnover for "fully certified" agents is less than 10 percent (LiveOps, 2007), or when West, another outsourcer, claims its contractors remain with it "for a significant period of time" (Frost & Sullivan, 2006), the qualifications in the statements don't bolster confidence. Our concern is not so much with whether home-based agents stay with their employers or contract agencies longer.

We are concerned with the organizational arrangements that build the shared identity and social capital required for home-based agents to trust other customer support staff sufficiently to collaborate with one another and engage in knowledge sharing. As Johnsen (2006) notes, "…agent team members must now have a way to know the skills and availability of virtual team members, and it becomes impossible for agents to simply raise their hands and say they need help from a supervisor if they are working at some other location" (p. 48).

A large body of research on distributed work is concerned with the types of work most effectively organized using employees working in proximity to other employees, or remotely by distributing

work using the Internet (Kanawattanachai & Yoo, 2002). Kiesler and Cummings' 2002 summary puts it aptly,

…when people are in the presence of an audience, coworkers, or even others doing unrelated tasks, their performance changes. When they are working on well-learned or easy tasks, the presence of others increases their alertness, motivation, and speed. However, when people are working on difficult or unlearned tasks, the presence of others can be distracting, reduce accuracy, and increase feelings of stress (p. 59).

Complex problems requiring specialized expertise represent one common example of the type of customer support, and general problem-solving, conducive to collaboration at a distance. For example, high-level technical support for telecommunications and internetworking equipment companies was one early example of a support role delivered at a distance using distributed work organization, often from home-based employees. Freelance writers who write feature stories or compile news digests for specialized audiences provide another example. Sales representatives working out of their home office are another. Facilitators of online communities using discussion lists, chat, instant messaging (IM), or some other asynchronous communication are other examples. So are home-based insurance auditors who review insurance claims.

Companies advocating the use of home-based, virtual contact centers often fail to clearly take into account the challenges in organizing structured work routines that involve little self-direction on the part of the home-based agent. Consider the contention in 2004 of the Chief Information Officer of IntelliCare, a home-based virtual contact center provider for health-care services, who asserted that, "Remote agents do not need to feel alone. With the technology tools, they can get real time help, attend meetings, and take training whenever they need and wherever they are" (Forbes, 2004).

Forbes' (2004) assertion implies technology provides the solution to problems that often result from the isolation of individuals doing home-based work, that is, that they are "out of sight out of mind," but it does not explicitly recognize the larger, practical point of what motivates home-based agents to engage other home-based agents online to share what they know. Specifically, how can a virtual contact center motivate currently employed, or contracted, home-based agents to help newly hired, or newly contracted, home-based agents when they need it?

Among other factors that motivate people to share knowledge, the research on distributed work indicates shared identity is one of the most important, especially when it involves development of social bonds resulting from mutual engagement. People who share a social identity and engage one another in facing common challenges develop trust in one another and share social capital. New employees are more likely to turn to fellow employees with issues and questions first. As Harless (2007) notes, "The supervisor is generally the last person a new agent will contact with any questions they might have" (p. 20). Papacharalambous and McCalman (2004) describe the challenge well noting,

Organizations simply cannot order people to be willing to share their knowledge. However, organizations can…create an atmosphere of freedom, openness and generosity in which people's initiative towards the development of knowledge-sharing practices will be fostered and enhanced (p. 146).

It is certainly true that, as Forbes (2004) claims, interactive communication technologies like discussion forums, e-mail, chat, blogs, or video-conferencing can help in developing a shared identity, even a community among home-based customer support agents. Moreover, these uses of interactive communication technologies can provide an analog to discussions at the water cooler, in the

snack room, or with a friend sitting in a nearby cubicle to provide help, offering agents a way to exchange hints, tips, or examples. However, in the absence of face-to-face interaction, it takes longer to develop shared identity and community using online resources alone (Sproull & Kiesler, 1992). Indeed, IntelliCare recognizes the point and organizes its home-based agents around regional offices to facilitate an initial training period of 3-12 weeks.

The Japanese concept of "nemawashi" is relevant in such discussions of shared identity and social capital. Nemawashi refers to the development of trust through time (Thackara, 2005). Thackara (2005), for example, notes that, "dialogue and encounter are the inescapable basis of trust in our relationships with one another, and technology-enabled disintermediation can support but not supplant that time-based fact" (p. 43). Moreover, Baba, Gluesing, Ratner, and Wagner (2004) point out that an unshared context precludes many opportunities to observe the work of others, thereby making co-orientation difficult. They add, "There also is less awareness across sites of temporal factors that are context-related, and there is little incentive to communicate about the context, creating more opportunities for miscommunication" (p. 551).

Companies selling outsourced home-based customer support services, or managers organizing it within their own company, often fail to consider that the most effective work to distribute to individuals, at home or in remote offices, is work combining creativity and ingenuity with specialized knowledge on a self-directed basis. Trust and shared identity are important largely because even routine customer support interactions, where automated scripts guide the communication with customers, can require home-based agents to search for answers to customer problems from other agents, using chat or a discussion forum. Anyone who has called a company's customer support line and been "put on hold," so the agent can look for information, was probably waiting for the agent to find information in an online knowledge base, or for the agent to request an answer from other agents online. Consider Schelmetic's 2006 description of how calls are managed in a virtual contact center using home-based agents:

When a consumer dials … the 800 number for the specific product or service for which the person is calling is immediately recognized. The call becomes a digital signal, or VoIP call, and is routed to the first available agent who has historically performed well with calls for that product. The call is switched back to a traditional phone signal, and a script pops up on the agent's home computer as his or her phone begins ringing. The agent answers the phone, reads the script and helps the customer through the call. If the caller has questions not answered in the script, the agent has many other places to find the answer, including a comprehensive FAQ list, real-time chat with agents, and community forums (p. 31).

In instances where the script is insufficient to solve the customer's inquiry, the challenge for the virtual contact center lies in knowledge sharing (Bartol & Srivastaba, 2002), and even the most sophisticated technology is insufficient to motivate people to share knowledge in the absence of their goodwill toward one another or their employing organization. Developing a knowledge sharing culture among agents so the conditions for producing goodwill are present is a key issue for companies organizing customer support using virtual contact centers.

DISTRIBUTED WORK, KNOWLEDGE SHARING, AND SOCIAL CAPITAL

Vendors of distributed work technologies typically contend that the Internet enables companies to design interactive communication technology applications that can direct customer support requests to individuals with the best knowledge,

based on skill profiles and a knowledge base, to respond to the customer's problem. Vendors typically overlook the point that the biggest challenge faced by such initiatives is not technical in nature. As Cross and Parker (2004) note:

One reason that skill-profiling systems have not been more successful is that sought-after people often do not respond. If incentives, culture, leadership, or time run counter to one person helping another, no amount of technical infrastructure can solve the problem (p. 42).

The issues involved relate to the way individuals work together, collaborating in organizations. Many people find it difficult to share knowledge. When it comes to sharing knowledge, the fact that the giver must actively try to share it complicates matters. The knowledge shared can be ***explicit*** in nature and codified in meta-data for a knowledge base, as part of a knowledge management system, or skill-profiling system. It can be conveyed personally through formal interaction in teams or other organizational groups, shared within communities of practice (CoPs) using discussion forums, instant messaging, or Wikis. Or, the knowledge shared can be ***tacit*** and conveyed through informal interaction among individuals. Regardless of the type of knowledge shared, all knowledge sharing requires active engagement by the sharer (Bartol & Srivastaba, 2002; Cross & Borgatti, 2004).

The observation that sharing knowledge requires active engagement is important for several reasons. *Skills-based routing*, getting a specific customer request to the right person with the right skills to support it, requires development of a profile of skills, or knowledge, kept current for each virtual contact center agent, including staff from divisions other than customer services, such as technical support. When skill profiles and the associated knowledge base become "out of date" the organizational capability to share knowledge to meet support requirements, that is, routing customer contacts to an agent with topical expertise, diminishes. Developing and keeping skill profiles current requires knowledge sharing as a cultural practice and organizational process. Otherwise, as Neale, Griffith, and Sawyer (2003) point out, company use of explicit knowledge like a skill profile provides only a short-term benefit. You cannot know what new skills and expertise an agent develops by examining the kind of support calls they worked successfully in the past, so data mining, though useful, is not enough.

Home-based customer support agents must actively engage other home-based agents, or employees with specialized knowledge in such areas as medicine, insurance, software, hardware, and so on, in order for knowledge sharing to occur. Indeed, the need for such engagement of other employees increases as the complexity of support services increases. On the other hand, Neale, et. al., (2003) report that many employees working in virtual teams feel as if their knowledge sharing is a gift they are giving away rather than a resource they exchange, especially if they feel isolated from the team. The point relates to a longstanding discussion about how people view exchange relationships ("Workers may be uneasy," 2004). The concept of social capital is central to the topic and largely neglected among organizations implementing home-based customer support.

SOCIAL CAPITAL, RECIPROCITY, AND BENEFICENCE

Social capital refers generally to the organized relationships between people that lead them to value their connection to one another. Social capital, unlike human, or intellectual, capital, does not reside in an individual. It is located in the relationships between individual actors. Van den Hooff, Rider, and Aukema (2004) contend that, "social capital refers to the value of these social structures to actors in the form of resources that they can use to achieve their interests" (p. 165), in

social organization. Social capital increases when individuals sharing social identities develop trust that others, in the future, will reciprocate their support if they give it now.

One of the first attempts to define reciprocity as a social and organizational norm came from Alvin Gouldner (1960), who contended that the "norm of reciprocity" is a generalized component of social organization. He argued that the norm of reciprocity involves "two interrelated, minimal demands: (1) people should help those who have helped them, and (2) people should not injure those who have helped them" (p. 171). In fact, the area of social psychology known as Social Exchange Theory (Blau, 1964) developed from the same insights.

However, reciprocity viewed solely as economic exchange fails to explain the range of knowledge sharing activity people engage in, or how it starts. For instance, researchers also point out that many people benefit from information shared by others who are not friends or colleagues but still provide help, that is, who don't currently share social capital. Granovetter (1973), for instance, contended that useful information is in fact more likely to come from others with whom we have weak-ties. Indeed, Constant, Sproull, and Kiesler (1996) researched the issue trying to explain the "kindness of strangers" one often sees in online networks where people solicit technical advice and assistance. Their research examined weak-tie sharing in a geographically distributed organization, making the point that, in many online groups, offers of help to other members aren't always linked to direct reciprocity. Rather, they contended, such offers of kindness involve "maintaining the social institution of the network as an organizational resource" (Constant et al., 1996, p. 122).

In other words, the willingness of strangers to help others appears to stem from the helper's adherence to a norm of generalized reciprocity. A norm of generalized reciprocity depends on adherents having "a positive regard for the social system in which requests for help are embedded" (Constant et al., 1996, p. 122). Thus, the higher the degree of trust individuals have for the larger social entity, that is, institutional trust, the more likely they are to share knowledge with strangers on a company team who ask for help (Ardichvili, Page, & Wentling, 2003, p. 73). Essentially, the concept of reciprocity depends on an existing shared identity to motivate knowledge sharing. Thus, Neale's ("Workers may be uneasy," 2004) report that many members of distributed teams feel sharing their knowledge is a kind of "gift giving", rather than an exchange, points to an issue often neglected by those considering reciprocity.

McGee and Skågeby note that, "certain gift-giving phenomena can be difficult to adequately explain purely in terms of reciprocity" (2005, p. 4). The willingness to share knowledge depends on the norm of reciprocity. However, the eagerness to share knowledge as a form of gift giving does not (van den Hooff et. al, 2004). In other words, individuals who are eager to share their knowledge provide a way for the exchange process to get started. The social capital concept, when developed solely from insights about reciprocity, is limited in that respect.

Gouldner (1973) also noted the inherent limitations of reciprocity. He maintained that the general norm of reciprocity does not explain how people settle accounts over time regarding who owes whom for previous help. He argued for a complementary "norm of beneficence" as a generalized imperative to "give something for nothing" in social relationships (1973, p. 266). Indeed, Gouldner (1973) contended the norm of beneficence provides a way of explaining the conundrum of how collaboration gets started to facilitate knowledge sharing before individuals establish trust in one another. Costa (2003) outlines the dilemma as well as anyone, noting that, "if trust is absent, no one will risk moving first and all members will sacrifice the gains from collaboration and co-operation in increasing effectiveness (2003, p. 605).

Indeed, following Mayer, Davis, and Schoorman (1995), Costa offers the insight that a "willingness to be vulnerable" provides a basis for trust in social relationships (2003, p. 607). Significantly, Bordia, Irmer, and Abusah (2006) found in their research that evaluation apprehension, "or the anxiety arising from a concern that one's knowledge or expertise may be evaluated unfavorably" (p. 263), motivates individuals to avoid knowledge sharing. As Costa (2003) summarizes, "Underlying the 'decision to trust' is also the individual willingness to become vulnerable, and the expectation that others will act in a way that is beneficial or at least not detrimental for the relationship" (p. 607).

The findings of Cabrera, Collins, and Salgado (2006) reinforce the point. They report that the most salient psychological attributes in knowledge sharing are 1) self-efficacy, or the confidence in one's ability to perform, and 2) openness to experience. Cabrera et al., (2006) also point out that the highest level of knowledge sharing requires a rich two-way communication practice between the employee and their organization, in other words institutional trust. That communication practice entails "informing employees but also listening to them and even encouraging them to speak" (p. 260). Additionally, Cabrera et al. (2006) report that work autonomy produces a direct positive influence on self-efficacy. Their findings reinforce points made above about the characteristics of work that make it more readily managed at a distance. As noted previously though, agents performing customer support work are traditionally allowed minimal autonomy.

Constant et al. (1996) note that people offering help to strangers are motivated to benefit the organization and earn the respect of others. Their institutional trust is high. In fact, Gouldner's 1973 formulation of the norm of beneficence explains this seeming inconsistency as follows:

Social systems may thus develop mechanisms that foster the continued existence of undischarged, outstanding obligations. One way this can be done is to develop and internalize norms of beneficence in group members which sanction the giving of aid even to those who cannot reciprocate it. By requiring men to aid others, regardless of what they have already received from them or expect to receive in the future, norms of beneficence serve as 'credit' mechanisms which enlarge the store of outstanding obligations in a social system, and generate assistance even for those seen as unable to reciprocate (p. 274).

Or, as van den Hoof et al. (2004) conclude, the eagerness to share may be necessary for the knowledge sharing process to take off, whereas a willingness to share may be a precondition for the process to continue. As we discuss below, the two dominant management strategies to home-based customer support make very different assumptions about what produces an eagerness and willingness to share knowledge.

Companies that hire their own employees, whether the company organizes its own virtual contact center or provides outsource services to another company, focus on the corporate culture, and engage in team building to develop a shared identity and social capital among workers. These companies focus on cultivating a group culture. Companies that hire contract employees and pay them based on the amount of time spent on a call, completed calls, or some other piece-rate incentive assume that contractors will share knowledge to avoid social isolation. These companies focus on economic relationships alone to encourage knowledge sharing. Several studies note the inherent weakness of financial incentives in starting or facilitating knowledge sharing (Bock & Kim, 2002; Taylor, 2006).

We add that neither the norm of reciprocity nor the norm of beneficence make sense outside the existence of shared identities between the people sharing knowledge. Together, the two norms provide a complementary framework for explaining how individuals produce the trust and

social capital needed to sustain knowledge sharing and increase the effectiveness of collaboration.

SHARED IDENTITY AND VIRTUAL CONTACT CENTERS

People are more likely to share knowledge willingly with coworkers if they identify with those receiving it, and trust in the relationship (Topi, 2004, p. 81; van den Hooff et. al, 2004). A key question for companies that are either organizing their own home-based customer support team, or outsourcing the task to a vendor, is how to encourage development of shared identity and social capital among employees. Research indicates that economic incentives are not as effective as intrinsic incentives in efforts to develop knowledge sharing (Bartol & Srivastava, 2002; Bock & Kim, 2002; Constant et al., 1996). Informed efforts focus on developing group culture to emphasize information sharing rooted in a company's organization (Davenport, 2005). In fact, experts on virtual contact centers often note that maintaining a cultural connection between home-based agents and the company is one of the basic challenges (DeSalles, 2007; Herrell 2006).

Chatham's 2001 summary of an early Forrester study is instructive. The study advises companies organizing their own home-based agents to,

…tap seasoned, self-starting workers. As competition for the remote work force heats up and firms dip deeper into the talent pool, they must develop strategies for bonding workers to the organization and their managers. Remote-agent pioneers advocate bringing workers together weekly for in-person training and socializing to keep their skills and motivation fresh (p. 11).

Similarly, Exony's 2007 analysis summarizes the option as follows:

While a variety of group dynamics, such as team building exercises, are easily deployed in a contact center establishment, many enterprises perceive this is simply not achievable for homeworkers. However, geographical groupings of home-based agents put these advantages within easy reach. With home-based agents situated in the same town or area, VCC [Virtual Contact Center] managers can arrange regular meetings, home visits and social events aimed at increasing morale, efficiency quality. Web chat technologies can also help build teams by providing a virtualized alternative to office communications (p. 5).

Companies implementing their own virtual contact centers using home-based agents are more likely to organize teams meeting on a regular basis using both face-to-face and online group activities than are companies that outsource the customer support and hire independent contractors. The former strategy emphasizes an organizational group culture strategy and the latter emphasizes an individual contract strategy.

Group Culture Strategy

Companies that rely on a group culture strategy for organizing virtual contact centers emphasize team building, knowledge management practices with home-based agents. Companies take two basic approaches to address the knowledge sharing challenge. Those companies organizing their own virtual contact center using home-based agents typically do so by recruiting within a geographic area. Some companies, such as JetBlue Airways, require home-based agents to attend training at company facilities and come to team building meetings on a regular basis. Proctor & Gamble organized its home-based agents in a similar way (Read, 2003). Other companies such as IntelliCare employ home-based agents, but require extended face-to-face training at a corporate location to develop a new employee's awareness of company culture. Both approaches emphasize team building using online resources such as eLearning, communities of practice (CoPS), and social networking.

The group culture strategy recognizes that the norms of group behavior governing face-to-face community and online community are mutually reinforcing. When home-based customer support agents meet at the company's office, the face-to-face interaction increases the sense of community between those employees. Bonds of trust are easier to develop in more densely connected communities, thereby increasing social capital (Blanchard, 2004).

JetBlue's emphasis on developing a shared identity exemplifies the group culture strategy. JetBlue requires six to eight weeks of new hire training, and then the agent works from a home office. JetBlue also has agents come to team meetings once a month, or to meetings with supervisory staff (Langhoff, 2002). Indeed, JetBlue concentrates its home-based, virtual contact center agents in the Salt Lake City area to enable face-to-face activities (Salter, 2004).

The face-to-face meetings required by companies like JetBlue do not result from a supervisory need to monitor capability. Most companies implementing virtual contact centers provide the technology to let management "listen in" on live calls or pull up recordings of both calls and screen activity from a central location while agents work remotely. Rather, requiring face-to-face meetings and training instills a shared identity and cultural norms among the agents and the organization. Consider, for example, the operational difficulties in early 2006 that the airline experienced. Customer requests overwhelmed JetBlue's home-based agent workforce. It was unable to reach the agents it planned to use during a "flex up" challenge. As a result, JetBlue instituted a "Code Red" signal to reach employees in any future emergencies. It also instituted a requirement that employees work three to four extra hours during future emergencies, and agreed to pay them double for their time. JetBlue displayed employee loyalty as well as customer loyalty in responding to its operational trouble (McGregor, 2007), thereby reinforcing institutional trust among employees.

Alpine Access is an example of a business process outsourcer that employs its home-based agents, providing initial and ongoing paid training opportunities. Alpine Access recognizes the importance of shared identity and uses "virtual motivational programs" as well as annual local company picnics for agents to meet one another and network with others on their team, program, or across the country (Peters, 2004). In addition, the company provides dedicated teams for each support program a home-based agent serves, meaning the goals of the team and the individual are complementary and aligned as a group. In other words, Alpine Access recognizes the challenges of building a networked community among employees that work at a distance, even though it does not organize local offices to support the team networking.

Individual Contract Strategy

Among outsource providers of customer support using home-based agents few organizations follow the suggestions made in the Forrester (Chatham, 2001) study or the Exony (2007) analysis regarding use of face-to-face meetings to bolster shared identity and team goals. Rather, most outsource companies using home-based agents rely on economic relationships to compensate for knowledge sharing challenges.

Companies like Aspire (formerly known as Willow CSN), LiveOps, and, WorkingSolutions approach the issue of knowledge sharing largely in terms of economic exchange alone (Marquez, 2005). Their agents are contract employees who pay for their own training and equipment. Aspire, for example, provides peak hour services for companies, contracting to agents who work out of their homes. Aspire agents are paid by the call, meaning they have minimal incentive to take advantage of Aspire's online chat rooms to share knowledge when trying to solve client issues (Dolezalck, 2004). Therefore, knowledge sharing among these home-based agents is not

encouraged by the compensation model used, or the collaborative strategy employed.

Indeed, the compensation model used by companies implementing the individual contract strategy is most effective in customer support requests simple enough to solve using scripted interactions. Ironically, the same type challenges are the easiest to solve using self-service applications. It is the opposite kind of service challenge needed to motivate people to share knowledge in a distributed work arrangement. Indeed, Taylor (2006) found that a piece-rate incentive, such as the pay per minute or pay per call reimbursement of contract agents working at home, produces "a disincentive to share because it would take time away from their own task" (p. 110). However, all the companies using the individual contract strategy claim piece-rate incentives can increase agent retention and sustain high quality performance. The findings of applied research on distributed work reviewed above directly contradict the assumptions of the individual contract strategy.

FUTURE TRENDS

The two factors encouraging companies to use home-based agents in virtual contact center implementations—converging technologies on Internet Protocol and dissatisfaction with the customer service provided by offshore support agents—will continue in their relevance to the emerging trend. The analysis here doesn't mean that large companies purchasing services from home-based customer support outsourcers will experience poor customer service. Rather, it means that companies turning to any outsourcer need to scrutinize the type of work they outsource and use research in distributed work to inform the selection and manage its implementation.

In addition to questions about the capabilities and security of the network, informed clients of outsource providers will want to know whether distributed customer support agents perform better, and share knowledge more willingly, under some circumstances than others. Future research on home-based agents working in virtual contact centers can test the claims made by outsource vendors regarding increases in retention and customer satisfaction while controlling for work autonomy. For example, research can examine the effects on retention and customer satisfaction of emphasizing the importance of first call resolution as a basic performance goal, rather than minutes per call. In addition, applied research studies can test the importance of knowledge sharing to the effective support of customers where no clear resolution exists due to the complexity of the customer request.

CONCLUSION

Vendors selling virtual contact center technologies, or full-scale outsourcing of business processes, often fail to differentiate their claims according to the type of task involved in the support activities, or to the challenges involved in collaboration that requires knowledge sharing to enhance agent learning and motivation. It is increasingly clear that when corporate management formulates a strategy to distribute the work of customer support across multiple divisions, channels and locations, it needs to consider a range of organizational issues related to such distributed work. Issues of shared identity, trust, and social capital figure prominently among those concerns with the way employees collaborate in distributed work organizations. Interpersonal trust can maintain knowledge sharing through reciprocal exchanges among those sharing an identity. Institutional trust can produce the organizational bases for encouraging beneficent sharing of knowledge.

The individual contract strategy does not take into account the relevance of geographical constraints in its model of business organization. Proponents of the approach do not build organiza-

tional practices into their respective management models to leverage the boost to shared identity provided by face-to-face communication. In short, the individual contract strategy fails to recognize the organizational limitations of the "anytime, anywhere" vision of how to use Internet technologies in collaboration.

Indeed, research on distributed work indicates that the shared identity, trust, and social capital that facilitates knowledge sharing is easier to accomplish in face-to-face, proximate collaborative settings since people can develop common understandings about the service challenges on a continuing basis (Hinds & Weisband, 2003). Only the group culture strategy draws from the available research insights on distributed work, supporting the contention that the most effective organizational strategies are those blending face-to-face meetings, with other employees and management, and distributed work online.

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KEY TERMS

Customer Support: The process of assisting customers to purchase or return products and resolve product or service problems.

Distributed Work: Work done by multiple individuals across different locations and time.

Knowledge Sharing: Developing a common understanding of experiences, concepts, techniques, or problems.

Norm of Reciprocity: A group expectation that individuals who receive assistance from others will offer reciprocal assistance in the future, and refrain from harming those giving assistance.

Norm of Beneficence: A group expectation that individuals who can assist others do so regardless of the recipient's future ability to reciprocate.

Outsourcer: A business service provider who enters into a contract with a company to assume responsibility in whole or in part for performing a specific business process of the client.

Self Service: An online, or telephony, process that enables customers to locate and change their customer profile, locate product or service information, purchase products or services, return products, resolve problems, or offer suggestions to a company.

Social Capital: Social capital refers generally to the organized relationships between people that lead them to value their connection to one another.

Shared Identity: Affiliation with a group involving common social relationships.

Chapter XXXIV
KMmaster® for Collaboration and Knowledge Management

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ABSTRACT

Collaboration is a constitutional element of any organization. To conceptualize the organization as an evolving system of interactions means to put the focus on communication. Communication in organizations implies a process of information and knowledge exchange between two or more individuals or social aggregates such as teams, groups, and departments. From the social perspective as the dominant paradigm in recent information and knowledge management studies, the core of electronic collaboration is to support informal communication, communities of practice, and social networks. This chapter provides the theoretical background of informal communication in organizations from a social constructionist view in a first step. In a second step, it presents the KMmaster framework as an example of a Web-based enterprise software to support electronic collaboration and knowledge transfer across intra- and inter-organizational boundaries. The knowledge management platform KMmaster will be illustrated with its editions designed for specific applications (lessons learnt, reporting), processes (innovation management) and industries (life science).

INTRODUCTION

During the last decade, knowledge management (KM) has become an independent branch of academic research and a professional discipline on its own. At the same time, it has become of primary importance to industry: investments in knowledge management activities gained the second highest priority (30 percent) after marketing and sales investments (36 percent), and surprisingly, even higher than research and development (R&D) investments (26 percent), as recently found in a survey by The Economist among 1,000 leading managers (Economist Intelligence Unit, 2007).

Knowledge management professionals point to "knowledge sharing" as the biggest challenge for the future development of knowledge management and "personal networks and communities" as the most important knowledge management concepts in R&D environments (Müller-Prothmann, 2006). This overall picture provides the background of current approaches to support electronic collaboration and knowledge exchange in industrial enterprises and organizations from a social perspective. The KMmaster framework is based on these approaches and has therefore been designed as a knowledge management platform to specifically meet complex workflows of collaboration in large organizations. The development of specialized software editions allows its application in various industrial environments.

BACKGROUND

Communication in Organizations

To examine collaboration in organizations, we can conceptualize the organization as an evolving system of interactions (White, 1992). Thus, we put our focus on communication as the organizational core. In the 1930s, Barnard (1951 (1938)) already noted that communication occupies a central place in organizational theory because "structure, extensiveness, and scope of the organization are almost entirely determined by communication techniques" (p. 91). In their influential paper of 1951, Bavelas and Barrett (1951) concluded that communication "is the essence of organized activity and is the basic process out of which all other functions derive" (p. 368).

For a first definition of communication, we can simply follow Rogers' (1983) description as the "process in which participants create and share information with one another in order to reach mutual understanding" (p. 5). He continues: "This definition implies that communication is a process of convergence (or divergence) as two or more individuals exchange information in order to move toward each other (or apart) in the meanings that they ascribe to certain events."

Maletzke (1963) defines communication as the mediation of meaning between creatures. Watzlawick, Beavin, and Jackson (1967) express the complexity and omnipresence of communication in their prominent first axiom that one cannot not communicate. Based on Fisher (1978), Krone, Jablin, and Putnam (1987) outline four conceptual approaches to human communication of (1) mechanistic, (2) psychological, (3) interpretive-symbolic, and (4) systems-interaction perspectives as a framework for the study of organizational communication. As an adaptation from the study of human communication, these four perspectives provide a suitable theoretical framework for introducing the study of organizational communication with a focus on interpersonal relationships as proposed here. Especially the interpretive-symbolic perspective is useful for the study of individual and organizational knowledge communication as perceived for our purposes. It analyzes organizational communications as consisting of "patterns of coordinated behaviors that have the capacity to create, maintain, and dissolve organizations" (Krone et al., 1987, p. 27). Thus, it "posits by virtue of their ability to communicate, individuals are capable of creating and shaping their own social reality." Additionally, we can add insights from the systems-interaction perspective. Here, the locus of communication "is patterns of sequential behaviors or the recurrence of contiguous acts and interacts" (p. 31). Unlike the psychological perspective, the focus is not put on the individual but rather on the behaviors that he or she shows in relation to others. Moreover, this perspective emphasizes the dimension of time in that structure and function of relationships gradually evolve.

Social Construction of Knowledge

From the perspective of business economics, knowledge is often differentiated with regard to (1) knowledge as object and (2) knowledge as process (e.g., Heckert, 2002). In both interpretations, we find the pragmatic and action-oriented character of knowledge that is relevant from the perspective of business economics and management. The object-based approach is widely prominent as a theoretic foundation of information technology (IT) based solutions from a management perspective, while the process-oriented approach refers to philosophical, psychological, and sociological approaches even from an economic perspective (Sveiby, 1997). If we assume that we can indeed manage knowledge, the aim of an organization must be to manage knowledge as an object as well as to manage the processes of knowledge (Zack, 1999).

A different perspective emerges from the focus of social construction of knowledge that is central to approach issues of collaboration in organizations. From this perspective, knowledge is primarily in the heads of individuals (Wersig, 2000), or as McDermott puts it "knowing is a human act" (McDermott, 2002). Armbrecht, Chapas, Chappelow, Farris, Friga, Hartz, McIlvaine, Postle, and Whitwell (2001) talk of "purists" who "consider 'knowledge' to be that which is within and between the minds of individuals and is tacitly possessed" (p. 29). From this perspective, we cannot manage knowledge: "data and information may be managed, and information resources may be managed, but knowledge (i.e., what we know) can never be managed, except by the individual knower and, even then, only imperfectly" (Wilson, 2002). Rather, we can try to manage influence factors like organizational environments or communication processes that facilitate and improve processes of knowledge creation and sharing.

Collaboration and Knowledge Communication

For the study and support of collaboration in organizations, another aspect of communication puts the focus on its network character. From a network perspective, communication in organizations can be differentiated according to three dimensions: (1) structure, (2) function, and (3) system (Schenk, 1984). Structure focuses on the repetitive, relatively stable sets of communicative relationships that exist between the members of an organization. Function is the consequence of communications that could be described as production, maintenance of the social relationships, and innovation (adaptation) (Barnard, 1938, 1951). The system level is the aggregation of individuals who provide the basic units of analysis from dyadic relationships to the whole organization.

Using this network perspective on communication, a basic element of collaboration in organizations is knowledge exchange. The underlying function of knowledge exchange in organizations is learning, innovation, and decision-making with regard to development and management processes as well as with regard to strategic orientation on the individual and organizational levels. According to Choo (1996), the strategic function of knowledge communication "is when organizations create, organize and process information in order to generate new knowledge through organizational learning" (p. 330). Therefore, he describes organizations as sense-making communities: "organizational actors have first to make sense of what is happening in their organizational environments […]. In other words, people in organizations create their own subjective reality" (pp. 332-333).

Using the approach of social construction of knowledge, Choo draws back on the work by Weick (1979) that is helpful to serve this perception. Weick "proposes a model of organizations as 'loosely coupled' systems in which individual

participants have great latitude interpreting and implementing directions" (Choo, 1996, p. 333; with reference to Weick, 1979). Since we conceive knowledge as residing in the individuals' minds, personal knowledge needs to be converted into knowledge that can be shared and transformed into organizational innovations. Therefore, processes of knowledge communication and collaboration are strongly connected with interpersonal relationships and informal structures within an organization.

ELECTRONIC COLLABORATION AND KNOWLEDGE MANAGEMENT

Collaboration, Informal Organization, and Knowledge Management

The social perspective has emerged as the dominant paradigm in collaboration research and knowledge management studies in the last few years. Putting the focus on collaboration and interpersonal relationships in organizations, academic research and business practice have led to various conceptualizations of informal knowledge communication in communities and social networks. A social constructionist view of knowledge exchange considers not only single individuals and dyadic interpersonal relationships but also social aggregates and their structural patterns. A growing literature studies and describes concepts of communities and social networks from the perspective of knowledge management (e.g., Botkin, 1999; Brown and Duguid, 1991; Collinson & Gregson, 2003; Erickson & Kellogg, 1999, 2001; Lesser Slusher, & Fontaine,, 2000; Lesser & Storck, 2001; Liyanage, Greenfied, & Don, 1999; Powell, 1998; Seufert, Back, & Krogh, 1999a; Seufert, Krogh, & Bach, 1999b; Wenger, 1999; for a critical discussion of the different concepts see Müller-Prothmann, 2005a). Particularly the concept of communities of practice (CoP) has become an influential approach. Introduced by Lave and Wenger (1991) from the background of anthropologically oriented pedagogics, this approach focuses on the importance of CoPs for processes of organizational knowledge exchange. According to the authors, the approach is based on the capacity to wholly integrate knowledge and learning into social practices without treating these as individually isolated processes beyond everyday life.

Since we cannot manage knowledge from the perspective of social construction of knowledge as outlined above, rather, we can try to influence and optimize knowledge related processes and communication. Then, knowledge management "deals with conditions and influence factors of knowledge generation, sharing, use, conservation, and forgetting on individual, organizational, and societal levels" (Müller-Prothmann, 2006, p. 29).

Framework of Knowledge Communication

In their review of literature, Swan and Scarbrough (2002) reveal the paradox that "[k]nowledge [m]anagement itself suffers from the problems it is trying to address—i.e. problems to do with the distribution and lack of integration of knowledge across, in this case, disciplinary boundaries" (p. 11). More general, knowledge management tries to address the distribution and integration of knowledge across manifold (disciplinary, organizational, regional, etc.) boundaries, and knowledge communication and exchange can be identified as its central tasks (Müller-Prothmann, 2006).

Difficulties with regard to knowledge exchange do not arise alone due to the socially and cognitively bounded nature of knowledge. Moreover, from a purely technical perspective, we meet additional barriers based on the (physical) transportation between transmitter and receiver, that is, the codification of knowledge and the medium of transportation. Kriwet (1997) distinguishes three phases of the knowledge transfer process:

1. preparation (or: initiation),
2. knowledge flow,
3. integration.

Based on these elements of the knowledge transfer process, knowledge communication can be conceptualized within the framework presented in Figure 1. The simplicity of this framework allows us to systematically analyze the different aspects of knowledge communication as well as tools and methods to support these processes. Barriers of knowledge communication can be systematically identified as follows (Müller-Prothmann, 2006; modified and extended version of the scheme presented by Heckert, 2002):

1. Person-related barriers
   a) Barriers by the transmitter
      - lack of the willingness (extrinsic and intrinsic motivation) to share knowledge,
      - lack of the ability to share knowledge,
      - lack of good reputation,
      - lack of trust.
   b) Barriers by the receiver
      - lack of the willingness (extrinsic and intrinsic motivation) to absorb new knowledge,
      - lack of the ability to absorb new knowledge,
      - lack of the ability to preserve new knowledge,
      - lack of trust.
2. Knowledge-related barriers
   - (cognitively, organizationally, socially) bounded nature of knowledge,
   - causally determined ambiguity,
   - lack of evidence of utility.
3. Channel-related barriers
   - lack of connectivity and / or common standards,
   - noise,
   - loss of data.
4. Contextual barriers
   - resistant societal setting,
   - resistant organizational setting,
   - resistant social setting (e.g., lack of trust between transmitter and receiver),

Figure 1. Framework of knowledge communication (Müller-Prothmann, 2006, p. 59; following the approach by Krogh & Köhne, 1998 and its modifications by Heckert, 2002)

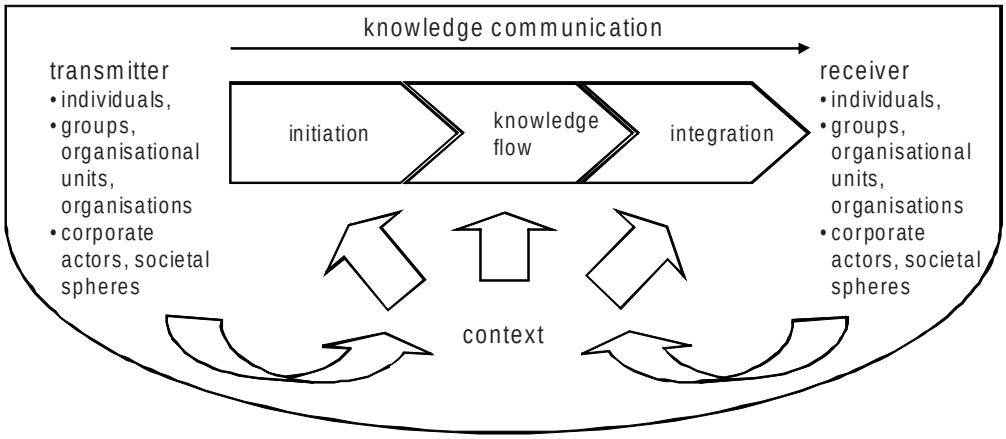


Figure 2. Knowledge networks reference model (Müller-Prothmann, 2006, p. 62; following with modifications Seufert et al., 1999a)

Environments	**Facilitating conditions:** • (infra)structure • culture • institutions
Processes	**Social relationships:** • actors – individual – group – organization – collectives – society • relationships – properties – content • changes – entrance and exit of actors – establishment of new and loss of existing relationships
Framework	**Standards, methods, tools:** • common standards (addresses, channels) • organizational methods • information and communication tools

- low level of transparency with regard to knowledge resources and deficits,
- lack of resources.

Extrinsic and intrinsic motivation to share knowledge, such as individual motivation or personal interest in the topic, are strongly connected to aspects of informal learning in collaborative environments but are beyond the scope of this chapter. For more details on this topic outlined with regard to the "Wikipedia phenomenon" see Frost and Rohs (2007).

Overcoming barriers of knowledge communication and transfer means facilitating communities and social networks. In their knowledge networks reference model, Seufert et al. (1999a) outline the different network dimensions using Giddens' (1979; 1984) duality of structure. Their referential model of knowledge networks consists of processes and relations between network members, tools, resources that are available to them, and surrounding facilitating conditions (control mechanisms, operating procedures, norms and rules, and communication patterns) as presented in Figure 2.

Information and Communication Technologies

As proved evidence by a macro-quantitative analysis that tracked the numbers of articles on knowledge management published over an eleven-year period (from 1990 until 2000) in the popular and academic journals across different professional domains (Swan & Scarbrough, 2002), the first wave of knowledge management until the end of the 1990s was characterized through a strong orientation toward (or even an occupation by) solutions based on information and communication technologies (ICTs). More than 41 percent of all the articles analyzed in the 11-year period were written by and for computer or information technologies/information systems professionals. Identifying a second wave of knowledge management in the discourse during

the late 1990s and a backlash of criticism against emphasis on technology, the study states a broad cleavage between socially oriented approaches to knowledge management and technology based solutions: "where these concerns were discussed, there was relatively little reference to IT, except to note its limits. Our analysis suggests, then, a polarization in the literature between 'KM as systems' and 'KM as people'" (p. 12).

We will not further reinforce this separation between technology and people here, since it is actually not helpful for good practices of knowledge management. Indeed, ICTs occupy a central role to knowledge management solutions. Nevertheless, we should clearly take into account not only their potentials but also their limits. Before introducing the KMmaster framework below, we will shortly discuss these issues here.

Role and use of ICTs in knowledge management can be distinguished according to: (1) strategic role, or (2) use and applications of specific instruments (Heckert, 2002). Rehäuser and Krcmar (1994) identify three strategic levels of ICT systems for knowledge management:

1. application and utilization of knowledge and information,
2. knowledge carriers, information and communication systems,
3. infrastructures for knowledge and information processing and communication.

Application and utilization are managing demand and supply of knowledge. Commonly, this task is assigned to the upper management in organizations. Information and knowledge resources are subject to the operative management. The lower level provides infrastructures for communication, knowledge, and information processing. From a top-down perspective, the higher level specifies its requirements to the level below, while from a bottom-up perspective, the lower level provides support to the level above. This approach does "not only integrate different management levels from an organizational perspective but also relating ICT systems […] While this integration must be acknowledged positively, the authors focus only on ICT systems of artificial intelligence but do not discuss utilization of other technologies, especially those of communication technologies that are central to social aspects of knowledge communication" (Müller-Prothmann, 2006, pp. 56-57).

With regard to specific ICT applications, we can find a large variety of literature focusing on use of ICT instruments for knowledge management purposes (e.g., Borghoff & Pareschi, 1998; Stein & Zwass, 1995). Most authors do not recognize the role of organizational and management levels, and ICT systems are more or less selected due to pragmatic reasons. Heckert (2002) identifies the following problem areas that must be addressed with regard to use and application of specific ICT instruments in knowledge management:

1. concretion of the relation between business processes and knowledge processes,
2. systematic selection and analysis of ICT instruments according to specified knowledge management tasks,
3. adjustment between utilization of ICT instruments and organizational methods.

Social network analysis can be a suitable method to address these areas and support the evaluation of solutions for use and application of specific ICT instruments (Müller-Prothmann, 2005b; 2006).

The KMmaster® Knowledge Management Platform

The KMmaster is an example of software designed to facilitate collaboration and perform specific knowledge management tasks. It provides a Web-based knowledge management platform to support knowledge communication in whole organizations as well as in teams, departments,

Figure 3. Knowledge management framework of the KMmaster (www.kmmaster.com)

DEVELOP CAPTURE SHARE	Creative processes are fostered, ideas emerge, personal experiences may be stored and shared with colleagues.
PRESERVE APPLY EVALUATE	For later access, knowledge components are archived, integrated in working processes, and validated. Core knowledge has been identified.

or inter-organizational networks. It promotes active knowledge management of the organization's members to develop new knowledge, document existing knowledge, and integrate all knowledge processes. Originally developed with a focus on engineering knowledge management, the KMmaster provides a basic framework to develop, capture, share, preserve, apply, and evaluate knowledge (Kahlert, Langenberg, Marwinski, & Sell, 2004) as presented in Figure 3.

Concept

The KMmaster platform is based on three central concepts that provide the core of a holistic knowledge management approach: documentation, organization, and collaboration. It is holistic in that every KMmaster approach combines these three concepts in a single solution (Figure 4). The concrete implementation of these concepts is based on individual characteristics that may vary depending on the existing requirements within an organization.

Organization is related to processes, people, roles, and the formal organization as presented in an organization chart. Here, the KMmaster platform supports mapping of organizational and knowledge management processes.

Documentation is related to structures, documents, data, and classifications. The KMmaster aims at the construction of knowledge components to capture codified knowledge as well as tacit experiences, competencies, and networks.

Collaboration is related to communities of practice, individual motivation, and groupware. The KMmaster supports knowledge and new ideas developed and shared within specialized communities of practice.

Task-Driven View

Given a typical task concerning knowledge management within an organization, the three concepts outlined above can be combined into different approaches. Such an approach presents a strategy to solve the problem. Figure 5 illustrates

Figure 4. Central concepts of the KMmaster (www.kmmaster.com)

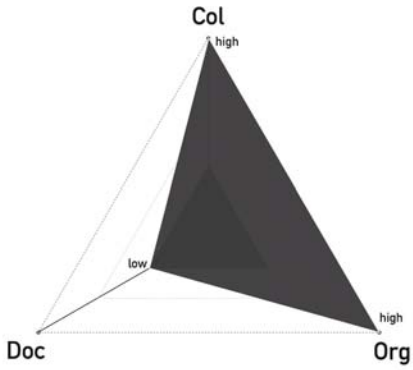
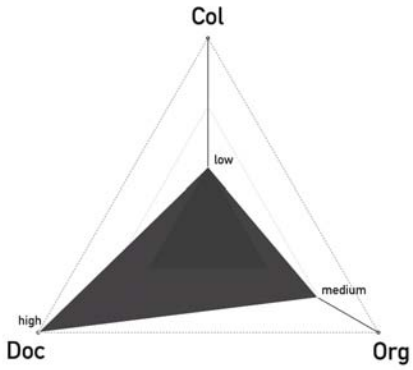
two approaches to the development of knowledge, competencies, and ideas as an example from the six knowledge activities introduced in Figure 3.

Functions

Detailed specifications of the KMmaster concepts lead to the application of selected functions. These functions are connected to a concrete technical level. For each of the three concepts, the KMmaster framework provides the following functions:

- Documentation of knowledge and experiences:
  - flexible templates to capture knowledge components,
  - software system integration,
  - classification by community and taxonomy,
  - full text search including attachments.
- Organization of processes and knowledge:
  - modeling of knowledge processes,
  - assignment of user rights and roles,
  - process-based validation of documents.
- Collaboration in knowledge communities:
  - community-based document management,
  - individually configurable workflow management,
  - support of distributed teams and sites,
  - collaborative desktop.

Figure 5. Approaches of the KMmaster – examples (www.kmmaster.com)

Approach 1	**Approach 2**
The development of knowledge, competencies or ideas may be encouraged by a specific process as well as by internal collaboration. Do you think that the development of knowledge could be supported by accessing specific experiences of your colleagues?	The development of knowledge, competencies or ideas may be supported by documentation. Do you think that the documentation of knowledge could be improved or at least be more formalized?
	
	Col: Collaboration **Doc:** Documentation **Org:** Organization **low, medium, high:** Specification

Editions

The KMmaster platform provides specialized "editions" to meet the requirements within different environments and their individual approaches. Currently, these individual solutions are based on the following editions:

- **EBoK Edition:** EBoK stands for electronic book of knowledge and is a lessons learnt approach to capture and manage project experiences as a central library.
  While projects differ, problems almost always remain the same. The KMmaster EBoK Edition helps to capture and share valuable experiences within an organization or network. Employees are encouraged to learn from each other.
- **Reporting Edition:** This KMmaster Edition supports decentralized project management and facilitates the sharing of short and concise progress reports (achievements). These reports can be periodically published such as weekly or monthly.
  Additional summary reports can be produced for later management reporting within an organization.
- **Innovation Management Edition:** The Innovation Management Edition supports the entire idea management process. From generating ideas, their evaluation, up to their documentation, all people, processes, and organizational levels can be included through highly flexible workflows.
  As a result from the analysis of the innovation management process from the different roles (idea provider, experts, management), this edition provides a functional tool which practically supports decentralized creation, share, and use of ideas effectively.
- **Life Science Edition:** The KMmaster Life Science Edition provides a platform for collaboration and documentation in the biotechnology, healthcare, and pharmaceutical industries.
  It supports process and quality management of the drug development life cycle, portfolio management, as well as target identification and drug discovery through collaborative knowledge management.

FUTURE TRENDS

The development of modern knowledge management software is a double process. On the one hand, solutions for clients promote the development of new features. Some of these features will be integrated into the KMmaster platform; others will remain a client-specific implementation. On the other hand, technological innovations and state-of-the-art approaches from academics need to be analyzed on a theoretical level and then be adopted to the KMmaster platform.

As a Web-based knowledge management platform, developments of internet technologies play an important role for future applications of the KMmaster framework. Currently, we are observing networking technologies and communities in the Web ("Web 2.0"). Especially social tagging is a new method that is used to structure big amounts of Web sites by Web-users ("del.icio.us", "mister wong", etc.), that is, unstructured knowledge that is clustered in single documents can be structured by a large community. The phenomenon of social tagging is currently reviewed as a feature of a KMmaster's next major version.

The internet encyclopedia "Wikipedia" is one of the biggest public knowledge management platforms. The project uses so-called Wiki-software for the collaborative work on articles. Furthermore, the Wiki-software is also used to organize the community itself and to identify experts for a given task (Frost, 2006). Wikis (short for the Wiki-software principle) seem to be a method that can be used very effectively to support specialized communities within organizations. Therefore, the KMmaster will offer Wiki-features in the near future.

Social networks can be modeled in network environments such as the internet. Models of network structures and methods of social network analysis offer approaches for monitoring and support of knowledge management activities (Müller-Prothmann, 2005b; 2006). Their integration into the KMmaster framework will provide a powerful add-on.

We observe more complex programs and software based services within a company's infrastructure. While currently these infrastructures are mainly characterized as closed systems, they provide high potential for intensified communication and collaboration across the system's borders. A program can behave like a client and a server, that is, like a service that is able to serve information and to use information at the same time. An innovative approach for a knowledge management platform could be a "mashups" or "service oriented architecture" (SOA) that is able to integrate knowledge relevant data of other systems from within an organization and from the outside across organizational boundaries.

Since processes get more and more complex, a challenge of software applications is to maintain a high degree of its usability. New users and users with a high workload must be able to intuitively use an application. Therefore, complexity has to be reduced to selected actions that are really needed within a specific environment and for a concrete task.

CONCLUSION

Focusing on collaboration and knowledge exchange as the core issues of knowledge management activities, we need to purposefully address the above mentioned barriers and try to overcome them by systematic rules (Müller-Prothmann, 2006):

- Person-related barriers need to be met, for instance, by an organizational "knowledge culture," trust-building activities, team building, communication trainings, localization, transparency of expertise, and so on.
- Overcoming knowledge-related barriers aims at methods of knowledge codification, translation, evaluation, and integration into the related processes.
- Channel-related barriers are addressed by suitable infrastructures as well as by information and communication technologies, especially Web-based tools that facilitate and enable processes of knowledge transfer.
- Contextual barriers exist on the various levels of individual, organizational, and societal relationships and their environments and demand institutional, cultural, and structural rules, solutions, and settings.

Basically, all of these activities aim at supporting collaboration and facilitating knowledge communication between the individual members of an organization, between organizational subgroups (teams, departments, sites), and between the organization and its environment.

A Web-based knowledge management platform, such as the KMmaster framework presented here, can address a limited set of barriers outlined above only. Nevertheless, due to its flexibility of workflow integration it provides a powerful tool for an adequate adjustment between the application of a software solution and use of organizational methods, fitting the specific organizational environment with its individual settings.

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KEY TERMS

Collaboration: A basic element of collaboration in organizations is knowledge exchange. The underlying function of knowledge exchange for collaboration is learning, innovation, and decision-making with regard to development and management processes as well as strategic orientation in the individual and organizational levels.

Communication: Basically, communication can be defined as the process of sharing information between individuals to reach mutual understanding. Communication includes preparation by a transmitter, (physical) transportation, and integration by a receiver. With regard to organizational knowledge communication, transmitter and receiver can be individuals, groups, organizations, and so on.

Documentation: Documentation is related to structures, documents, data, and classification schemes. Documentation of knowledge aims at capturing codified knowledge as well as tacit experiences, competencies, and networks.

KMmaster®: The KMmaster Knowledge Management Master is a Web-based knowledge management platform to support development, capture, sharing, preservation, application, and evaluation of knowledge based on organization, collaboration, and documentation. KMmaster is is a registered trademark of Pumacy Technologies AG (www.kmmaster.com).

KMmaster® Editions: The KMmaster provides specialized "editions" for different applications and industries. These editions include lessons learnt, reporting, innovation management, and life science industry.

Knowledge: Social construction of knowledge is central to approach collaboration in organizations. Then, knowledge is within and between the minds of individuals, that is, tacit. From the perspective of business economics, knowledge is often distinguished with regard to knowledge as object and knowledge as process.

Knowledge Management: Knowledge management aims at systematically supporting knowledge generation, sharing, use, conservation, and forgetting on individual, organizational, and societal levels.

Organization (Institutional): With a focus on collaboration, here organization is perceived as an evolving system of interactions. From this perspective, interactions are mainly based on communication.

Organization (Process-Related): Organization is related to processes, people, roles, and the formal organization (institutional). The function of knowledge organization as perceived here aims at mapping organization (institutional) processes and knowledge management processes.

Chapter XXXV
Ultimate Performance in a Highly Functioning Team

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ABSTRACT

This essay explores ultimate team performance as experienced by veteran airline pilots working together with a common purpose. The research ellicited the subjective experiences of five individual team members, employing a structured interview method to gather data for phenomenological analysis. Results offer a better understanding of what makes a high-performing team, the team experience itself, the context, and the meaning of ultimate team performance as lived experience. The research offers subjective descriptions of social interaction between self and other in a virtual/nonvirtual team context, offering a window into the collaborative experience; the self-other relationship; how individuals navigate their lifeworld within a team setting; and the applicability of the pilots' experience processes across other organizational domains.

INTRODUCTION

Collaboration is key to a thriving business in a fast-paced, global environment. In my work with both virtual and non-virtual teams, I see all sorts of team function and dysfunction, and dedicate a good portion of my time to helping teams improve team collaboration. I was curious about what makes certain teams very good at collaboration, often when team members are in multiple locations. What factors are at play to create the environment for ultimate performance? I chose to examine this airline pilot team as it is thought of by the organization as an example of strong team performance and collaboration.

What are the characteristics of a high performing team that allow it to adapt and thrive in an ever-changing environment, often with some members across the hall and others in separate locations? What are the characteristics of a team

that push it into high performance and allow it to maintain exceptional functionality? And what can we do to help teams move past solid performance and into ultimate performance?

SUBJECTS

I searched for a business team to examine after doing research on a jazz team in 2003 (Jeddeloh, 2003). I was looking for a team that displayed what the host company deemed as high-performance. I also was interested in identifying a team whose members considered themselves to be high-performing. I found that team operating in one of the major US airlines: a group of veteran male pilots who, in addition to their regular duties, came together to develop flight safety policy and training; or, as they put it, "We try to keep the passengers and pilots out of the trees," overseeing airline safety for the commercial pilots and passengers, in accordance with Federal requirements and airline best practices.

DATA-GATHERING METHOD

Pilots were interviewed singly and then as a group to allow them to reflect on what they said in the interviews. All conversations were recorded and transcribed. The transcriptions then were analyzed for common themes and characteristics. Open-ended interview questions were designed to draw out the team characteristics and allowed team members to talk about what they deemed important.

What follows is an overview of the themes supported by the pilots' own words. I will then draw some conclusions and make suggestions based on this team's experience. The fact that this is a qualitative description of one high-performing team is not a proclamation of truth, but an invitation to others to conduct more research, examining individual teams to learn what we can do to improve team performance.

THEMES

Themes from this study can be thought of in three broad categories, factors that impact team performance: Individual Member Factors, Team Collaboration, and Organizational factors. Individual Member Factors include a strong sense of *self,* relationships with other team members, and individual technical expertise. Team Collaboration Factors include: problem solving processes, mistakes, conflict, team leadership, overt and covert cuing, and the work itself. The Organizational Factors include: team chartering and sponsorship, rewards and recognition, and environment.

INDIVIDUAL MEMBER FACTORS

Sense of Self and Relationship Between Team Members

Pilot team members described each other as having a strong ego that is kept in check when operating with the team. This is exceptional given the ego strength of the individual team members. What makes this exceptional? One member stated, "I think lack of egos. In fact I feel pretty strongly about that." They described other teams in the past as having members exerting too much ego. "It was just a daily, ongoing train wreck that wouldn't stop …"

Team members describe themselves as personally dedicated and proud of what they accomplish, what they bring to the team, and what the team does, reflecting, and building on past experience individually and together. This is a group of men who set very high standards and work incredibly hard to maintain personal and team pride in the work. The way they do this is by asking questions to continuously make sense of the past and to understand what needs to happen going forward.

Team members have a tremendous amount of respect for each other as individuals and as technical experts. They have developed a healthy

reliance on each other for support as well as for differing views. "… It is a comfort factor with a bunch of guys that know what they're doing, and [have] the ability to take all of the different experiences and solve a particular problem." Each team member describes his *focus on the team and the collaboration*, rather than his individual pursuits. "I try to put the other team members first. I try to consider, what can I do to help the team, to make this team look good?"

The outcome of healthy interdependence shows up as trust built over time. They know what trust is without a doubt or hesitation. "It's a trust or a faith that comes over time that is built through interactions, through seeing, through hearing what they profess and what they do, their actions." Each describes trust as a quality that grew with familiarity and respect for each other as pilots and technical experts. They sense that each team member is there for the mission rather than individual or political gain. "Nobody's lying to each other, nobody's trying to make a name for themselves …we felt very strongly about what we had to fulfill."

They are clear that enjoyment of each other and the length of their relationships are important to them. "We enjoy working with the people … The enjoyment is the activity and the people." They also use humor to break the tension and show regard for each other. "We have the ability to laugh at ourselves and at the same time take our work very grave seriously."

As they developed their relationships, they have formed bonds where they care for each other on a deep level. They have transferred the learned military norm of watching out for each other, so critical to being a fighter pilot, to their current work.

"You look around and you see the facial expressions, you see the body language. You can see that people are tired. So, I will pick up the phone and walk over … I make it a point to walk over and just say 'hey, how's it going?' and do stuff like that … I've actually reached over and turned off computers on a guy and said, 'Look, you've got to get out of here.'"

Comparing their current work to their pre-flight practice in military operations, one pilot stated,

"You got really keen at looking around the briefing room and looking for 'this guy's not here,' you know, 'this guy, he's sitting there, he's alert, he's got his gear on, he's not here. The lights are on, the car's in the garage, but nobody's home inside that head.'"

Making the comparison to the current work, he went on to say,

"You look around at the other team members to see who's the weak team member today, and make sure they take care of themselves; because when they're sharp they're going to be really productive, when they're not sharp they're wasting all this time."

In this team's work, relationship trumps task; the more urgent the work, the more emphasis upon maintaining strong relationships. That doesn't mean that their purpose is not important, but they accomplish their purpose through first supporting each other.

Strong egos translate to a strong sense of self and self-confidence in their abilities and in their specialty areas. Once involved in the team tasks, the group purpose or desired outcome is well known, taken for granted, and, surprisingly, kept in the background. What comes strongly into focus is the collaboration. Each team member sets his ego aside in order to contribute to the success of the group. In fact, the collaborative aspects of the team (the relationship) are the primary focus. Team members are confident that if they make each other successful, then the team will be successful and the task goal will be successfully reached.

Another aspect of the team's processes is team members' efforts to bracket outside distractions and focus entirely on the collaboration, especially

their relationships. This focus results in great collaborative effort while oftentimes a loss of a sense of the outside world, including a sense of clock time.

Technical Competence and Respect for Each Other's Knowledge and Efforts

Team members have an effective blend of experience and expertise. Each team member is willing to rely on other team members for consultative advice and council. "… That goes back to the common, mutual respect of knowing what each one brings to the table and knowing so well … that we anticipate, 'Yeah, this sounds like a good idea.'"

Team members speak of individual competence as a requisite for achieving a good, collaborative outcome fueled by trust. Team members are all experienced pilots. Part of their taken-for-granted experience requires that other team members with whom they work are all competent, experienced pilots and contributors who don't need to be "propped up."

The Pilot team operates at peak—that is, every team member comes to the team with a high level of expertise. None of the team members are there as "interns" or inexperienced members who joined the team to learn. Each team member indicates that they know that every other team member has a high level of expertise. This impacts the confidence levels and trust that each has as they work with the others. It also results in a high level of respect for the other's expertise and mitigates the effects of individual egos.

Technical competence is a team expectation going into their work. It also is a requisite for high performance in this team, as lack of technical expertise becomes a distraction for all the other team members. Competence provides the automaticity required to detach and perform without thinking.

TEAM COLLABORATION FACTORS

Problem Solving, Decision Making, Assertive Sense-Making

The strength of the team member relationships shows up as problem solving and decision-making when problems or technical issues arise. The team indicates that they rely on each other to spot flaws and issues and offer any ideas. "… If we do it with the collective agreement, well, then he's going to see something that I missed."

The team operates with a consensus model, where each team member is encouraged to have his say, and when the discussion is over, unspoken agreement is made that the team will walk out of the room supporting the decision, even when there is heated disagreement in discussions. "We pretty much operate that way because we know how critical it is to have consensus with the type of business that we're in. We join forces and move on."

This high performing team's members use a process to navigate their work as they move forward. The Pilot team called their process "problem-solving," though they go beyond a traditional problem solving approach, and use creative give and take to make sense of the data they have and come to consensus. Each team process requires focusing intently on whatever situation is at hand, and then each team member makes a decision about what and how much he will contribute to the situation depending on his own expertise, his own time availability, and his sense of relational need to contribute to the collaboration. Team members speak of contributions to the work and, just as importantly, their contributions to making other team members successful and feeling strong.

Each team process relies on individual team members improvising creative ideas to add to the ideation process. All contributions are welcome and stream into the group consciousness, whether

delivered face-to-face or more likely, through virtual avenues. As the process proceeds, some ideas stay in the foreground as others slip to the background. Asking questions and listening deeply are the two basic skills, applied within an atmosphere of trust and confidence in self and each other. At the end of the process, the team has a successful result: The pilots develop a solution that makes sense.

Mistakes as Learning

This was an interesting topic given the Pilot team focus and work. On the one hand, the pilots indicate that they cannot afford to make mistakes and in fact, they do not make mistakes. "We don't. We try not to make mistakes. We think through it carefully. It's got to be right!" On the other hand, they indicate that in piloting an airplane, there is no such thing as perfection, but a constant correcting, as in adjusting flight controls to fly at a certain altitude.

In this team culture of constant adjustment, the team interdependence, high standards, and setting aside of egos is present. Team members work together to make adjustments to their work to maintain their own high standards. They see a mistake as a potentially fatal group error and a group process in need of adjustment. "So, we don't point fingers … It's our fault. It's not my fault, it's not your fault, it's not his fault, it's our fault. What did we miss and why did we miss it?" It is a continuous sensemaking process (Weick, 1995), where overarching team ideas are formed from the individual contributions. This sensemaking is a conscious process decision for this team. Members are aware of what they are doing and why their work as a team is successful and push to maintain a high sensemaking level through their group awareness, bolstered by their communication processes.

One factor is present that comes from team members' military backgrounds. They see mistakes as dangerous, life-and-death failures. "There was no bronze medal in a war. You don't want to take second place." So, the extremely high personal standards they each set, coupled with the importance of their work, and their reliance on each other for expertise and support, creates a strong push for continually making sense, maintaining excellence and minimizing any chance of making mistakes.

If a member is assigned to the team and not accepted by the team, and/or comes forward making rudimentary mistakes or is known to have a skill deficit, he/she will not be included in the team process. An expectation and assumption exists that each member of the team will contribute expert skills and experience. The team member who lacks skill and acceptance is gradually pushed out. Each team member is confident that under the pressure to perform, each pilot will perform at peak. Team members push each other to the edge of their skill and knowledge.

Team members focus on collaboration and describe their individual responsibilities and consciousness as a group consciousness. They describe making sense out of a situation and reaching consensus about what will be done. In the end, the team reaches consensus about the whole, the result; it is a solution to a problem or development of a new procedure that will provide safe handling of the airplane. They feel that if they collaborate well, then the outcome will be positive.

Managing Con.ict

As with any vibrant human interaction, where important issues are discussed, potential for conflict among team members is always present. "We have disagreements all the time about approaches. They're generally philosophical … We keep working at it until we come to consensus. We don't let things ferment." They don't seem to carry the emotional baggage often inherent in conflict. They are not territorial—they don't own their individual positions to the death, but focus on ideas and outcomes.

A strong team attribute is that each team member is assertive about expressing an opinion, and, each is willing and motivated to work out any and all disagreements, resulting in a consensus agreement. "You generally come back together and you both, or the whole team comes back together and apologize at the same time and they say, what's the right way to do this?" This is due to the fact that each member is willing and able to set aside his individual ego and agenda, and work toward the common good. Sometimes the team even uses conflict as a problem-solving tool where individual team members take a side to debate a problem or issue, to see the situation from "all angles."

The pilot team spoke of past instances where there was a team member who was not collaborative, was ego-centered and demanding. They indicated that while this member was part of the team, the work become agonizing and difficult. It takes awhile, but the team eventually was successful in getting rid of the problem team member through political pressure. This speaks to the synchronizing nature of the team, striving to create entrainment and "flow" (Csikszentmihalyi, 1990), and exercising positive behaviors to maintain the flow state.

Conflict is viewed, not as a negative occurrence, but as a healthy expression of passion leading to consensus. Rather than something to be avoided, conflict is seen as necessary and healthy and often even used as a tool to move the team process forward; a foundation of trust and safety that allows conflict to occur as an outlet and a tool for work rather than a factor that diminishes relationships or causes the work to stop.

Team Leadership

The pilot team is highly respected and allowed to self-regulate within the organization and does its work without a designated leader present. Each team member is a leader in his own right as a technical expert and an emerging leader on specific projects. Each has work they do separate from the group and interdependent work to do with the group. "A collection of individuals [who] all recognize that we're either going to sink together or we're going to swim together on the program here." They strive to operate with a minimum of organization structures that will open up the most space for team improvisation. Interestingly, the organization recognizes the critical organizational value of this team and in turn strives to keep the structures minimal, knowing that this group needs flexibility to operate effectively. The team sponsor is instrumental in providing just enough structure to optimize the collaboration.

Formal leadership is seen as intermittent and useful only in specific circumstances, where one team member is more familiar with a situation or is needed to start the team process. A leader on the team is organizationally appointed, a supervisor within the company structure, who works to run interference and eliminate roadblocks for the team but stays out of the day-to-day team function. Once the team process is started, and the project is set in motion, the designated leader slips into his role as an equal contributor, allowing others to emerge as leaders as appropriate. The designated leader stays an equal member of the team until he is needed to step in and shift direction of the team process in some way. Leadership on this particular team is significant for the leader's abilities to be unobtrusive and willing to allow the group to work without interruption, and, where necessary, to effectively remove obstacles imposed from the outside.

Overt and Covert Cuing

Cuing is used between pilot team members to indicate acceptance as well as discomfort with project/solution direction. Communication occurs often in silence. One team member describes the face-to-face and virtual communication as part of a personality mix that allows for communication without speaking, through body language,

tone, silence, or simply knowing the other person through his personality.

"It's like in the jazz field where you know the guy on the other end of the row is going to do the right thing at the right time, but you're not talking to him. And, you might not even be looking at him but you know that at that point in the piece he's going to come through with his part of the deal, and that's kind of the way we work."

So, over time, with understanding of each personality, team members gain a trust and acceptance of communication and understanding of each other without overt cuing.

Team members described team communication as critical to team success. Virtual communication (e-mails, phone calls) predominates but members have an expectation and desire to get up from the desk and go across the hall or across the campus to speak with other team members face-to-face. This face-to-face communication was deemed critical to maintaining rapport and maintaining high performance.

Face-to-face interaction is deemed necessary by team members to maintain the team and get the work done. "So, I pick up the phone and walk over…and say, 'Hey, how's it going?' It's kind of a concern for your other people." Virtual communication is the norm for day-to-day information sharing, but they stressed the need for regular face-to-face interaction to maintain strong relationships.

A common outcome of this nonverbal give and take is synchrony or entrainment. Interpersonal social entrainment occurs when team members synchronize with each other's rhythms and movements while interacting, and contributes to smooth and efficient interchange. Emotional mutuality is established between selves as entrained partners interact and create resonance.

Pilot team cuing is part of a socially constructed set of norms developed over many years together, and part of the known military conventions. Individual team members are skilled at "reading" the subtle cues of their teammates, whether face-to-face or virtually, constructing a set of norms through their length of service in the field and their lengthy history with each of the other members. Each team member learns a universal set of norms and then learns particular nuances of individual team members by working with them over time.

The Work Itself

"Our job is to make sure that we have a fully trained, competent, qualified pilot out there in the airplane … if we work together right from the beginning of things it makes it a lot easier." Each pilot team member is extremely dedicated to the airline mission and, in particular the team mission of "Keeping the airplanes out of the trees." Team members feel their work is important and valuable to the airline. "I feel like I serve in a position of privilege and with that I understand that that is a great responsibility …" They have a strong sense of obligation not only to the airline but also to each other. "… So it's important for me to fulfill my role to the absolute best of my ability so that I can support the others." This critical "life and death" nature creates a tremendous sense of task and member interdependence. The only way the team can complete their work is by relying on each other.

Each team member relies on vast amounts of experience and skill to contribute to the collaboration. Each team member improvises his ideas based on years of experience and a strong desire to support other team members. One of the most amazing things I learned was that each team member focused much of his efforts on the collaboration—that is, the relational aspects of the team as the work unfolds. Team members are as, or more dedicated to each other as they are to their purpose or desired outcome. The critical team mission/purpose, coupled with trust and skills creates a strong team interdependence.

ORGANIZATIONAL FACTORS

Team Chartering and Sponsorship

Individual expertise and experience are highly regarded and expected by all team members. This creates another surprise. Is it feasible and prudent to expect to place inexperienced individuals on a more experienced team without negative consequence? Certainly it bears consideration when forming the team, to weigh the need for high performance with the organization need for training and succession planning. The implications are that when the organization has a critical need or purpose in forming a team, then it is best to populate that team with the strongest technically and socially skilled members.

The pilot team has a senior leader acting as the sponsor who allows the team to function with minimal interference and maximum support. He is instrumental in getting the team the resources they need to do their "mission." He is also "one of them," in that he is a certified pilot. This creates a sense of trust that is not always evident between the team and the organization. The sponsor is also effective in running interference for the team so that organizational influences are "filtered" before they are imposed on the team.

Rewards and Recognition

The work the team does together is tremendously interesting and rewarding. "[We] function off of the reward of the satisfaction of a job well done as much as anything…" The team members feel tremendous responsibility and privilege to be doing the work they are empowered to do.

The organization lacks formal feedback loops for rewards, recognition and appreciation of team and individual outcomes. Team members indicate that they don't need a lot of recognition—that the work itself and the satisfaction of knowing they complete a "successful initiative" is reward enough. "We know we've done good when we don't get a lot of hate mail. … If we put something out and then we don't hear anything about it, maybe this is good news."

They describe how, on rare occasions, they get together informally at a team member's lake house or somewhere for a dinner. These outings are highly regarded though not a regular occurrence.

They are driven not so much by external rewards and recognition but by the knowledge that they do vital work, a self-rewarding mechanism. "We're driven through appreciation and the fact that what we do counts." "[Our work] is simply too critical to let [the airline] fail." Typically, verbal praise or acknowledgement about individual contribution is lacking and more acknowledgement of the collaboration that transpires is common. And, there appears to be an acknowledgement that deep caring and appreciation exists between members. Indeed, member closeness is a form of reward for team members, a feeling of esprit de corps and a deep sense of support. They indicate that it is nice to receive accolades once in awhile but they do not expect them and do not perceive that they have the time to solicit them.

Environment

Physical distance between team members is a challenge. "This physical distance between us … the real estate" makes it more difficult to maintain face-to-face contact when a team member deems it necessary. The pilots describe the need for face-to-face communication more to enhance relationship than accomplish tasks. Tasks are accomplished through telephone and e-mail. They talk more about face-to-face communication when they want to check in with each other about stress level and other factors of well-being.

Team members pay attention to the environment mostly before the work is started or as a reflection about how to best structure the environment. Members of this team describe building relationships with at least occasional "line of sight"

connections that are not adequately served when operating in different locations. When face-to-face is not possible a team member uses the phone, even to the extent of calling a colleague in another location to "check" on a third team member.

Team Data Summary

My observations are that this team developed over time together with a solid and critical purpose, the initial team design and formation from sponsorship and ongoing leadership that stayed in the background but provided adequate structure, direction and resources to keep the team going in the right direction. Sustained high performance for this team was the result of a combination of strong sponsorship and leadership, strong, evenly matched team members, and enough time for team members to create a sense of interdependence around task and relationship.

IMPLICATIONS AND DISCUSSION

I entered into this project anticipating that there might be predictable crossover characteristics between all high-performing teams, virtual and colocated. I ended up in amazement, not at the team characteristics but how much emphasis is placed on relationship. This Pilot team can be described as an ongoing, functional team (Duarte & Snyder, 2006) as they have distinct membership, clear boundaries and an ongoing, critical safety purpose defined by their charter. Although team members are located in the same city, they are officed in various buildings on a widely dispersed campus. This requires predominantly virtual communication techniques using email and telephone. It is a rare occasion when the whole team meets face-to-face.

Here are team characteristics that impact this team's performance and provide implications for teams in any environment:

Individual Team Member Implications

Strong Sense of Self

Ego strength and well-developed sense of *self* are important factors in team functioning. It is not so important that each member comes with a strong ego but it is advantageous for individual members to have reasonably similar ego strength and self-awareness in order to appreciate each other and to assert their viewpoints as needed. It is also important that individual team members be able to set their egos aside, respect others on the team and support each other as they do their work. They each need to project confidence in their own abilities and the abilities of their teammates to perform competently and with integrity. Thus integrity is a major component of the task work and their individual reputations. Further, realizing and accepting the equal "ego strength" of each member requires that there be no competition with each other for recognition. Indeed, if each member is more concerned about the well-being and recognition of the others than of himself, these factors combine to establish and maintain a tremendous sense of closeness and trust (Duarte & Snyder, 2006). Team members also need to seek out each other based on "self-enhancement" needs, to reduce uncertainty and make sense of their ambiguous tasks (Fiol & O'Connor, 2005). This provides the team members with a sense of psychosocial interdependence (Tjosvold, 1990) and unique common field affiliation, based on their expertise, critical responsibilities, and the tenure of the team. The felt sense of responsibility and autonomy results in a felt sense of team "identity" (Fiol, 2005), of empowerment, job satisfaction, customer dedication, and team commitment (Kirkman & Rosen, 1999). This notion of interdependence around task cannot be underestimated when a team is formed and is a way to establish the platform for high performance.

It is up to the team sponsor and leader to attend to this need and help team members make these connections.

Team Collaboration Implications

Task and Relationship

Team task is defined as a stated purpose for being together coupled with individual and group dedication to accomplishing that purpose. What is truly amazing is how a high-performing team establishes a purpose early on and then sets it in the background (though not out of sight) and focuses primary efforts on the relationship among members. One remarkable high-performance factor is an unshakable belief that supporting each other is the best way to achieve the team purpose. Team members need to demonstrate high degrees of *affective-based* and *cognitive-based* trust (Bligh, Pearce, & Kohles, 2006), where members act as good, social team players, and exhibit consistent reliability. The trust that is established is based on socially constructed integrity and "loyalty" norms that members learn in past roles. If this integrity is not evident, the team performance will suffer. Trust is built on individual member reputation for competent performance, integrity, the practice of giving honest and constructive feedback, concern for the well-being of teammates, and belief that teammates would hold ideas shared in confidence (Duarte & Snyder, 2006; Nemiro, 2004; Ross, 2006). These norms promote a sense of "swift" trust that is both fragile and temporal (Jarvenpaa & Leidner, 1999), depending long-term on expertise and team "fit." Each member understands that a major part of his or her role functions as "backing up," or taking care of the others to make sure that the team is functioning and focused.

High-performing team members adhere to a number of established practices that promote exceptional team performance (Malhotra, Majchrzak, & Rosen, 2007): they establish and maintain trust through frequent communication, they respect and value each other's diverse views and specialization in the field, they meet via technology and face-to-face when necessary to problem solve and support each other, they promote each other within the team and within the organization, and they provide a supportive environment where each member benefits. This makes a strong case for meeting face-to-face if at all possible, especially at startup, to develop the beginnings of trust. If this is not possible, then extra care must be taken to develop the trust necessary, the task interdependence appropriate, and frequent communication strategies (Rico & Cohen, 2005). It is not a good idea to include team members on a team who do not have high integrity and capacity for trust building. One significant implication here is that we need to focus more attention and effort on training teams how to focus on the relational aspects of collaboration. If we can get team members to understand that "making each other look good" is a primary success factor in team performance, then most other issues will take care of themselves.

Conflict, if managed well and accepted as an integral function of the team actually improves performance, creativity and outcomes (Chen, 2006), and a sense of bonding between members, as more ideas and challenges are placed on the table. The lack of competition around task-based differences is instrumental in keeping relational conflict to manageable levels, healthy conflict management being instrumental in increasing creativity in seeking solutions (DeChurch, Hamilton, & Haas, 2007). A collaborative conflict management style based on the collective purpose (Souren, Samarah, Seetharaman, & Mykytyn, 2004) has positive results, including increased trust building.

Problem Solving and Sensemaking

Most teams perceive their work as primarily problem solving in the more traditional sense. This is a normal part of team functioning as a problem is

defined and solutions are contemplated. A way to move this problem solving to a higher level is to include the expectation of supporting each other and welcoming free-flowing ideas, even if those ideas may not be feasible, up until a decision is made. Allowing this "sensemaking" (Weick, 1995) step in the problem solving process can have a positive effect on outcomes. The "sensemaking" process is messy and at times chaotic, with multiple views encouraged and valued. The final decision is then reached, with an expert individual contributor facilitating a final decision. This process is a combination of linear and intuitive (Nemiro, 2004), where a regular problem-solving process is started, a creative brainstorming and debate ensues and then the team goes back to a linear process to close.

Overt and Covert Cuing

All teams use a variety of overt and covert cuing. Overt cuing includes sound and visual signals that team members learn in order to communicate effectively, both in face-to-face and virtual environments. These include verbal and nonverbal cues such as appreciation, acceptance, disagreeing with an idea, adding ideas, and letting each other know what they are thinking.

Covert cuing is interesting in that cues are known, seemingly innate practices. Team members describe how they "just know" how the other is feeling and what is going on emotionally. This is communicated through embodied language: slight movement, facial expression, color changes, pitch, and volume in the sounds expressed. It can be as much audible expression as it is silence or lack of sound. In a virtual sense, it is the art of catching nuance in phone conversations and e-mail text as well as reduction of communication. It is important that teams and individuals know and understand the use of overt and covert cuing and that this factor be addressed as an encouraged and transparent process. In a virtual environment it becomes vital to discuss cuing and gain team agreement about how this is done. This is also an opportunity for training in alternative communication methods.

Covert as well as overt cuing is much more common than is often thought as a communication technique. It makes sense to attend to this at the team formation and foster and sanction it as part of the agreed socially constructed communication norms within the team. It is necessity to notice and sanction less common ways of "knowing" with the more covert cues, especially in virtual communications. And, varied technologies that support this cuing, technologies agreeable to the team, must be put in place (Malhotra & Majchrzak, 2005) to promote maximum communication and innovation.

Mistakes and Experience

High-performing teams have a low tolerance for final outcome mistakes and view them as critical occurrences. Accuracy becomes a matter of team pride and needs to be articulated within the team charter, and encouraged as part of the team culture. Up to the point of final outcome, the team needs to have a high tolerance for mistakes resulting from exploration and risk-taking. This needs to be encouraged as the team makes sense of their purpose and outcomes. High-performing teams take risks within the confines of the team, exploring creative possibilities leading up to a final outcome. This can be a team expectation and an outcome of trust building combined with strong individual technical expertise. Definitions and descriptions of the value and use of mistakes as learning events are vital for higher-level team performance.

Assertive sensemaking (Weick, 1995) might be used as an alternative operational method to the more traditional problem solving approach so ingrained in our management ranks. Indeed, the pilot team used variations of assertive sensemaking as a preferred problem-solving norm. They were ruthless about no mistakes in the outcome

but encouraged risk taking and exploration prior to a finished product.

Social Conventions

The high-performing team operates with socially constructed norms, some of which are innate conventions carried forward over time within the organizational environment and brought from team members' pasts into their current industry. These are spoken and unspoken conventions and expectations around who can be a part of a team, how team members care and support each other, how they communicate, how they resolve conflict, and, in general, how they go about fulfilling the team purpose. Social conventions need to be overtly addressed in the high-performing team and include: a set of operating norms or "ground rules" they adhere to, established communication preferences and norms both face-to face and virtual. Team members need to be cognizant and vigilant about potential conflicts and individual member focus, and, once individual members are accepted and respected, they need to embrace diverse points of view (Combs & Peacocke, 2007).

The significant point here is that team members need to be aware of these socially constructed norms and at times discuss them to make changes that fit their own situation. This makes a strong case for making socially constructed norms more transparent and changeable as the team goes forward.

Organizational Implications

Leadership

A high-performing team might also be called a *virtuoso team* (Boynton & Fischer, 2007) made up of individual virtuosos, people who are at the top of their field. Leading this sort of team takes finesse. They operate best with minimal structures coupled with a critical purpose, allowed to form and develop their outcomes with minimal supervision (over-supervision is seen as interference by the team) and maximum support and recognition. Leadership here is not hierarchical but more a social, dynamic process (Bligh et al., 2006), which further promotes egalitarian and collaborative behaviors. Each team member is a leader in his or her own right and needs to be encouraged to share expertise, experience and findings while taking care of each other.

Team Chartering and Sponsorship

A frequently overlooked or minimized factor in the use of teams is attention to team startup. This includes sponsorship from the organization, chartering the team, and planning for ongoing resource allocation and support. Often a senior person will pull a group of individuals together to accomplish a particular project or task. Careful thought needs to be given to what it means to sponsor a team, to successfully launch a team, and to support it as it moves to high performance.

Team members need to have the technical (subject matter expertise) and social (ability to work with others) skills to create a high performance team. Care must be taken to avoid burdening the team with members who do not fit, lacking either technical or social skills. Highly skilled and collaborative team players will have little patience for assigned teammates who do not contribute or are hard to work with, causing team performance problems.

The organization's need for control must be mitigated by the high-performing team's discerned need for autonomy and minimal structures. Recall that the subject team pushed out team members who were not up to acceptable skill levels, and the team sponsor would tread lightly, protecting the team members from organizational control. Indeed, we need to rethink our assumptions about the care and feeding of high-performance teams. It is best to focus more leadership attention to framework and purpose development at team startup and move away from "managing" the

high-performing team as they work. It is better to strive to move leadership and control into the hands of the team.

A sponsor must also be readily available to support the team with the necessary resources, such as communication technologies, additional members as needed, and rewards and recognition as appropriate throughout the team's life. The sponsor knows when to remain close without solving the team issues for them, yet knows when to step in when needed to help the team remain on track and move to high performance. It becomes *not* a matter of motivating team members—they will be motivated by their purpose and other members; it *is* a matter of avoiding "de-motivating" them with factors that get in the way of high performance.

CONCLUSION

The data drawn from the words of this high-functioning team are surprisingly concise and descriptive, particularly in the areas of strong sense of self, task and relationship, building trust, problem-solving/assertive sense-making, cuing, mistakes, social conventions and leadership. Notable implications abound for how we set up and support teams' journeys to high performance. Much of the work to create a high-performing team needs to be done up front in the sponsorship and chartering of the team.

High-performing team members have strong technical and social skillsets and maintain awareness of their critical purpose, keeping the purpose visible in the background, while focusing much of their energy on the caring and support of each other.

A strong sense of self is driven by team members' skills, and trust, built on integrity and confidence in themselves and their team, with equally skilled and confident teammates. This makes a strong case for mindful team sponsorship, discerning who is invited to join a team (and who is not), relating to both technical and relational skillsets. Is the team a place for training less-skilled members and interns? Perhaps the conclusion here is that individual team members need similar technical and social skill levels regardless of tenure. What is the optimal level of Supervisory support and involvement? This study creates a strong case for mindful organizational and team leadership developed in the initial team charter, pushing the team to operate with minimal structures and interference, and promotion of self-management and self-leadership wherever possible. Many factors need to be considered when choosing team members and a leadership configuration, including team member expertise, affiliation, and individual emotional intelligence. This implies that leadership configuration is best tailored to team, rather than organizational needs.

While it is true that not all teams can be high-powered in the same ways as this Pilot team, there is often room for improvement. One of the things that may be hardest for leaders to embrace but that is most apparent, is that the model we have all been following relating to technical competence and empowerment has to move further and further along a more independent, "self-leadership" path. While mindful sponsorship is critical, and while a certain amount of time has to be spent on the mechanics, less heavy direction and micro-management in the right doses help teams achieve higher performance.

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KEY TERMS

Charter: A charter is the contract or agreement that team members have that defines their expectations and the team expected outcome.

Collaboration: Collaboration is the process of working together where team members cooperate and contribute both to a quality output and a quality team process.

Colocated Team: A colocated team is one whose members are in the same geographic area, easily accessible face-to-face.

Cuing: Cuing is prompting between team members. It can be overt with visual and auditory signals; and it can be covert with unseen and unheard nuance.

Purpose: The team purpose is its mission and reason for being assembled. It is set of expectations about outcomes and team process.

Sponsor: The team sponsor is the person or persons responsible for initiating the team by legitimizing need, suggesting membership and defining the team purpose and expected outcomes.

Team: A team is a group of people brought together to complete a task or purpose.

Trust: Trust is an individual and team belief that individual team members and the organization will do what they say they will do in a quality manner.

Virtual Team: A virtual team is one whose members are not in the same geographic area, requiring accessibility through virtual means such as email, telephone, and video conferencing.

Chapter XXXVI
Globalizing a Function within a Company

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ABSTRACT

This case study presents the work done to develop and execute the global vision for a 24/7 matrix organization within a major multinational corporation. Following a literature review describing the opportunities and challenges of a global virtual matrix organization, it presents a McKinsey 7-S (Gluck, 1985) type analysis of this organizational change. At the time this is written, the organizational change is being implemented. The discussion is presented from the vantage point of two of the Change Management consultants that have been engaged to facilitate this work. Specifically discussed is how technology is employed as an enabling element to global collaboration working in virtual teams. While high tech is absolutely necessary to this globalization effort, equally necessary is a high touch approach to build relationships and trust across the organization.

INTRODUCTION

As with any case study involving an ongoing concern, this chapter presents a work in progress. The task at hand was how to globalize a single and central functional organization within a large multinational corporation. The function discussed has thousands of employees globally and is found in the top third of the company's value chain. The task was how to move from being a function within a multinational organization based in the Midwestern United States that conducts business on six continents and dozens of countries to being a truly global function with the global headquarters in the Midwestern US. To achieve this task, the people of the organization

are learning to collaborate amongst themselves in ways that they have not previously done. The shift presented in this case study demonstrates how the organization has worked and continues to work to bridge time, distance, culture, language, and geography to become a single global entity operating as a global virtual team. In this regard, a global virtual team is a globally dispersed group with members in and from more than one country who are working to achieve a shared objective. The globalization effort of this case study examines the impact of collaboration through use of global virtual teams across six newly-chartered global centers.

In presenting this case study, there first will be a discussion of the initial operating state of the function and the intended vision. This will be followed by a review of the literature discussing the benefits and challenges of operating as a global virtual team. Finally, there is discussion of the steps taken by the organization in the study to take advantage of the benefits and address the challenges of shifting to operation as a global virtual team.

These specific steps will be discussed in a holistic analysis which incorporates the McKinsey 7-S model and will include how technology has been both a challenge and an enabler to globalization. The McKinsey 7-S model contains the interrelated elements of a shared vision, strategy, structure, systems, staffing, skills, and style. It would be logical to ask why an organization would use the 7-S model, a model that is over 20 years old, in developing cutting-edge work such as that examined by the case study. There are four reasons for use of this model. First, it is comprehensive. By covering the full spectrum of an organization, it assures that the organization is prepared to implement the globalization plan. By developing a plan that comprehends each of the 7-S elements and their interdependence, the organization can be sure that all aspects have been considered and are aligned with the others. Second, the value of a 20-plus year old tool is that it has been widely used globally. This means that the people around the world who are required to implement the globalization plan are more likely to be familiar with the tool. Using a model that people are more likely to have previously seen increases the acceptance of its use and provides a common language for discussing the change. Third, the 7-S model incorporates both the elements of task and relationship. Some cultures have a greater task orientation. The 7-S elements of strategy, systems, and structure, appeal to the orientation toward getting the task done. Other cultures have a greater relationship orientation. The 7-S elements of staff, skills, and style appeal to the concern for harmony in people relationships. Having elements that appeal to both the task and relationship orientations increases acceptance of the use of the approach and tool. Finally, using a comprehensive model ensures that the less-favored orientation is addressed. In application, this means that task-based cultures which would find greater relevance with a review of strategy, systems, and structure are also able to consider their less favored elements of staff, skills, and style.

LEVERAGING THE GLOBAL FOOTPRINT

The global vision is to take advantage of the organization's size and global reach so that the workforce and workload may be optimized across the globe. Development of this global vision was created by the top executives in the parent company in concert with the board of directors. The strategies to carry out the vision were created by the senior leaders in the function who represented the major global regions. The major global regions were allocated and assigned to six geographic centers. This senior leader team then identified 11 major "practice areas" or "key functional deliverables" which would need to be made common in order to share work across the six centers and work on a 24 hour clock. That

is, theoretically, when work is completed on a deliverable in one regional center and their work day is complete, the work can be electronically continued by another region and center where the team is just beginning their work day.

Prior to the start of this initiative, work was done very differently. The focus was regional. Resources were regionally owned. People considered that their career and business focus were dependent upon the success of their regional business, as opposed to the success of the global organization. There was minimal cross-regional work. Cross-regional collaboration was ad hoc, typically driven by special projects. Most of the people who did work in one region had minimal awareness of their counterparts in the other regions.

To begin the globalization effort, each of the 11 practice areas was led by one of the senior executives from the original strategy team, and populated with Subject Matter Experts (SMEs) from each of the six centers around the world. A SME is an individual with deep expertise and experience in a technical area within a function. These teams were chartered to do the following in four months: complete a current state analysis of how work is done in each practice area and across all centers; conduct a cost/benefits analysis of the different approaches; and choose the best approach or create a hybrid approach that would enable the company to fulfill the vision of the 24/7 global operation.

While the task appeared to be simple, there was significant complexity due to the team composition. Each of the 11 teams was a separate global and virtual team. Each team had members who spoke, at a minimum, four different languages, were located across five different time zones and had varying degrees of organizational maturity and complexity in their locations.

In determining the proper structure for the organization, the benefits and challenges of operating within a global virtual team were explored. A review of the pertinent literature is provided next. In the analysis, the benefits proved that operating this way was certainly in the best interest of the organization. At the same time, it was also abundantly clear that the challenges needed to be addressed directly for the new organization to work. To address these challenges, the organization partnered with an internal Human Resources – Change Management professional specializing in large scale organization change.

LITERATURE REVIEW: BENEFITS AND CHALLENGES OF GLOBAL VIRTUAL TEAMS

Global virtual teams provide many benefits to the business in the creation of business knowledge because crossing time zones allows work to be done all 24 hours in the day (Huijser, 2006). Specific organizational application follows this generic discussion of the benefits and challenges of operating in a global virtual team environment. When global virtual teams are working to their optimum, operating costs are reduced because of the ability to save travel costs, save employees from having to relocate, and avoid having to place people in expensive expatriate assignments (Duarte & Snyder, 2006). Other benefits include the ability to be close to customers and emerging markets, building access to a large and more diverse global talent pool, being able to use the skills of partial-retirees who spend part of the year in a different climate, and increasing the likelihood of business continuity in the event of a disaster on one area of the world (Froggat, 2001). Despite the significant benefits, there also are significant challenges. These include the need to bridge geography (Henttonen & Blomqvist, 2005), time (Huijser, 2004), culture (Gurung & Prater, 2006), and language. Each of these individual issues has the potential to minimize a team's effectiveness.

Crossing the borders of geography and organization adds challenges to success. It means

that members of global virtual teams are not able to resolve issues by walking down the hall and talking with each other. The lack of proximity tends to breed more conflict than is found with co-located teams (Henttonen & Blomqvist, 2005; Jarvenpaa, Shaw, & Staples, 2004). In viewing organizational integration, Barki and Pinsonneault (2005) discuss specialization and politics as barriers to success. When an individual is a part of a global virtual team that is based upon function, there will be pressures upon the individual to optimize results for the overall global function. Simultaneously, there is also pressure coming from the local organization to be a partner to the success of the local unit. To succeed as a larger entity, sometimes the local unit's performance has to be sub-optimized to ensure optimal performance for the entity. Sometimes, local unit resources will need to be dedicated to work on the global effort, to the seeming detriment of the local effort. The expected result is power struggles, particularly when resources are expected to be shared. When this occurs, focus tends to shift way from the organizational goals and energies are spent on internal political battles, rather than external competitive battles. What this suggests, then, is that the natural state of virtual global teams is one of having political misunderstanding, even outright battle, with the localities of the team members. Building trust among team members is critical.

Building Trust

Given the rampant opportunity for internal political battles, building trust is a challenge of global virtual teams. One definition of trust is to look at it as the four elements of behavior, goodwill, capability, and self-reference/identity (Henttonen & Blomqvist, 2005). When there is trust, there is the understanding that the team members can be counted upon (Lu, Watson-Maneim, Chudoba, & Wynn, 2006). The challenge of developing trust is made all the more difficult because the team members are unable to see each other with sufficient frequency (Jarvenpaa et al., 2004). When the issue is one of trust across various local organizations with the matrix function to which the local team members report, then there is also the potential for seemingly competing local priorities, even though they all serve the same global shareholders. The same issues arise both across individuals, as well as across business units. For purposes of this discussion, the focus will be on the various individuals in the virtual global team. However, it is acknowledged that the same issues and solutions apply across the organizations.

Work is done over computer-mediated processes. This means that communication is mediated by technology, rather than conducted face-to-face. Team members who work over computer-mediated processes have a greater likelihood of reporting dissatisfaction with other team members (Hinds & Mortensen, 2005). Team members in distributed teams are more likely than co-located team members to be harsh about each other and to disparage other team members. When, however, the team members are able to spend sufficient time to build an understanding of the context of the other, there is a greater likelihood to have increased trust.

Hinds and Mortensen (2005) highlight the importance of understanding the context of each other. While it is a good step for team members to regularly meet on a face-to-face basis to build contact and camaraderie through multi-day conferences and socializing together, it is even better to spend an extended time working together in another team member's local setting. So, for instance, if a team member from Germany goes to the local site in South Korea and works alongside the South Korean colleague for a week or two, there is greater appreciation of the work environment, the communication patterns, the local site pressures to meet other objectives, and the language implications. This also gives a greater appreciation of the impact of cross-time zone work on such seemingly banal matters as

the availability of technology in the home, impact on family life of the early and late virtual meetings, and how much sleep a team member gets when operating as a member of several virtual global teams that have differing meeting times which require them to end one global meeting at midnight, take another global meeting at 2:00 a.m., and then be in the office by 9:00 a.m. to meet with the local team.

As with co-located team members, integrity is important toward building trust among global virtual team members. Duarte and Snyder (2006) identify that trust cannot be built when team members do not show the integrity of doing what they say that they will do. To build trust, members of global virtual teams need to meet their obligations, respond to inquiries in a timely manner, be respectful of others in their correspondence, give positive feedback, and work with others to resolve problems (Jarvenpaa et al., 2004).

Working Over Technology

The reality of global virtual teams is that the majority of the work is done using technology. This has benefits due to savings of time and travel costs. However, there are also increased difficulties in working in a way in which communication is mediated by technology. Henttonen and Blomqvist (2005) suggest that computer-mediated communication hinders the ability to build trust. Jarvenpaa, et al. (2004) clarify that this is because it gets in the way of the communication cues that would otherwise act to transfer trust, such as warmth, attentiveness, expression, and body language.

Exacerbating this are issues over the use of technology, inconsistent team processes, and inconsistent training. Thus, the result can be inconsistent performance. Team members may not have the expertise to diagnose and address the team development behaviors which could improve their performance and team effectiveness. Their leaders are not necessarily learning how to lead effectively in a global virtual environment (Javidan, Dorfman, De Leque, & House, 2006) and may not have the conflict management skills to help in cross-cultural situations, much less when the situations occur virtually (VonGlinow, Shapiro, & Brett, 2004).

When it comes to choosing the most appropriate technology, there is no particular magic in one technology over another. What is important is that it allows spontaneity and there must be minimal techno-churn so that technology selected is available to all, along with the requisite training. Techno-churn is when technology updates occur with such a frequency that not all team members are using the same technology or version of the specific technology. Hinds and Mortensen (2005) look at the need to have a medium to allow spontaneous communication. Even when the communication can be spontaneous, there is still room for miscommunication and hurt feelings to occur. However, for the most part it is preferable to keep the communication flowing spontaneously rather than to have silence, which breeds even greater opportunity for miscommunication as ignoring/avoiding/anger reactions. Lu et al. (2006) argue for the need to have all team members have the same tool set, rather than continuously upgrading to the next new technology. This might seem a simplistic key; however, what some teams experience is that a tool is selected, some people get it and some do not, some get training and some do not. When a critical mass finally has the tool, then a new tool is introduced and the cycle begins again. For people who are on more than one global virtual team, the result can be the need to have, learn, and use different tool sets for each team. Lu's experience at Intel was that the technology churn was adversely affecting team productivity. The recommended view would be to cadence in new technology to ensure that all receive it and are trained relatively simultaneously.

ORGANIZATIONAL CASE STUDY: A 7-S REVIEW

Continuing to the case study with this understanding of the benefits and challenges of global virtual teams, the task was to develop an organization that could maximize the benefits while anticipating the challenges. The review of the organizational change management work is examined through the use of the McKinsey 7-S model (Gluck, 1985). According to Gluck, the model provides that organizational effectiveness comes from more factors than just structure and strategy. Rather, organizational change requires a forward-looking approach in incorporating the interrelationship of the seven factors. In discussing the case study for the globalization of the instant function, the seven factors of shared vision, strategy, structure, systems, style, skills, and staff are discussed in the work done to ensure a successful change effort.

The 7-S model is a widely used tool in this multi-national for both planning and diagnostic purposes. Additionally, this organization uses a large-scale change methodology based on Kotter's change work. Kotter (1995) discusses that few change efforts are truly successful. He identifies eight errors that get in the way of the potential success of organizational transformation efforts. The errors are in not : (1) establishing a great enough sense of urgency (2) creating a sufficiently powerful guiding coalition; (3) having a vision; (4) communicating the vision; (5) removing obstacles to the new vision; (6) systematically planning for and creating short-term wins; (7) waiting before declaring victory; and (8) anchoring changes in the corporation's culture (Kotter, 1995). In partnering with the organization, the Change Management professionals incorporated Kotter's teachings by using the common change implementation methodology mentioned earlier. The common methodology uses tools which support leaders and teams to create a sense of urgency, align themselves around a common vision, develop a communication plan, action plan for resistance, measure and monitor progress, and celebrate small wins during the change implementation.

Clearly Shared Vision

There are two elements to a clearly shared vision. The first is that the vision is developed. Next the vision and its accompanying strategies must be communicated to and understood by those who are impacted but may not have been involved in their development. As is well established, only a small percentage of large-scale change efforts succeed (Kotter, 1995). Kotter admonishes that the vision is typically under communicated by a factor of ten. As this change effort involves thousands of employees in dozens of countries, the likelihood of failure is very high. Declaring victory is years away.

The parent company is combating high structural costs and is under extreme market pressure. The top executive leading this function along with the CEO pledged to the board a multi-billion dollar savings and began the major strategy to achieve this through the commonization of processes, systems and tools across the six existing centers located around the world.

With this vision, the function's top leadership team agreed on the top functional deliverables that would need to be commonized in order to successfully achieve the vision. Each of these deliverables was considered a separate practice area. They carefully selected a SME and highly regarded team member to lead each of the practice areas. These SMEs were people from three of the four geographic regions. They then identified SMEs from each of the six centers to populate the teams. Their task was to bring the best practices from their centers and to collaborate with the other centers to determine the best solution for the globe.

An essential component of the global vision is global collaboration. It was envisioned that global collaboration would occur both within and across the practice areas. Concerted work effort was

required to track and measure communication patterns so that the organization's leaders would be aware of how their personal behaviors impact organizational results.

Global Strategy

With the vision in place, the next step was to determine the strategy to achieve the vision. Figure 1 shows the timeline of the strategic steps that had to occur to implement the vision.

The challenge is to operate in the ideal situation where there is alignment between objectives so that there is optimal productivity. In this instance, this is the place between where commonizing the work makes sense and where regionalizing the work makes sense. The strategic direction is to have a richer global distribution of where the work is done.

The teams worked across several time zones using a Web-based global collaboration technology tool called TeamCenter as the best way to share written documents and make sure that everyone was working on the same/most current version of the documents. The teams had many conference calls over technology which allowed participants to simultaneously work from the same shared documents. Each team also had a least one face-to-face meeting, several had two or three. A "cross area team" was created to support each team's progress, drive for alignment across the practice areas, highlight conflicting strategies, and assure that the teams stayed on target to the timeline.

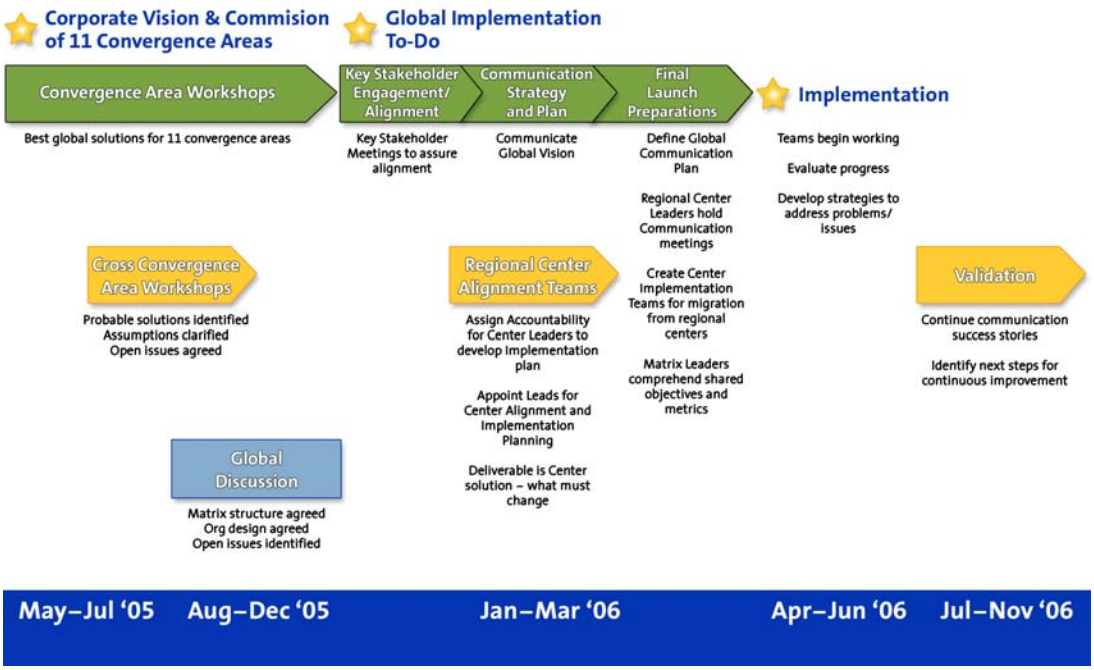
The teams were convened in May 2005 and work started in June. The first cross area globalization workshop was held in September. The purpose of the workshop was to prepare the first cross area report for the function's global leadership team. At the September 2005 workshop, each practice area team shared deliverables, progress to date, thoughts around their global solutions, alignment issues with plans to resolve them, and definitions of key roles and responsibilities.

The biggest challenge for the cross practice area workshops was having enough detail to understand the issues and while completing discussion in the allotted time. Even working face-to-face, having participants with many different native languages and cultures continued to be a roadblock. A critical learning was that when people used the same words and thought they meant the same thing, they did not necessarily mean the same thing. Even technical terms used in different locations around the globe have different meanings. A tremendous amount of time and frustration was involved in the search to uncover those different meanings.

The outcome from the September cross area workshop was less than expected. The teams needed more time to come to a proposed global solution for the practice areas, and then for a total global solution to be developed. The report for the global leadership team in October highlighted the trouble spots and the plans to resolve them. The cross practice area team planned the next meeting to create another deadline and even more pressure for global collaboration.

The original deadline for the 11 practice areas was moved to December 2005. The delay was not fully unexpected. What was underestimated was the degree and amount of interdependence across the practice areas. For example, when one practice area created a global solution, it was based on assumptions that several other practice areas needed to fill in their proposed solution. It was only in the cross-area workshops that all the interdependencies were visible and that global solutions could be developed. A key lesson was that many face-to-face experiences would be required to lay the groundwork of working virtually in the future. The organization was not able to globalize by edict, it required many days of face-to-face conversation and negotiation at the outset, and many subsequent hours of face-to-face conversation and negotiation after the work was launched.

Figure 1. Timeline of strategic steps



Organizational Structure

As structure follows strategy, the next task is to ensure that the organization design supports the vision. At the outset, the function had business units in nearly a dozen countries. While the business units reported in to the single global functional leader, they largely operated independently. Coincident with this function's global shift, other functions began a global shift. It was also becoming increasingly clear that the company's future hinged on its ability to be a force in emerging markets. Continuing to operate regionally would result in a blind spot when it came to internalizing the needs of potential customers within the emerging markets. Globalization of this function in response to this shift was both inevitable and necessary.

The new global organizational structure was announced in the spring of 2006 coincident with the vision roll out. The new structure was a global virtual team matrix organization in which the operating functions cut across each of the geographic regions. A matrix organization is a "grid-like organizational structure that allows a company to address multiple business dimensions using multiple command structures" (Sy & D'Annunzio, 2005, p. 40). It its basic form, it is a hybrid of a functionally-based organization and a product-based organization. A matrix structure allows a company to leverage its resources in a manner which focuses on the task. By design, tensions and conflicts are expected within the matrix structure because of differing goals of functional organizations and product-based organizations. In an organization that produces goods, a matrix is commonly used because product development requires "the grouping of technical expertise for complex projects to allow companies to pool specialist expertise and to keep pace with short product development cycles" (Corporate Strategy Board, 1998, p. 3).

Staff

The people selected to lead these global teams had not necessarily done previous work in a virtual environment. Not all of them had worked outside of their home countries. To ensure the success of these leaders in their new assignments, the organization took the unusual step of partnering each of these leaders with an internal Change Management consultant from the Human Resources organization. The intent was that the Change Management consultants would work with the leader and the team through the initial transition, with a contracted time of 90 days. The work focused on increasing collaborative efforts within each leader's team. The partnerings lead into a discussion of skills.

Skills

The Change Management consultants were charged with the task of helping the newly appointed global functional leaders and their teams' transition into their new global roles. What made that particularly challenging was that most of these consultants were also relatively devoid of global experiences. Certainly, they were all experienced executive coaches; however, the global experience was mostly low. This created the double challenge of needing to educate the consultants so that they could help the effectiveness of the newly-appointed global leaders and their teams. Plus, similar to the global leaders, not all of the coaches were in the same country—or even necessarily in the same country as their leader client with whom they were partnered.

To bridge these gaps, common global tools and processes were incorporated into the work of the Change Management team. The first need was to have an understanding of global issues and concerns. To address this, a Web-based tool called GlobeSmart was made available to all employees. GlobeSmart provides critical business and historical information about dozens of countries. It also provides information about current news headlines, holiday information, and weather reports. A significant amount of information is provided about business protocol tips and techniques. It also allows individuals and teams to self assess against six cultural dichotomies: task vs. relationship, risk vs. restraint, egalitarianism vs. status, short-term vs. long term, independent vs. interdependent, and direct vs. indirect. Finally, it provides the ability to view these cultural preferences based on country and conduct comparisons at the individual level, the team level, and the country level. Change Management consultants received training in this tool. The tool was also used with the function's senior leadership team so that they would develop an appreciation for what it was and how it could benefit the teams. For those who had had minimal global experience, this tool enabled the consultants and leaders to have a high-quality education from the comfort of their laptops. At the team level, an even greater level of richness occurred with facilitated team discussions of the learnings.

A second common tool incorporated by the Change Management team was an internally-developed tool called the New Leader Transition. A New Leader Transition is a facilitated session designed to decrease the team development time by discussing issues, concerns, and expectations early and openly. This tool had been in use in the organization for over a decade and is highly valued within the organization. During a New Leader Transition session, the team members anonymously respond to these questions in a facilitated session without the leader present:

- What is already known about the new leader?
- What is not known about the new leader that team members would like to know?
- What are the team member concerns about this individual becoming their leader at this time?

- What does this leader need to know about this team?
- What is working that the team wants to keep in place?
- What things do the team members want to change?
- What challenges are currently facing the organization?

While the team members are working with the facilitator on their responses, the team leader is in another room, preparing answers to a set of questions that includes such things as leadership philosophy, communication preferences, known blind spots, concerns, and aspirations. For most of the newly-appointed leaders, the New Leader Transition occurred at the team's first face-to-face meeting. For one team, however, the leader felt this process so important that he had the facilitator conduct the meeting over a video conference so that issues and concerns were aired more quickly.

The third common tool was incorporation of a book on leadership transitions. Each consultant and senior leader was provided with a copy of *The First 90 Days* by Michael Watkins (2004). In this book, Watkins speaks to the great risk of failure of executive assignments due to actions that occur during the first 90 days. The tools and suggestions in this book were incorporated into the one-on-one coaching sessions that the Change Management consultants had with the newly-assigned global leaders.

Systems

There are many systems that have to work in concert to implement the vision of the global matrix. This section will focus on the human resource systems. Information technology systems used as part of this globalization effort were previously discussed. In addition, significant work is occurring to globalize work processes.

Functional expertise alone was insufficient to implement the global matrix organizational vision. The global Human Resource leaders around the world not only were required to partner with the globalizing function to make the vision a reality but also had to collaborate in their own global virtual HR team. This required strategic alignment of the function's HR leaders. To ensure this strategic alignment, the global HR leader supporting the function convenes the regional HR leaders and the lead Change Management consultant for an annual face-to-face strategy meeting and also a monthly virtual meeting.

Additional partnering is required to comprehend both the expertise of the function's human capital around the world as well as eventual resource requirements within each practice area and geographic location. To understand the function's global capacity and capability, HR and the function's leadership had to partner to both determine needs and to assess the existing state of the talent. To the extent that talent was not available, plans are developed to understand future training requirements, future hiring needs and future development needs. In some instances, cross-regional knowledge transfer needs to occur, with people in one region educating people in another.

As has been discussed throughout the case study, the Change Management consultants had special coaching relationships with the newly appointed global leaders. The consultants used the same common set of tools to assist the new leaders. The consultants also worked with the teams to develop their global norms. An example of those global meeting norms is at Figure 2.

While each of the leaders was provided a Change Management consultant, they each contracted with their consultants differently. Some had initial conversations with the consultant and then decided not to continue the engagement. Others continued to work with their consultants for three-quarters of a year. Still others worked with a consultant early on and then re-engaged after

Figure 2. Global meeting norms

about a year to continue the team development. When the leaders move to different assignments, they re-engage with their Change Management consultants to ensure a robust transition and continued development of the new team.

Style

The organization's style is illustrated by looking at how it communicates. It is well understood that engagement with thousands of people in dozens of countries would be a challenge. A primary focus was placed on engaging the entire global organization to embrace the new ways of working. The organizational leadership already had spent a half year internalizing the vision and developing the strategies. The challenge was to engage the remaining several thousand employees around the world and achieve critical mass to work together to further these efforts.

Communicating the new vision, strategy and structure was a major challenge. Knowing that the assignments changed for most of the organization's global leaders, the planning team knew that the largely hierarchical organization wanted to hear the message directly from the global leader. To respond to the need to hear directly from the leader and the reality of time zones, two identical briefing sessions were scheduled for the roll out. They were scheduled for the same day, 12 hours apart, to allow people from every time zone to hear the message directly from the global leader during their normal working day. This initial communication was conducted using both meet-me lines that allow many people to participate in the same telephone call at the same time concurrent with a Web-based meeting that allows everyone to view the same graphics at the same time.

While the global leader for the function lives in the US, he made the deliberate choice to be physically in Europe for the initial roll out so as to minimize resistance from perceptions that the plan would be overly US-centric. The meeting was interactive in that it allowed participants to pose questions in the "Question & Answer" chat capability of the Web-based meeting tool. Additionally, participants were encouraged to submit questions after the event.

The content of the roll out included the direction and agreement with the Board of Directors along with a chart showing how the savings were determined and the role of the function in achieving those savings; the new global structure to implement the global solution; and the next steps which would impact each person in the meeting.

As is natural over the course of time, in the two years since the initial roll out of the vision, consistent message communication has occurred on a regular basis. The senior leader makes Web meeting broadcasts once per quarter, delivered from different regions around the world, and co-hosted by leaders who are implementing the strategies and vision in the new structure. Additionally, an annual survey is taken of all global

leaders to assess the degree of understanding and progress with implementation.

One important aspect is that the vision has stayed consistent and the words used to communicate this vision have remained the same, so as to avoid confusion within the organization. Technology has and continues to be used as an enabler in communication of the vision, strategy, and results. In addition to the live Webcasts delivered multiple times to increase participation, the company intranet is heavily used to push communications. Regular leadership intranet messages ensure that employees have the ability to learn the leadership perspective, and allows for the bridging of time and distance. While English is the common operating language of the business, it is also understood that it remains important to bridge the language divide. One way of doing this is providing major messages in English, as well as Mandarin Chinese, Korean, Portuguese, Spanish, German, Dutch, French, and Swedish.

It has also been realized that top-down, interactive, Web-based communication is a good start, but that it is not sufficient in becoming a truly global organization. Nothing takes the place of human interaction with face-to-face discussion to build trust in relationships. According the Center for Creative Leadership (1998), trust is the distinguishing factor between high performing teams and teams that perform adequately. To build trust in relationship across many country and business cultures, it is critically important to understand the context of the others in the global organization and meet people face to face. To that end, hundreds of people in the organization have traveled outside their home country to work and collaborate with their functional counterparts. They report that they can accomplish face-to-face in one or two days what they have been struggling to accomplish for six months. The leadership teams meet regularly in different geographic locations and make sure to spend significant personal time with the people in the organization. While much of the work is done using technology, the style of the organization is to combine high tech with high touch.

FUTURE TRENDS

Globalization will continue to increase within organizations (Friedman, 2005). To do this effectively, organizations need to be proactive in their planning for collaboration. It is not enough to merely set the vision, strategy, and structure, and then tell the organization to go implement. Technology will clearly be used to assist the collaboration by assisting with real-time conversations in which people are able to see each other and simultaneously see the documents on which they working. It will also help by providing tools to allow team members to understand each others cultures so that people do not inadvertently offend one another and can effectively build trusting relationships. Technology will also be used to translate documents into other languages.

At the same time, there will continue to be a need for human intervention in the collaborative efforts. Team members need to learn how to develop shared operating norms. They must be able to take a step back to examine their communication patterns and understand the effectiveness of their communication. Human Resources should continue to be used as a strategic partner at the outset of globalization and change implementation. Effective partnering with Change Management consultants can be pivotal to successfully implementing a global strategy.

CONCLUSION

This chapter provides insight into a work in progress as a major corporation seeks to globalize one of its larger functions. Consistent with Kotter's (1995) admonition to not declare victory too soon, victory is certainly not yet being declared here. In fact, declaring victory is years away. What this

chapter does present is a look into the window of a major change initiative as the implementation occurs. It shows an understanding of the literature of the best practices of development of global virtual teams as well as the literature of leading large scale change. While technology is most certainly being used as an enabler, it is also understood that working over technology can lead to misunderstanding. Even when working face-to-face, a key learning has been that people can say the same thing in the same language, but have very different intent.

The key learning is that high tech does not work without high touch. To increase the likelihood of success of this organizational change, the organization's Human Resources team has been involved since the outset of the planning. Internal Change Management consultants are assigned to work with organizational leaders around the world. They are working with the leaders to ensure that the change strategy includes development of a solution as well as a robust strategy to ensure organizational engagement and commitment globally. They continue to work with the organization to increase cross-cultural understanding, design leadership interventions, coach leaders, provide training, and help set performance norms. It is through this work that the organization has been able to improve its internal collaboration both within the teams and across teams toward the achievement of business results. They also partner with other parts of the Human Resources organization to ensure global and functional consistency in the provision of the overall Human Resources work. Successful globalization requires detailed understanding of the organizational needs, capacity, and capability. Extensive planning and cooperation are required both across the Human Resources organization as well as the function that is served. Like the function served, the Human Resources professionals need to ensure their own cultural understanding, develop norms for technology use, and build relationships and partnerships globally.

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KEY TERMS

Computer-Mediated Processes: Communication is mediated by technology, rather than conducted face-to-face.

Global Virtual Team: A globally dispersed group with members in and from more than one country who are working to achieve a shared objective.

Matrix Organization: A matrix organization is a "grid-like organizational structure that allows a company to address multiple business dimensions using multiple command structures" (Sy & D'Annunzio, 2005, p. 40).

McKinsey Seven-S (7-S) Model: The McKinsey 7-S model (Gluck, 1985) contains the interrelated elements of a shared vision, strategy, structure, systems, staffing, skills, and style.

Subject Matter Expert (SME): An individual with deep expertise and experience in a technical area within a function.

Techno-churn: When technology updates occur with such a frequency that not all team members are using the same technology or version of the specific technology.

Trust: The four elements of behavior, goodwill, capability, and self-reference/identity (Henttonen & Blomqvist, 2005).

Work on a 24 Hour Clock: Work continues constantly. When work is completed on a deliverable in one regional center and their work day is complete, the work can be electronically continued by another region and center where the team is just beginning their work day.

Chapter XXXVII
Integrating Web 2.0 Technologies within the Enterprise

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ABSTRACT

This chapter examines the elements of the new Web 2.0 technology base and reviews the lessons learned when implementing these technologies. Collaborative applications have made enormous inroads into the enterprise and bring unprecedented speed and transparency to communications. Researchers and practitioners alike are focusing on how collaborative applications can replace the one-way communications inherent to Intranet sites. This chapter is intended for individuals who are looking toward the possibility of integrating these new technologies into the core communication medium. Unfortunately, there are still large barriers such as politics, turf battles, integration, and poor usability with the current product set. A company's ability to manage information effectively over its life cycle, including sensing, collecting, organizing, processing, and maintaining information, is crucial to the long term success in a global economy. The success or failure of this integration may very well create or lose a competitive advantage for the enterprise. What is missing is a framework or roadmap in which organizations can plan out their execution of We 2.0 deployment.

INTRODUCTION

Enterprises are being transformed from an old business model built around the command and control aspects information management to a new one where collaboration is the essential component. We are witnessing this transformation outside the enterprise with the success of Web 2.0 technologies like Wikipedia, YouTube, and Flickr. Yet, within the walls of the organization, progress

is slow. This chapter will examine why the adoption rates for Collaborative and Social Software are low and what can be done to improve them. This research emerges from three Fortune 500 companies which the resulting methodology has worked to increase the adoption rates ten fold.

Traditional implementation methodologies focused on the hardware, software, and the associated functionality. Our research indicates that while these are important they do not lead to mass adoption of the application by the enterprise. Many functions that information workers perform are dictated by the business and current transactional systems like CRM, ERP, or accounting systems. Collaboration and Social Software need to be integrated as situational applications and although they are optional, they are required to reach higher levels of performance. Members of complex teams are less likely to utilize collaborative tools in the absence of other influences such as executive encouragement, modeling collaborative behavior, creating a "gift" culture, training, supporting a strong sense of culture, assigning team leaders, building, and understanding roles (Erickson & Gratton, 2007). Our research indicates barriers to adoption including social issues, cultural issues, awareness issues, educational issues, and political issues. This research will focus on the awareness and educational issues since most organizations implementing Web 2.0 will face these first issues first.

BACKGROUND

Web 1.0 Intranets

The term Web 1.0 emerged from the research around Web 2.0. Basically, Web 1.0 focused on a read only Web interface while Web 2.0 focuses on a read-write interface where value emerges from the contribution of a large volume of users. The Internet as well as the Intranet initially focused on the command and control of the information itself. Information was controlled by a relative small number of resources but distributed to a large number which spawned the massive growth of the Web itself. Like television, the Web allowed for the broadcasting of information to a large number of users.

Inside the organization, the Intranet has changed the way organizations structure and operate their business. Specifically, the Intranet has centralized communications and corporate information as well as built a sense of community across organizational boundaries (McNay, 2000). Typical organizations will have office-based employees in various locations, telecommuting, and off-shoring staff. The traditional day by day communication landscape has changed from personal to electronic. The migration to electronic communications emerged as standards, technology and infrastructure matured. This allowed more information sharing and community building to occur without a requirement of physical location. Over the past several years Intranets have emerged as the key delivery mechanism for application and business information. Intranets may be thought of as providing the infrastructure for intra-organizational electronic commerce (Chellappa & Gupta, 2002). This allows organizations to utilize the technology to achieve its organizational goals and objectives. Web 1.0 allowed the organization to govern the information flow and focus on achieving the business goals.

Unfortunately, most technologies fail to deliver competitive advantages over an extended period of time. Investments in information technology, while profoundly important, are less and less likely to deliver a competitive edge to an individual company (Carr, 2003). This is especially true in the world of the Web 1.0 since much of the knowledge and information is disseminated all over the world as quickly as it gets published. Organizations are beginning to see that the command and control model is no longer effective at developing a high performance work force which opens the door for the next evolution in technologies as described by the Web 2.0 framework.

Web 2.0 Defined

While Web 2.0 has been debated by researchers as to who and when the concepts emerged, little argument exists that the technology and demand has arrived. Unlike Web 1.0, this new technology encourages user participation and derives its greatest value when large communities contribute content. User generated metadata, information, and designs enable a much richer environment where the value is generated by the volume of employees. Sometimes referred to as sharing, collaboration, aggregate knowledge, or community driven content, social software creates the foundation of collective intelligence (Weiss, 2005). Much of the Web 2.0 technology is difficult to nail down with an exact definition; the basic truth is that Web 2.0 emphasizes employee interaction, community, and openness (Millard & Ross, 2006). Along with these characteristics, Smith and Valdes (2005) added simple and lightweight technologies and decentralized processing to the mix. O'Reilly (2005) defined Web 2.0 as a platform, spanning all connected devices; Web 2.0 applications are those that make the most of the intrinsic advantages of that platform: delivering software as a continually-updated service that gets better the more people use it, consuming and remixing data from multiple sources, including individual users, while providing their own data and services in a form that allows remixing by others, creating network effects through an "architecture of participation," and going beyond the page metaphor of Web 1.0 to deliver rich user experiences. While Web 2.0 has many and often confusing definitions most include the concepts of Weblogs, Wikis, Really Simple Syndication (RSS) Functionality, social tagging, mashups, and user defined content.

Weblogs or Blogs

Weblogs or blogs have become so ubiquitous that many people use the term synonymous for a "personal Web site" (Blood, 2004). Unlike traditional Hypertext Markup Language (HTML) Web pages, blogs offer the ability for the non-programmer to communicate on a regular basis. Traditional HTML style pages required knowledge of style, coding, and design in order to publish content that was basically read only from the consumer's point of view. Weblogs remove much of the constraints by providing a standard user interface that does not require customization. Weblogs originally emerged as a repository for linking but soon evolved to the ability to publish content and allow readers to become content providers. The essence of a blog can be defined by the format which includes small chunks of content referred to as posts, date stamped, reverse chronological order, and content expanded to include links, text, and images (Baoill, 2004). The biggest advancement made with Weblogs is the permanence of the content which has a unique Universal Resource Locator (URL). This allows the content to be posted and along with the comments to define a permanent record of information. This is critical in that having a collaborative record that can be indexed by search engines will increase the utility and spread the information to a larger audience. With the advent of software like Wordpress and Typepad, along with blog service companies like blogger.com, the weblog is fast becoming the communication medium of the new Web.

Sample Weblog URLs

- Andrew McAfee Web 2.0 Blog (http://blog.hbs.edu/faculty/amcafee/)
- Randy Basler's Boeing Blog (http://boeing-blogs.com/randy/)
- Jonathan Schwartz's Sun Blog (http://blogs.sun.com/jonathan/)
- Rough Type by Nicholas Carr (http://www.roughtype.com)

Wikis

A Wiki is a Web site that promotes the collaborative creation of content. Wiki pages can be edited by anyone at anytime. Informational content can be created and easily organized within the wiki environment and then reorganized as required (O'Neill, 2005). Wikis currently are in high demand in a large variety of fields, due to their simplicity and flexibility nature. Documentation, reporting, project management, online glossaries, and dictionaries, discussion groups, or general information applications are just a few a examples of where the end user can provide value (Reinhold, 2006). The major difference between a wiki and blog is that the wiki user can alter the original content while the blog user can only add information in the form of comments. While stating that anyone can alter content, some large scale wiki environments have extensive role definitions which define who can perform functions of update, restore, delete, and creation. Wikipedia, like many wiki type projects, have readers, editors, administrators, patrollers, policy makers, subject matter experts, content maintainers, software developers, and system operators (Riehle, 2006), all of which create an environment open to sharing information and knowledge to a large group of users.

Sample Wiki URLs

- Disney's Parent Wiki (http://family.go.com/parentpedia)
- Wikipedia (http://www.wikipedia.org/)
- Reuters Financial Glossary (http://glossary.reuters.com/)
- Internet 2 (https://wiki.internet2.edu/confluence/dashboard.action)

RSS Technologies

Originally developed by Netscape, RSS was intended to publish news type information based upon a subscription framework (Lerner, 2004). Many Internet users have experienced the frustration of searching Internet sites for hours at a time to find relevant information. RSS is an XML based content-syndication protocol that allows Web sites to share information as well as aggregate information based upon the users needs (Cold, 2006). In the simplest form, RSS shares the metadata about the content without actually delivering the entire information source. An author might publish the title, description, publish date, and copyrights to anyone that subscribes to the feed. The end user is required to have an application called an aggregator in order to receive the information. By having the RSS aggregator application, end users are not required to visit each site in order to obtain information. From an end user perspective, the RSS technology changes the communication method from a search and discover to a notification model. Users can locate content that is pertinent to their job and subscribe to the communication.

Sample RSS URLs

- Newsgator (http://www.newsgator.com/)
- FeedBurner (http://www.feedburner.com/)
- Pluck (http://www.pluck.com/)
- Blog Lines (http://www.bloglines.com/)

Social Tagging

Social tagging describes the collaborative activity of marking shared online content with keywords or tags as a way to organize content for future navigation, filtering, or search (Gibson, Teasley, & Yew, 2006). Traditional information architecture utilized a central taxonomy or classification scheme in order to place information into specific pre-defined bucket or category. The assumption was that trained librarians understood more about information content and context than the average user. While this might have been true for the local

library with the utilization of the Dewey Decimal system, the enormous amount of content on the Internet makes this type of system un-manageable. Tagging offers a number of benefits to the end user community. Perhaps the most important feature to the individual is able to bookmark the information in a way that is easier for them to recall at a later date. The benefit of this ability on a personal basis is obvious but what about the impact to the community at large. The idea of social tagging is allowing multiple users to tag content in a way that makes sense to them; by combining these tags, users create an environment where the opinions of the majority define the appropriateness of the tags themselves. The act of creating a collection of popular tags is referred to as a folksonomy which is defined as a folk taxonomy of important and emerging content within the user community (Ahn, Davis, Fake, Fox, Furnas, Golder, Marlow, Naaman, & Schachter, 2006). The vocabulary problem is defined by the fact that different users define content in different ways. The disagreement can lead to missed information or inefficient user interactions (Boyd, Davis, Marlow, & Naaman, 2006). One of the best examples of social tagging is Flickr which allows user to upload images and "tag" them with appropriate metadata keywords. Other users, who view your images, can also tag them with their concept of appropriate keywords. After a critical mass has been reached, the resulting tag collection will identify images correctly and without bias.

Sample Social Tagging URLs

- Flickr (http://www.flickr.com/)
- YouTube (http://www.youtube.com/)
- Del.icio.us (http://del.icio.us/)
- Technorati (http://technorati.com/)

Mashups: Integrating Information

The final Web 2.0 technology describes the efforts around information integration or sometimes referred to as "mashups." These applications can be combined to deliver additional value that the individual parts could not deliver on their own. One example is HousingMaps.com that combines the Google mapping application with a real estate listing service on Craiglists.com (Jhingran, 2006). Other examples include Chicagocrime.org who overlays local crime statistics onto Google Maps so end users can see what crimes were committed recently in the neighborhood. Another site synchronizes Yahoo! Inc.'s real-time traffic data with Google Maps. Much of the work with Web services will enable greater extensions of mash-ups and combine many different businesses and business models. Organizations, like Amazon and Microsoft are embracing the mash-up movement by offering developers easier access to their data and services. Moreover, they're programming their services so that more computing tasks, such as displaying maps onscreen, get done on the users' Personal Computers rather than on their far-flung servers (Hof, 2005)

Sample Mashup URLs

- Housing Maps: (http://www.housingmaps.com/)
- Chicago Crime (http://www.chicagocrime.org)
- Healthcare Product (http://www.vimo.com/)
- Global Disease Map (http://healthmap.org/)

User Contributed Content

One of the basic themes of Web 2.0 is user contributed information. The value derived from the contributed content comes not from a subject matter expert, but rather from individuals whose small contributions add up. One example of user contributed content is the product review systems like Amazon.com and reputation systems used with ebay.com. A common practice of online

merchants is to enable their customers to review or to express opinions on the products they have purchased (Hu & Liu, 2004). Online reviews are a major source of information for consumers and demonstrated enormous implications for a wide range of management activities, such as brand building, customer acquisition and retention, product development, and quality assurance (Hu, Pavlou, & Zhang, 2006). A person's reputation is a valuable piece of information that can be used when deciding whether or not to interact or do business with. A reputation system is a bi-directional medium where buyers post feedback on sellers and vice versa. For example, eBay buyers voluntarily comment on the quality of service, their satisfaction with the item traded, and promptness of shipping. Sellers comment about the prompt payment from buyers, or respond to comments left by the buyer (Christodorescu, Ganapathy, Giffin, Kruger, Rubin, & Wang, 2005). Reputation systems may be categorized in three basic types: ranking, rating, and collaborative. Ranking systems use quantifiable measures of users' behavior to generate and rating. Rating systems use explicit evaluations given by users in order to define a measure of interest or trust. Finally, collaborative filtering systems determine the level of relationship between the two individuals before placing a weight on the information. For example, if a user has reviewed similar items in the past then the relevancy of a new rating will be higher (Davis, Farnham, & Jensen, 2002).

Sample User Contributed Content URLs

- Amazon.com (http://www.amazon.com)
- Ebay (http://www.ebay.com)
- Trip Advisor (http://www.tripadvisor.com/)
- Review Centre (http://www.reviewcentre.com/)

Web 1.0 Compared to Web 2.0

While the differences between Web 1.0 and 2.0 are grey at best, we can attempt to draw some segmentation by reviewing the high level characteristics. Table 1 provides a side by side comparison of these technologies.

In the Web 1.0 environment, information was largely static and controlled by a few resources. Specifically, the individual or organization that produced this information pushed information to the end user by either controlling the access or limiting the feedback options. Web 2.0 turns that model around and create a far greater dynamic environment where each consumer has the ability to contribute to the overall value of the information itself. Instead of searching and browsing topics, Web 2.0 users are allowed to publish and subscribe

Table 1. Characteristics of Web 1.0 and Web 2.0

Web 1.0 Characteristics	Web 2.0 Characteristics
Static Content	Dynamic Content
Producer Based Information	Participatory Based Information
Messages Pushed to Consumer	Messages Pulled by Consumer
Institutional Control	Individual Enabled
Top Down Implementation	Bottom Up Implementation
Users Search and Browse	Users Publish and Subscribe
Transactional Based Interactions	Relationship Based Interactions
Goal of Mass Adoption	Goal of Niche Adoption
Taxonomy	Folksonomy

to the content which results is a more bottom up implementation. The following section will review how these new technologies can be integrated into the current knowledge environments that have traditionally followed the command and control model of information.

Enterprise 2.0

Enterprise 2.0 is a term used to describe the integration of the Web 2.0 technology portfolio inside of the organization. Both the producers and consumers of the information will reside inside the organization. If either of the customer classifications involve outside entities then the Web 2.0 tag should be used. McAfee (2006) indicates a new wave of business communication tools which allow for more spontaneous, knowledge-based collaboration. These new tools, the author contends, may well supplant other communication and knowledge management systems with their superior ability to capture tacit knowledge, best practices and relevant experiences from throughout a company and make them readily available to more users. For all its appeal to the young and the wired, Web 2.0 may end up making its greatest impact in business. And that could usher in more changes in corporations, already in the throes of such tech-driven transformations as globalization and outsourcing. Indeed, what some are calling Enterprise 2.0 could flatten a raft of organizational boundaries; between managers and employees and between the company and its partners and customers (Hof, 2005).

Barriers to Adoption

This chapter does not address issues around infrastructure or software selection. The research wanted to look at the barriers to adoption assuming all other variables are constant and normally taken into account on most implementations. The following barriers of adoption are not related to the specific technology. Rather, they focus on the end user and the major issues impacted them. This makes sense in Web 2.0 the end user contributes as much to the success of the implementation as any other component.

Awareness Issues

The awareness issue describes an environment where of the majority of users have never heard of Web 2.0, Enterprise 2.0, Collaboration, and Social Software. More importantly, end users have not heard of the internal product offering, if one exists. Communication is one of the most critical aspects of letting people know that a collaborative or social application is available. Traditional information technology solutions were focused on a single business process and the aspects of marketing and branding were unnecessary. However, for enterprise services this awareness can be one of the most critical functions performed early in the product's life cycle. Like e-mail and desktop Office applications, you want a high degree of awareness across the entire enterprise. A high degree of awareness would be some where between 90-100 percent of the information workers within the organization.

Educational Issues

End users may have heard of Web 2.0 through the media but they still not understand how the technology can be used in a business setting. Once an end user becomes aware of an application, the next phase is to ensure that they understand how the application should be used. The educational area is critical since most employees above the age of 35 have not used these new types of technologies.

Cultural and Social Issues

When organizations have overcome the awareness and educational gaps, then we can make the statement that the majority of the organization

knows the technology is available and what can be done with it. They may still choose to use their older technology that has been used in the past. Not with standing political pressure, we are looking at cultural or social issues. These issues can emerge when end users fear change, afraid of new methods, or prefer to work in a command and control model.

Political Issues

The final area focuses on the political pressure organizations place on users. Political pressure may focus around strategic direction, vendor associations, or organizational structures. In smaller organizations, these issues may not be as big an impact as in a large distributed environment.

INTEGRATION OF WEB 2.0 TECHNOLOGIES

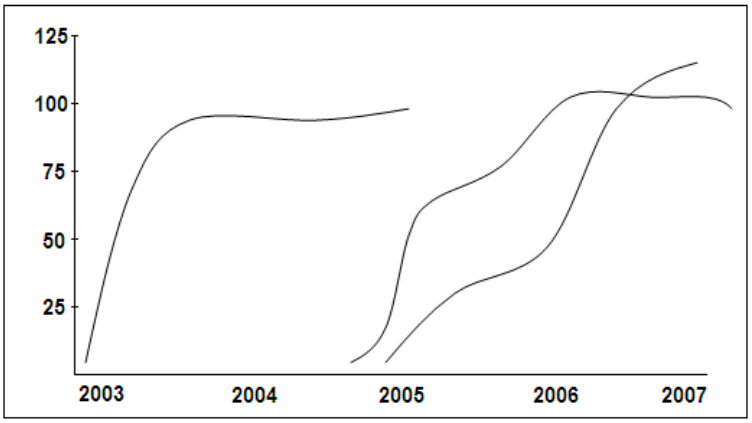
The studied organization is a Fortune 500 telecommunications company that has gone through several acquisitions over the past few years. With the integration of three companies, the presented framework went through several different field trials over the course of three years. This allowed the research to apply the framework into three different companies in order to test the validity in a real business environment. The framework was developed after five years of trials in traditional knowledge management systems. The application of the framework to collaborative tools started in 2004 and progressed through 2007. The initial deployment focused on Microsoft's Sharepoint which is a collaborative tool that has most of the Web 2.0 elements described in the prior section.

Common Situation

While all three implementations varied by size of the firm, number of employees, and basic infrastructure, the implementations had one common characteristic. Flat line growth occurred within six months in each of the deployments. Flat line growth occurs when new orders show no growth over a three to six month period. Figure 2 provides the different site metrics collected prior to the implementation of the proposed framework. The lines have been cut off to indicate the point in time the framework was applied to the organization.

In all three cases, the program had a solid beginning but reached a level of saturation between 90 and 120 collaborative sites. For clarity, the number of collaborative sites continued to grow but could not outpace the same number of deletions. A deletion occurs when a program, project, or resource no longer needs the collaborative or

Figure 1. Adoption rates prior to implementing the framework



social software environment. On average, the leveling off of site demand occurred between five and six months.

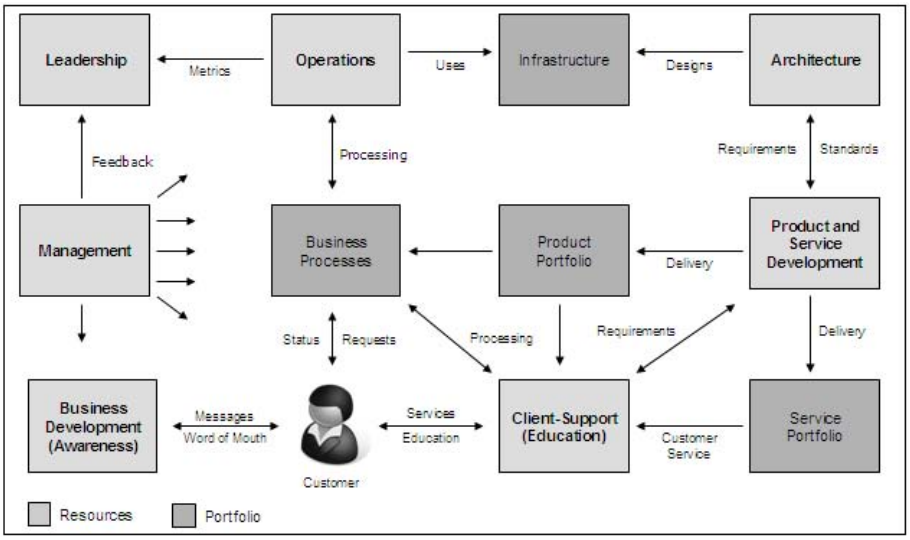
Business Model Framework

At the highest level, a business model is how an organization creates value. Timmers (1998) define a business in respect to the architecture for the product, service, and information flows, the benefits for the various actors, and the sources of revenue. In reality, an organization can have a variety of business models, each is simply an artificial representation of reality which detracts focus from certain aspects while concentrating on others (Kittl, Petrovic, & Teksten, 2001). This research uses the concepts of a business model, not in terms of commerce, but focused on the various interacting parts required to deliver business value. Figure 2 provides an overview of the business model used to describe functional designation of work. Some researchers refer to this as the resource model.

The model describes seven functional areas and four portfolio or product areas. Leadership and management are two functional areas that will not be covered in this chapter to any depth. The basic idea is that all information technology activities would include coordination, communication, and cooperation activities which are usually performed by these two groups.

Starting at the top of Figure 2, traditional implementations of information technology would include the operational and architecture functions. Operations would include activities such as hardware monitoring, software installation, backup, recovery, security, and maintenance. Computer Operations is a critical function to ensure delivery of a reliable, scalable, and functional infrastructure. This area must be governed with a high degree of control in order to maintain the stability of the environment. Architecture focuses on the design, planning, and software selection within the enterprise. Generally speaking, architecture includes the activities of defining and modeling the environment which may include the following architectures: business, application, data, information, technology, and product architecture (Pereira & Sousa, 2004). Traditionally, these components focused on ensuring that the environment did not fail from an infrastructure point of view. The vast majority of Web 2.0 implementations will focus on these core elements to ensure that the program operates effectively. The idea of an

Figure 2. Implementation business model



implementation failing would indicate the hardware or software failed to deliver the business value consistently over time. The problem with this approach is that having a perfect infrastructure does not guarantee mass adoption which is the truest measure of success. In the case of internally developed Web 2.0 applications or the utilization of open source, the architecture area could be expanded to encompass the entire System Development Lifecycle (SDLC).

We can define success (mass adoption) from two perspectives. In any knowledge type of application, you will have two key customer classes: the producer of the information and consumer of the information. The producer is the person, community, or application that creates a reusable asset in the form of information utilizing the Web 2.0 tools. This might include a wiki page or ownership to a specific weblog. The consumer is responsible for locating and accessing the information, assessing the ability to reuse the information, adapting to the information and integrating the information into the business. The consumer might not actually contribute to the environment in the form of comments or informational update. Production rates for Web 2.0 applications are still relatively low as compared to the number of users that consume the information. In one survey, only 11 percent of respondents would even consider contributing to Wikipedia while the actual number of contributors is less than 1 percent overall. When you have millions of consumers, a 1 percent contributor rate is pretty good. However, in an enterprise of 20,000 people that would indicate you will only have 20 contributors. This demonstrates the criticality of building up a producer community towards the long term goal of mass adoption. Not only do we need to focus on the information contained within the environment but also with the utilization of that information. The content must be used and to a greater degree, the utilization of the content drives the return on investment. This is not a trivial point; organizations must focus on the components of success and understand that having great hardware, software and functionality is simply the price of entry into the Web 2.0 environment.

Business Development

Located at the bottom right side of Figure 2 is the representation of the customer which could either be the producer or a consumer of the information. The overall framework centers around the customer behavior. The box on the left represents the functions of business development which we can define as any activity that impacts awareness and education before someone becomes a customer. Like the business functions of marketing, branding, and selling, business development strives to encourage participation. The ultimate goal is to ensure that every person in the enterprise knows these tools exist, understand how they can be used, and knows where to go to get engaged.

Client-Support

The vast majority of information workers are not familiar with virtual solutions and need guidance on how to best utilize and integrate this technology into their day to day operations. End users will ask five basic questions of the collaborative environment:

- What collaborative products and services are available to me?
- How can I utilize these products and services within my environment?
- Who can help me in case I need some professional guidance?
- Are the collaborative applications ready for enterprise usage?
- How am I doing in comparison to others or against best practices?

In order to address these questions, organizations should look toward developing a support group that can enable the end user rather than

hindering their understanding of a collaborative environment. Meeting the needs of the customer may vary depending on the level of knowledge the user brings to the environment. Customers who are new to technology expect a high level of reliability and support in order to gain the greatest value possible (Johnston & Supra, 1997). Customer service should not be homogeneous and both the online and physical support environments need to take into account the experience level of the end user (Dutta & Roy, 2006). The customer wants to know what products, services, and documentation are available to them within the collaborative environment. The content of an online environment is not limited to the product or services provided. Rather, content includes the solutions and strategies employed to make it easy for the user to accomplish important tasks, such as information retrieval, search, and obtaining feedback (Calongne, 2001). Support information or content should include the product and service quantity, quality, and relevance to the customer (Palmer, 2002). Technologists often make the mistake of assuming a certain level of expertise with the user community. Unlike e-mail or Office products (Word Processing or Spreadsheet), collaborative tools are fairly unknown to the end user. A Client-Support environment would include many of the following components:

- Training and Education
- Subject Matter Expert Information
- Technical Supports and Operational Information
- Best Practices and "How To" Documentation
- Community of Practice
- Ordering Processes
- Product, Service and Solution Overviews
- End User Metrics of Content and Usage

Product and Service Development

Normally when you discuss the concepts around a product, you think of products like Microsoft's Sharepoint, Confluence, Social Text, or IBM's Connections. These could be considered products from an architecture or operations point of view. However, from the customer perspective these are tools. A product solves a problem or generates value based on the consumption or utilization. In other words, the product is what you can do with the tool. Products in the Web 2.0 space include weblogs, wikis, collaborative intranets, virtual workspaces, RSS feed readers, book marking, and professional profiles. Each of these can be categorized as a product regardless of the tool selected to perform the function. Services would include both tangible and intangible value-add activities that go along with the products. Services might include templates, user guides, editing, PDF conversion, education, and training. Services must be delivered to the customer and cannot be inventoried for later use. Taken together, products and services provide the customer experience that encourages participation and end user involvement.

Portfolios

Not counting the infrastructure, the model identifies three additional portfolios including the product portfolio, the service portfolio, and the business processes. The product portfolio would include the various products developed in the prior section. Since most products are meta-physical in nature, they must be demonstrated in the online support environment. The service portfolio will describe the services available to the end user. The idea is that products must be demonstrated while services must be described. Finally, the business process portfolio defines the business processes required to engage in the environment. Taken together, a customer may engage with several products, services and business solutions which constitute a solution offering. Assuming the ultimate goal of any Web 2.0 application is the mass adoption of the customer base then you want to move up the value chain. The value-chain has been well documented by Joseph Pine II and James H. Gilmore.

Pine and Gilmore (1997) discuss "the experience economy" by tracing the value added to the coffee bean in its various iterations from pure "commodity" to pure "experience." In their evolutionary construct there are four stages, in ascending order of sophistication the stages are commodity, good, service, experience. They point out that coffee is traded on the futures market at roughly $1 a pound (thus, about 2 cents a cup at the "commodity" level). After manufacturers roast, grind, package and distribute the bean for retail, the price jumps to between 5 and 25 cents a cup (the "goods" level). At a "run-of-the-mill" diner a cup might run from 50 cents to $1 a cup (the traditional "service" level). The authors contend that one can "Serve that same coffee in a five-star restaurant or espresso bar, where the ordering, creation, and consumption of the cup embodies a heightened ambience or sense of theatre, and consumers gladly pay anywhere from $2 to $5 for each cup." Thus, by creating value at the "experience" level, the seller is able to charge an extremely high premium over that charged by the "service" provider. In defining their terms they argue that, "When a person buys a service, he purchases a set of intangible activities carried out on his behalf. But when he buys an experience, he pays to spend time enjoying a series of memorable events that a company stages, as in a theatrical play, to engage him in a personal way." The idea is that organizations that support the Web 2.0 implementation must move up the value chain in order to obtain the mass adoption

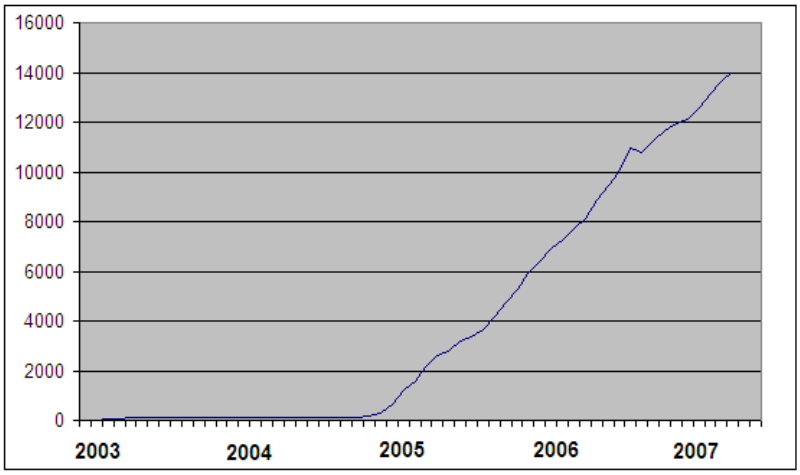
Field Trials

The first implementation of the framework occurred in 2004. As seen in Figure 1, the deployment had already reached the point of saturation when executive leadership contacted the author's team to see if the framework could be applied to the Web 2.0 area. In the past, the framework had been successfully implemented in knowledge management type implementations. These systems included prior research in metadata repositories, registries, and other knowledge applications. Focusing on the left most line (Figure 1), demand had leveled off at around 100 collaborative environments with an average monthly variance of +/-5 percent. The initial review and prioritization of activities focused on providing the online support environment, automating the procurement process, and developing marketing plans. These were seen as obvious gaps in the prior implementation model based on the author's observations. The author was also able contact various user communities in order to ascertain if these gap assumptions were true. No official survey was used to collect the information other than informal conversations. Figure 3 provides the results of implementing the framework over a 36 month period of time.

By the fall of 2007, the studied organization had over 13,000 collaborative sites with an average monthly growth rate of 423.62 percent. As the implementation matured, less focus was placed on the business opportunity area and more on the client-support area. This would make sense, since the number of employees that utilizing the collaborative environment was around 95 percent of the employee population. That is to say that 95 percent of the employees had heard of and used some form of the application which was determined by the unique user id logged into the system.

In 2006, the studied organization was purchased by a larger telecommunications company. This purchase brought together three different companies, all of which had an implementation of the collaborative suite. The adoption rates were similar to those found in Figure 1, represented by the two lines located on the right side of the chart. Executive leadership reviewed the implementations and determined that the framework needed to be applied in the other two companies as well. The initial step would be to survey the new organizations to see where the issues lie in adoption and determine which parts of the framework should be emphasized. Unlike the first field trial,

Figure 3. Collaborative sites after the framework application



the author had no insight into the new companies prior to the integration.

Survey Tool

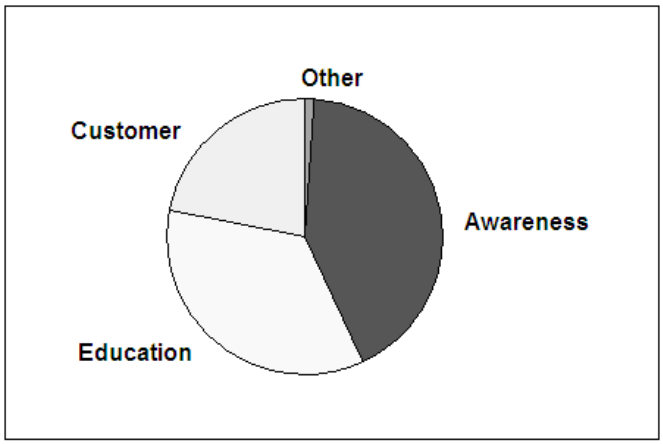
An employee survey was used to determine which of the adoption barriers were prevalent. Based upon some initial interviews, the survey was distributed via e-mail, and incentives were used to encourage participation. One hundred employees were randomly selected from the corporate directory. Two follow up e-mails were used to encourage users to participate and the average return rate was 72 percent. The questions on the survey included the following:

1. Have you ever heard of Collaborative or Social Software? (Determine Awareness)
2. If you have heard of these, does your organization utilize them? (Cultural, Political, or Social)
3. What is the primary use of the Collaborative and Social Tools within your organization? (Education)
4. Please describe your overall impression (use, purpose) of the products in a few sentences?
5. Please describe your experience with these tools in a few sentences (accessed infrequently, heavy user, loved it, etc.).

Notice that no specific questions were asked to differentiate between the cultural, political or social barriers. The reason for this was that the percentage was expected to be low as compared to the other issues of awareness and education. In order to ensure the survey group didn't know Collaborative and Social Software by other names, a product matrix was included that showed the specific products like Sharepoint, Confluence, or Open Source. The results of the surveys are presented in Figure 4.

The surveys were issued in January of 2007 and September of 2007. The first response to the survey showed an enormous awareness issue in which the vast majority of end users had not heard of the social offering or did not understand how the tool could be used. Over 77 percent of the respondents indicated that the lack of awareness or education was the primary reason for not implementing collaborative solutions in their environment. Only 2 percent acknowledged the actual use of the tools during the few years and the remaining 21 percent focused on the cultural, social and political issues. This result would

Figure 4. Survey results (percentage)



indicate the need to address the awareness and educational issues first.

Field Trials II, III and IV

Based upon the results of the survey, awareness and education were identified as the two main issues. The user community simply did not know the tools existed or how they could be used in a business environment. The current deployment could easily be expanded to the new organizations will very little effort. For example, the community of practice was expanded to include the new organizations as was the ordering process replicated across all three companies. The client-support was centralized as a one stop location for the end user community to obtain information and support in a self service fashion. The results of these field trials showed a dramatic increase in demand in just a few months. On average, the new organizations increased by 1,608 percent and 78 percent respectively. Key actions by the implementation team included the following:

- Expanded the Client-Support environment to include all three organizations
- Expanded the product offering (new releases, Web components, and applications)
- Expanded the service offering for additional training, education, and consulting
- Developed new reward and recognition programs
- Published articles in various organizational newsletters
- Posted to the corporate weblog and wiki daily
- Developed audio and video training programs
- Consolidated business process into a single customer experience
- Expanded the Community of Practice (CoP)
- Developed additional audio and video programs for awareness and education
- Integrated with other Collaborative tools like Podcasting, Audio Conferencing, Instant Messaging, and Social Software
- Celebrated Key Milestones like the 25,000th Collaborative Environment

At the time of this writing, the total number of collaborative sites had grown to over 28,000 with 2-3 million page views per month. The number of document objects exceeded 2 million. An additional survey was conducted in late 2007 which was similar to the one described earlier. The

awareness and education problem of 77 percent had dropped to 33 percent within the nine months of implementing the framework.

The final field trial occurred in mid 2007 with the deployment of Social Software which included weblog, wiki, and book marking applications. The major difference in this effort was that the framework was applied from the beginning. Similar activities were performed including adding an online client-support environment, training, education, marketing, and extending the offering with additional products and services. Within 4 months, the total number of information points exceeded 5,500.

CONCLUSION

In this chapter, we have laid a framework to support the implementation of collaborative and social software. As discussed, users come to this technology with a wide variety of experience levels which cannot be assumed by the technology community. Client-support must be implemented if the business wants universal adoption and a high degree of business value. The different components of the framework address the concerns of the end user which can put them at ease and create a more open environment for integrating this new technology. The framework focused on the issues with awareness, education, and the offering. By addressing these components, organizations will focus their resources on the components that define a successful implementation. The results of the field trials indicate that within any environment or culture, mass adoption can be obtained. With mass adoption, the return on investment of these technologies will be high.

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KEY TERMS

Client-Support: Client-Support is a term used to describe the various efforts to ensure the success of an environment. These efforts would include education, training, communities of practice, online documentation and automated business processes for procurement.

Collaboration: Collaboration is defined as people working together on non-routine cognitive work. This activity is about behavior, work habits, culture, management, and business goals and value generated we people from diverse backgrounds come together.

Information Worker: The information worker is a label placed on individuals that primarily work with information and data. Information workers perform non-routine, cognitive, or creative work that often requires both structured and unstructured information inputs from multiple sources.

RSS: In the simplest form, RSS shares the metadata about the content without actually delivering the entire information source. An author might publish the title, description, publish date, and copyrights to anyone that subscribes to the feed. A feed reader application is required just as an e-mail client is required to read e-mail.

Social Tagging: Social tagging describes the collaborative activity of marking shared online content with keywords or tags as a way to organize content for future navigation, filtering, or search.

Weblog: A blog (short for weblog) is a personal online journal that is frequently updated and intended for general public consumption. Blogs are a series of entries posted to a single page in reverse-chronological order. These original entries cannot be edit by others but can be commented on by anyone.

Web 2.0: Web 2.0 is a term used to decribe the next generation of Web applications where information flows both from the producer as well as from the consumer. Additionally, Web 2.0 embraces more of a thin client architecture which allows for the assembly of various components. Together, end user conent and thin client applications make the Web 2.0 environment.

Wiki: A wiki is software that allows users to easily create, edit, and link pages together. Unlike a blog, the end user can actually update the original authors information.

Section III
Interorganizational Collaboration in Government and Social Sector

Chapter XXXVIII
An Evaluation of 'Linking for a Change'

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ABSTRACT

This chapter details one project, "Linking for a Change" (LFC), connecting schools and public/social sector providers of education for sustainable (ESD) across eight counties in the South West of England, with the objective of promoting the DfES "sustainable schools" action plan. It presents a discourse regarding the need for new education linkages/networks to emerge in order to enable education systems to evolve in response to the challenges of unsustainable development. A snapshot of ESD, or baseline data set is analysed from 66 schools and 85 ESD providers, leading into an exploration of the extent of the resulting electronic networking, or "e-networking" and its ability to enable cross-sector collaboration. Thus this research questions the fundamental premise behind much networking, using a tested methodology (Kershaw, 2004, 2006) to question the assumption that e-networking results either in change in practice or in increased capacity, that is, that "Linking" leads to change.

INTRODUCTION AND OBJECTIVES

The Purpose of the Project

The purpose of Linking for a Change resides in the need for the South West of England to support the development of sustainable schools across the region as part of the UK's "Year of Action for Sustainable Schools." A regional steering group, drawn together around the project aims from a broader coalition for sustainability, created a Web site connecting ESD providers with education establishments for the purpose of information exchange and collaboration, aiming to provide long term support to schools through to 2020. The primary purpose of this research is to draw,

or tease out causal relationships and to identify any sector specific ESD actions and responses along with their corresponding support needs, within the data set. The secondary purpose is to generate an overview of the current status of ESD within the sample population against which change can be measured, while an implicit objective within both project and research is to support and instigate both changes in practice and the generation of new educational practice. Thus, the research objectives augment and extend those of the "LFC" project in which the data collection aimed to promote collaboration across education and service providers drawn from local government, the charity and private sectors. By archiving that information electronically and enabling the database to be searched by postcode or key words the project highlights mutual areas of both practice and lack of practice between the schools and the ESD providers.

The Process of "Linking for a Change"

The time from instigation through to dissemination was around one year, and the whole process was consultative across a steering group, providing an equal voice across the region, but not necessarily across sectors. According to an earlier case study of a local inter-organisational network (Kershaw, M 2004), "networks exist to promote collaboration and co-operation, avoiding information control"; while participating organisations have both individual and collective goals. Linking for a Change can only be called a network if there is a body of information exchanged (Thorelli, 1986) and the survey, circulated in paper format, was in most instances supported by either a face to face interview or a telephone conversation so putting the survey into the context of the regional and national education drivers of change in order to ensure maximum validity of response and maximum potential for collaboration against minimal demand on the respondent.

Stages One – Four

Four stages of the project are already completed: project inception, survey preparation, data collection and Web site construction. The fifth stage, Web site use or collaboration is underway with users currently being given access to the site though their own personal password. In devising the project it was assumed from the start that initial contact would be made electronically, and that the matching of priorities between schools and service providers would engender an exchange of information that is, " e-networking." In the context of this project, "e networking" is defined as "information exchange arising as a result of electronic communication." The exchange will, no doubt, be carried out by a range of mechanisms: electronic, postal, face to face and verbal communication, it is the electronic instigation of the exchange which defines it as "e- networking." The collaborative element arises from the individual aims of the participating organisations, coming together to find joint solutions, to share practice and to generate new practice as an educational response to sustainable development. This is the basic premise behind the national and international construction of ESD networks, as unpicked within this research; that the complexities of learning for sustainable development require new interfaces between structures of education and learning and that these new networks and learning platforms will help to bring about the change so urgently needed in society. The creation of new interfaces, between education and society, are one inevitable outcome of the global increase of "e-learning" in the developing world; for example in China where development of teacher training for over one million of the millions of poorly trained or untrained teachers, often in rural locations, is being tackled through distance learning, with the objective of poverty alleviation (Crichton et al., 2004). Other countries, such as Uganda, are taking their telecommunications to the next level through liberalising telecommunication systems

and moving from voice communication through to data transfer that is, networking. Perhaps it may be useful not to overlook the potential for new education paradigms and sustainable development solutions to emerge from such large-scale development?

The Formative Evaluation of Data, Extent of Networking and Change in Practice

The sixth or formative evaluation stage, is integral to this research, contributing to the three distinct evaluation objectives as outlined below:

Objective 1 - The research presents a picture of the data set, extracting key data relating to strategic levers for ESD such as "DfES" doorways/ themes, critical thinking skills and government specified outcomes for children. The greatest importance is given to the doorways, as these encompass both pedagogy and establishment management. Thus, the data gives a "snapshot" of the current status of ESD across the region, giving potential for enabling future initiatives to address the imperative of starting where people are. The researcher determines both the nature of information sought and included, with the **paradigm** being applied of education reform. From the outset it is noted that other site users may prioritise different criteria; for example, learning out of school, or the respective influence of NGO's/public and private sectors.

Objective 2 – In appendix one the research sets out an evaluation tool to measure the extent of information exchange as an indicator of the potential for collaboration, that is, the joint solving of problems. The Web site facilitates networking, but the subsequent quantification of information exchange and knowledge transfer recognises that they are not the same thing, but rather that UK research into future directions for education systems, DfES (2006), finds that "knowledge and skills transfer is usually slow takes time to perfect and embed … and (teachers) need to be coached as they wrestle with the transfer." Through using a simple but tested tool, which minimises the demands made on the participating organisations, the research limits the findings to the degree of information sharing. But this chapter suggests that information sharing acts as an indication of the potential for knowledge transfer and that, "better methods of knowledge capture" and e-mentoring (DfES 2006) will be practical methods by which future professional change will be achieved.

Objective 3 - This considers the question, "What change" is being caused by the "linking" or "collaborative" activity. Educational change with respect to sustainable development can be assessed against a wide range of criteria and performance indicators are themselves the subject of research (Sustainable Development Commission, 2006). The most relevant ESD outcomes arising from collaboration include the international objectives of the Decade of ESD (DESD)(2005-2014), which provide the strategic imperative for regional networking (UNESCO, 2005) along with the wide range of school improvement priorities highlighted by the Department for Education and skills (DfES) (2006) aimed at increasing educational innovation. There is however a range of unintended outcomes resulting from "electronically inspired collaboration" and this formative evaluation, through open questioning, seeks to identify all resulting changes in practice. The planning of future research should perhaps include interviewing participating organisations in order to ascertain the degree of organisational learning.

BACKGROUND DEFINITIONS AND DISCUSSIONS OF THE TOPIC

The Need for Networks

As suggested in the introduction, the first premise is that networks and alliances are necessary to engender or facilitate an education that will

promote more sustainable development. The Decade for ESD advocates networks, alliances and partnerships as key agents of change. It stresses that , "the effectiveness of the decade will not be judged by the number of such initiatives but rather by the degree of change in attitude and behaviour in the lives of communities and individuals at a local level" (UNESCO, 2005). Van Mieras (2006), finds that learning for sustainable development is a shared endeavour between individuals and organisations, requiring collaborative activity, enabled through the creation of genuine open learning environments which facilitate "encounters with a wide range of disciplines and stakeholders." As such, he finds that "it" (ESD) requires "learning innovation," stating that our current education system does not support such endeavour. A similar conclusion is reached by others, for example, Karl-Erik Eriksson (2006) who states that sustainable development is a common task which requires new and innovative institutional forms of academic links and co-operation, believing that "of the existential situation of fellow human beings has to be recognised as a form of knowledge. Such knowledge transcends statistical knowledge and theoretical knowledge and it transcends barriers between groups of humans" (Eriksson, K.-E., 2006, p. 21). Many theorists assume that ESD will require new forms of knowledge, while relying heavily on the wisdom from existing cultures.

The Outcomes of Networking

Accepting that linking and collaboration are innovations, what outcomes are anticipated? According to the Decade for ESD implementation document, network success for teachers/learners can be evaluated against: learning new content, developing innovative pedagogy, coordinating programme logistics, and school administrative and community support (UNESCO, 2005), while partnership research evaluates networking against parameters like longevity and the ability to spawn other partnerships (Goodwin & Stoker, 1998).

Changes in Pedagogy and Practice

What might the changes in pedagogy and practice be? Academic discourse into the nature of educational change is complex, with one useful explanation arising from Stephen Sterling's work into systemic thinking and organisational change. Sterling (2001) is a strong advocate of "bottom up" rather than top down strategy and he differentiates between strategic planning, which he defines as working from an existing position and "ecological design," which presents a vision of what is to be achieved through ongoing learning. ESD process at all levels has resulted in the adoption of the "other's" priorities at the interface between organisational boundaries, for example, inclusion to education opportunity, access to "e-learning" in public buildings, the key community role adopted by churches with respect to global issues to name just three. The idea that any effective educational change process has to be owned by the individual teacher or practitioner is not new (WWF-UK, 1989). Of new relevance, however, is the idea of both emergent properties, that is, those which can not be predicted but can be designed for, and of the importance of the starting point of learners, or learning institution. The UK sustainable schools action plan focuses on visions for the future, as seen through the doorways or dimensions of site management or campus, pedagogy or curriculum and community or the relationship between school and the "real" world. Challenging the historical lack of understanding from academics that, "the physical plant needs to provide a flawless service and that it can be used effectively for pedagogical purposes" (Lozano, Huisingh, & Delgado, 2006). The educational innovation however, incorporates criteria extending from travel planning and water management through to extra curricular activities and core curriculum and identifies critical thinking skills as a core element of ESD

Issues Relating to Access to the Network

Whichever criteria are used to assess success, it can not be assumed that this mechanism for networking, that is, "e-networking," is equally accessible to all site users. Matheos and Daniel (2005), identify five learner preference types in the context of blended learning where blended learning combines e-learning with other forms of interaction including "collaborative, technology centered, instructor centered, self directed and flexible," finding that when activities are structured to match learner's preferences then learning is enhanced. This project puts all site users into the position of learners yet only caters for the learning preferences of collaborative learners, those whereby collaboration with colleagues enable them to exchange experiences and jointly solve difficult problems that they would have not otherwise solved individually.

So against the backdrop of current research, the proposed measurement of the degree of information exchange appears a valid criterion against which to measure success. But future site development, leading to even more adaptable learning platforms may also cater for the "independent" and "technology-centered" learner as well as the flexible learner that is, those who prefer to access information and new practices electronically, but without collaboration.

MAIN FOCUS OF CHAPTER

The chapter critically evaluates the findings under each objective, identifying issues, controversies and problems and then discussing solutions and recommendations.

Issues Relating to the Definition of ESD

One premise behind this evaluation is that of the very existence of education for sustainable development or ESD. It arose from the earth summit in 1992 and has now emerged as a learning strand across all sectors of society, from the media to libraries, community groups and faith organizations, all of which have different powers to change perceptions and behaviours (Kershaw, 2004). Ideas and concepts arise and resonate within systems and critics find that while some fade others gain momentum. The author's current observation of society in GB demonstrate that ESD is of the latter type. The literature uses the terms Education for sustainable development "champion" in communities, "early ESD adopters" in formal education and "ESD pioneers" for those leading developments across education. This evaluation assumes that all the participating schools and providers can be considered as pioneers with respect to collaboration for ESD and that their progress is worthy of evaluation.

Findings Relating to a Snapshot of ESD in the Southwest

The Initial Survey Sample

The number of "participations per phase" is more than the total numbers of schools, as four of the schools deliver both pre-school and primary education, while two of the schools failed to record their phase of delivery at all. There was no participation by either special or sixth form sectors. Recording errors are a factor of data collection as is the non-return of data; and perhaps salience of data collection to educational sector is an issue. The highest participation rate is in the primary sector, with 78 percent of the total, while the secondary sector participation rate is only 15 percent. Yet education reform toward ESD is currently skewed towards the secondary sector for example, reform of Key Stage Three education giving an emphasis on Pupil Teaching and Learning Skills combined with the re-writing of the "14-16" curriculum with its focus on delivering work-related learning. All are drivers for an ESD centred on producing an effective skilled

workforce able to face the challenges of the future and direct the shape of the region's development. Given that the nature of collaboration may be partly defined by the sectors questioned and their individual objectives, question content may also determine the salience of the issues to that sector and thence the level of involvement.

Emphasis on Critical Thinking in ESD

Sixty-one percent of all the schools emphasize critical thinking as a part of their ESD with only 11 percent not making the links, giving a picture of a regional education service with a clear vision of the nature of effective, "transformative" ESD. It is interesting to note that 25 percent of pre-primary schools found this aspect the key to ESD, while 23 percent of primary schools admitted to not considering this aspect. This could be due to the higher curriculum content in the primary sector compared to an increased emphasis on stepping stones to later learning in the early years, when the foundation is laid to enable critical thinking to develop.

Focus on DfES Dimensions

There is a surprising and significant emphasis on ESD being tackled through the curriculum (83 percent), rather than via campus or community. This is an interesting observation with reference to the schools sector. The primary strategy enables holistic learning and for cross-cutting issues like ESD to be tackled through cross-curricular teaching and learning, as well as through subjects and similar approaches are emerging in the secondary sector, where for example Diversity and Citizenship is both a whole school issue and a subject. Opportunities for ESD are widely available through the secondary subjects, notably design and technology including cookery, geography, history, science, religious education, English, and the arts. By comparison, higher education establishments such as Plymouth University (2007), although committing to engage students at all levels with sustainability concepts and issues, comment that curriculum is less easy to address than campus, community, or culture. Many higher education ESD experts defend their right to safeguard against a prescriptive view, which William Scott and Stephen Gough argue would seek to limit the possibilities for sustainable development by focussing on society's current expectations for the future (Scott & Gough, 2006). For any linking project the nature of resulting collaboration will be a function of the learning expectations of the participating organisations, which are themselves a function of the survey content.

The information about entry points for ESD is of critical importance to the later quantification of the effects of collaboration, falling into three sections, below:

- There appears to be a link between doorways addressed and sector of education. Primary and pre-primary sectors show strong element of ESD focus through doorway 1 (food and drink) and doorway 5 (buildings) with a slightly weaker emphasis on doorways 3 (travel/traffic) and 4 (purchasing/waste). The primary sector alone has more focus on energy/water (doorway 2) and local wellbeing/global dimensions (doorways 7/8), and there is a lesser emphasis in the pre-primary sector on local well being and the global dimensions (doorways 7 and 8).
- ESD is addressed equally across doorway 6 (inclusion/participation) by all sectors, supported by written comments finding this theme central to the general work of schools.
- The secondary sector shows a more evenly spread ESD focus across all eight of the ESD doorways, with 60-90 percent engagement with the issues within each "doorway."

There are no priorities stated within the sustainable schools action plan; the document is

Table 1. Focus on DfES doorways - % of schools addressing ESD through each DfES doorway

DfES Doorways	Food and Drink	Energy and Water	Travel and traffic	Purchasing and waste	Buildings and grds	InclusPar-ticipation	Local Well being	Glob Dim-ens.
Pre sch.	¾ 75%	2/4 50%	2/4 50%	2/4 50%	¾ 75%	2/4 50%	¾ 25%	¼ 25%
Prim	46/53 87%	45/53 85%	6/13 46%	2/13 15%	46/53 87%	43/53 81%	37/53 70%	42/53 79%
Midd.	1/1 100%	0/1 0%	0/1 O%	0/1 O%	1/1 100%	1/1 100%	1/1 100%	1/1 100%
Sec	9/10 90%	8/10 80%	8/10 80%	7/10 70%	6/10 60%	6/10 60%	7/10 70%	7/10 70%
Mean	**88%**	**54%**	**44%**	**34%**	**81%**	**73%**	**66%**	**69%**

deliberately "light touch" with the aim of facilitating the widest range of approaches to ESD. There are however diverse links with other educational strategies, giving justification for collaboration. Examples include: "Every Child's Future Matters" (2007) in which road traffic, green space and climate change are the priorities for action most highlighted by children and young people themselves, being identified as areas which need a child centred perspective, along with "The Diversity and Citizenship" (2007) agenda, which makes clear linkages across communities. Thus, harnessing the local context is a key action point within the sector.

Links to Every Child Matters

Only 38 percent of schools do not link their ESD to the "Every Child Matters" agenda, thus by implication 62 percent of schools do, but consideration of the written response reveals a more complex picture as schools appear wary of declaring a linkage, which is implicit, but not yet deliberate. This may be a matter of timing, as this survey pre-dated the publication of "Every Child's Future Matters," research commissioned by the Sustainable Development Commission (SDC) across 9 local authorities. The research investigates the positive feedback between the two strategies, whereby a child centred perspective is needed within sustainable development planning in order to ensure that we are building a society fit for purpose for both children and young people. The environment is the third pillar in improving the daily experience of all young people from birth through to age 19 and further development of this site should provide valuable evidence regarding the importance of collaboration in building practice across the SW region.

Significance of ESD Awards

There is a large degree of error in recording, with some schools ticking awards when they have simply registered an interest while other schools which have achieved higher standards, failed to make records. The box-ticking exercise fails to reveal the diversity of approaches to the assessment of ESD being used by schools across the region, these appear in the written statement: Green Flag award, Arts Mark award, Sports Mark award, Active Mark. National Trust Award, "Be Smart" award from Severn Trent Water, ISA, Yellow Woods Award, "Wake Up to Waste," Arts and Sports Mark, and Clean schools. Interagency collaboration often requires shared monitoring, involving recording systems capable of standardising data and information across all agencies, but

the ESD statements provide revealing insights into the diversity of approaches adopted by both schools and ESD providers. This evaluation suggests that a diversity of recording methods be established.

Aims and Objectives behind E-Netorking and Collaboration

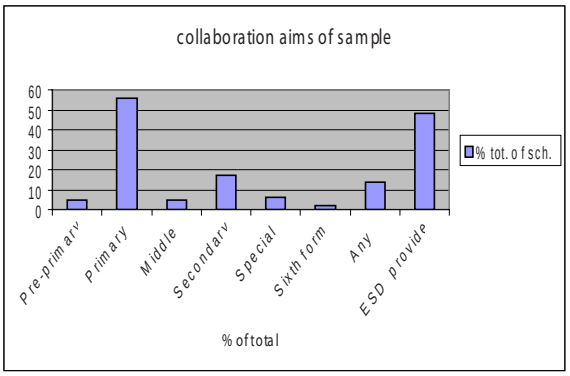
It is not perhaps surprising that 55 percent of schools wish to network with the primary phase and 17 percent of schools with the secondary phase, this corresponds with the percent participation rate across phases namely 78 percent and 15 percent. Of more significance relating to the future of this project is that 48 percent, nearly half, of all the schools would like to collaborate with an ESD provider, perhaps justifying the linking aspect of "Linking for a Change." Less significant but also noteworthy, is that there is a desire to network with both special schools and the sixth form sector, although they did not participate.

This question is key in terms of analysing collaboration trends; new ideas, learning from others and external visits for students are the areas of most interest to schools, closely followed by school visits by ESD providers and teaching resources. Professional development for staff and the sharing of experiences are the least popular aspects of collaboration. If the linking is to meet schools' needs, then enabling the generation of new activities, the sharing of knowledge and the facilitation of educational visits for students are the educational innovations most sought by schools. These objectives are broken into phase groups below.

There are marked differences between the collaboration aims of the pre-primary and primary/ secondary sectors. While the pre-primary sector is interested in developing new ideas, external visits for students and professional development for staff, both the primary and secondary sectors are interested equally in all aspects of collaboration. If there is a causal relationship here, possible links include:

Table 2. With whom would you like to network?

	No. of schools	% Total no. of schools
Pre-primary	3	5
Primary	36	55
Middle	3	5
Secondary	11	17
Special	4	6
Sixth form	1	2
Any	9	14
ESD provider	21	48

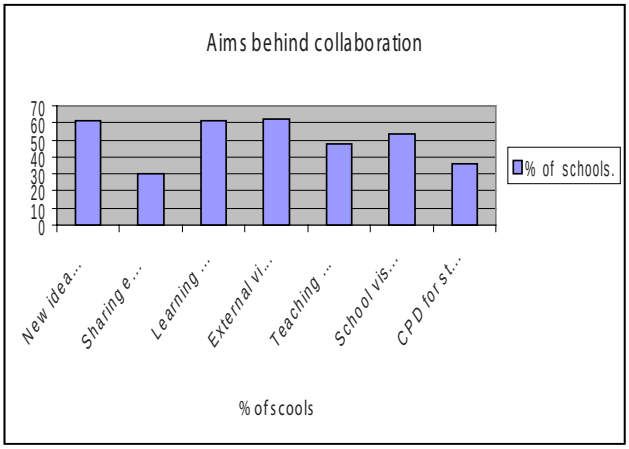


- Publication and dissemination of the learning outside the classroom manifesto, DfES (2006, p. 1), defined learning outside as providing "the most memorable learning experience," citing enrichment, extension, challenge and inspiration/motivation as outcomes, raising the current status of out of school learning.
- The data clearly indicates the confidence in the secondary sector in learning from the experience of others (80 percent of schools).

These findings give educational credibility to the further promotion of "Linking for a Change," particularly within the secondary sector.

Table 3. In which aspects of collaboration are you particularly interested?

	No of schools	% of schools
New ideas/activities	40	61
Sharing experience with others.	20	30
Learning from experience of others.	39	61
External visits for pupils	40	62
Teaching resources.	31	47
School visits by ESD providers.	34	53
CPD for staff.	23	36



The trends between themes addressed by schools and themes of interest to schools show some similarities although the fluctuations in the first are of a greater magnitude. In general schools show less interest in linking over themes which they already address significantly such as food and drink (88 percent), but the relationship is not linear. Buildings and grounds, addressed by 81 percent of schools for example, is a linking aim of 35 percent of schools. It may be that the different elements combined in each theme require different levels of support and that emerging aspects of practice require collaboration and innovation. For example, historically support has been widespread for school grounds at both local and national levels but relatively new areas of auditing buildings and ESD are currently being promoted (e.g., Buildings Research Establishment Audit Method). Another anomaly is that areas less well addressed by schools such as purchasing/waste (34 percent) are not necessarily matched by a desire to increase linking, perhaps indicating lack of salience of the issues.

One relative certainty is the high number of schools addressing inclusion and participation (73 percent) and the low level of support sought (15 percent). Guidance is available from the international level through to the national and county levels. It is worth noting that, "inclusion is seen as a process of addressing and responding to the diversity of needs of all learners through increasing participation in learning, cultures and communities, and reducing exclusion within and from education." Inclusion, therefore, requires the

Table 4. An analysis of the collaboration objectives of each phase of education

Phase	**New**	**Share**	**Learn**	**Ext**	**Res**	**School visits**	**CPD**
Pre-prim	75%	0	0	25%	0	0	25%
Prim	64%	36%	33%	64%	25%	53%	38%
Mid	0	0	100%	100%	100%	100%	0
Sec	50%	30%	80%	50%	60%	40%	40%

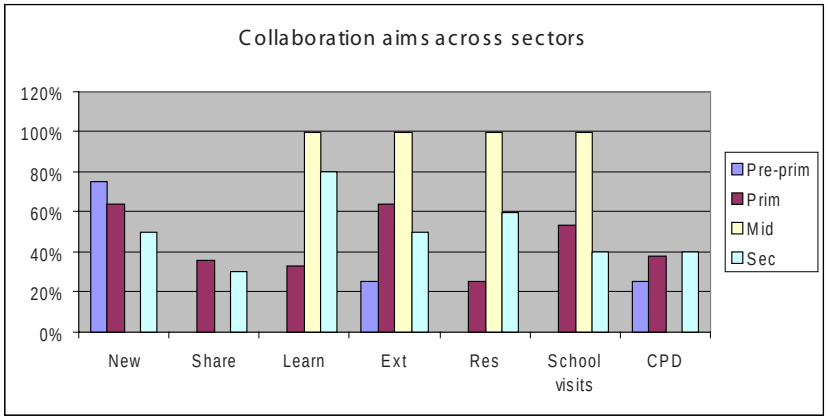
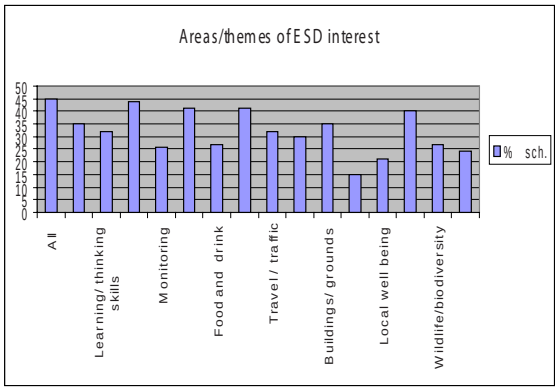
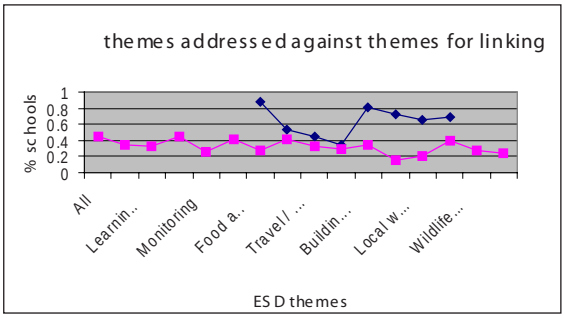


Table 5. Do schools seek to collaborate in areas already being addressed?

	Already addressing theme	**Interested in Linking.**
All		45%
ECM		35%
Learning/ thinking		32%
Local community		44%
Monitoring		26%
Whole school approach.		41%
Food and drink	88%	27%
Energy/ water	54%	41%
	44%	32%
Purchasing/waste	34%	30%
Buildings/ grounds	81%	35%
Incl./participation	73%	15%
Local well being	66%	21%
Global dimension	69%	40%
Wildlife/Biodiversity		27%
Any		24%





use of a range of methods and "changes in content, approaches, structures and strategies" (UNESCO 2003). Educational innovation, which increases the diversity of methods such as those aimed at developing personalised learning, therefore, contributes to inclusion and hence sustainable development.

How Closely does Service Provision Match the Objectives of Schools?

Seventy-one percent of the services provided are site visits, matching the collaborative aims of 61 percent of the schools and other notable areas of service include technical advice (47 percent) and presentations (36 percent). In comparison, over 50 percent of schools registered an interest in receiving visits from ESD providers. If collaboration is to be meaningful across schools and the public/voluntary sectors, then perhaps ESD providers should note schools' learning objectives, the technical aspects of ESD may be of more interest in the provider's sector.

How does this Agenda Address the Objectives within "Every Child Matters (ECM)" ?

Being healthy, making a positive contribution and enjoying/achieving are all outcomes for children which are addressed by more than 50 percent of the 85 ESD providers sampled, with the aspect of positive contribution being addressed by over 62 percent. Around one third of schools address the outcomes of safety and economic well being, while only 21 percent do not address ECM outcomes at all. These findings are important, as ECM ensures that educational innovation and intervention bring about outcomes which are in the children's best interests and contribute to their overall well being. The recent SDC research (2007) stresses that it is their daily experience of the environment that has the greatest influence on children's learning, and this evaluation suggests that ESD providers should identify how they impact on the child's relationship with their own locality.

What is the Extent of Information Exchange or Networking?

This chapter presents a method by which the extent of information exchange, or networking can be measured during the first six months of the project developed from one trialled in Dorset (Kershaw, 2006). If all of the organisations involved are learning organisations with respect to ESD, their practice should be changed as a result of their involvement in "Linking for a Change." Would that linking, or collaboration, take place through the ESD doorways or the ECM outcomes? There currently is insufficient data from schools to quantify the effect on ECM outcomes and this is recommended for expansion as the site develops, so the question was framed as follows: *Is there a similar trend of ESD engagement against doorways across primary and secondary sectors?*

The initial sample does not give enough paired data to carry out correlations between sectors and this evaluation suggests that future research ask similar questions across the sectors. However, the primary and secondary sectors show very similar trends indicating that it is likely that the degree of engagement is related to the degree of support via pedagogy and whole school practice. If "Linking for a Change" is to produce outcomes which meet the objectives of the sustainable schools project, then success will be measured against the level of increase in engagement with each issue, arising from collaboration.

Earlier authors' research into ESD networking devised and trialled a method to measure the extent of collaboration, identifying with the United Nations framework which assumes that it is not the number of networks which matters, but their effectiveness. This paper starts a process of quantifying extent of exchange of practice as an indication of the extent of collaboration outlined in Appendix One.

Other Mechanisms for Assessing the Change in Practice Resulting from E-Networking and Collaboration

The title "Linking for a Change" suggests two stages of activity, firstly collaboration and secondly change in practice, encompassing transfer of methods and resulting innovation. The extent of the change could be measured by asking participating organisations to re-submit data at the end of the six months and then on an annual basis. Improvement and change of practice will then be recorded. The natural end of the project is 2020, the date by which the visions of the sustainable schools strategy are to be realised. This overlaps the DESD, providing continuity with whatever emerges as the new international directive.

CONCLUSION

This chapter critically reviews the assumption that there is necessarily a causal relationship between e- networking and collaboration. It sets out firstly to identify the collaborative aims of the initial participants in a regional linking project involving 85 ESD providers and 66 schools and then proposes a method by which to qualitatively evaluate the nature and extent of that collaboration. The cultural context for the project is the UN decade for ESD, the DESD, which sets out a complex pattern of linking and information exchange at al levels, seeking outcomes which will be, "seen in the lives of millions of individuals as new attitudes and values inspire decisions and actions …"

The educational context for the chapter is that of a liberal education system in which solutions are not pre-formed. The author's previous research into e-networking for ESD (Kershaw, 2005) identified that education is the primary agent of transformation towards sustainable development, but that a diversity of educational processes are involved in that transition. It goes on to critically evaluate the effectiveness of 16 different channels of education, finding that they all instigated different responses in people. Such thinking is evident in higher education where Bill Scott and Stephen Gough clearly advise that "there is a need for barriers, giving freedom to research, teach, and learn (Scott & Gough, 2006, p. 91). It is not the job of universities to inculcate a particular set of beliefs, paradigms or modes of behaviour onto their students." There is a wealth of evidence that the place of sustainability in higher education is one of innovation, supported by a history in education of recognising miseducation tracing back to Dewey (1938) who stated, "that is the danger of forcing consensus about a perspective of an ill defined issue." This is one good reason to focus on networks, where learning outcomes will be different across all institutions and indeed between individuals.

Conclusions Relating to E-Networking

- It can not be assumed that the mechanism for networking is equally accessible to all site users. Matheos and Daniel (2006) identify five learner preference types in the context of blended learning where blended learning combines e-learning with other forms of interaction: including "collaborative, technology centered, instructor centered, self directed, and flexible."

Conclusions Relating to Linking and Collaboration

- Sixty-four percent of schools receive external support for ESD development, suggesting that external collaboration is acceptable practice.
- In interagency collaboration, it can be tempting to devise a recording system capable of standardising records across all agencies, but the ESD statements are perhaps the

most revealing insights into the variety of approaches being taken. This research finds that effective cross-sector performance monitoring relies on standardised recording alongside free recording.

- Fourty-eight percent, nearly half, of all the schools would like to collaborate with an ESD provider, perhaps justifying the Linking aspect of "Linking for a Change."
- Collaboration trends, new ideas, learning from others, and external visits for students are the areas of most interest to schools.
- Whereas the pre-primary sector is interested in developing new ideas, external visits for students and professional development for staff, both the primary and secondary sectors are interested equally in all aspects of collaboration, perhaps demonstrating more confidence in ESD and/or in their ability to share knowledge?
- If collaboration is to be meaningful across schools and the public/voluntary sectors, then note should be made of schools' learning objectives: developing new ideas, learning from the experience of others, and obtaining teaching resources.

ESD Levers

- The technical aspects of ESD appear of more interest outside of schools.
- Only 38 percent of schools do not link their ESD to the "Every Child Matters (ECM)" agenda, thus by implication 62 percent of schools do.
- There is currently insufficient data from schools to quantify the effect on ECM outcomes and this is recommended for expansion as the site develops.
- It is likely that the degree of engagement is related to the degree of support via pedagogy and whole school practice and that this may change over time, currently purchasing/waste, and local well being are emergent areas.
- Schools address all of the themes in the sustainable schools action plan, with a level of involvement ranging from 61 percent to 83 percent. This compares with a lower level of involvement ranging from 34 percent to 55 percent, for the ESD providers. This is perhaps to be expected, as the action plan is a strategy for schools, written in the language of education.

Future Evaluation

- A tried and tested methodology is put forward to use during the first six months of the project assessing the degree of inter-sector and intra-sector collaboration. This will result in a schematic representation of the degree of information sharing between organisations of a similar type, that is, between schools or between ESD providers.
- The above methodology is slightly adapted for an evaluation of cross-sector or inter-service collaboration, assessing the degree of collaboration across the ESD doorways.
- The extent of any change in education practice can be measured by asking participating organisations to re-submit their data at the end of the six months and then on an annual basis through to 2020.

HOW CLOSELY DO THE CONCLUSIONS ANSWER THE RESEARCH QUESTION?

This chapter presents a detailed analysis of an e-networking project aiming to facilitate collaboration and educational innovation and draws a series of conclusions regarding the need for different public service sectors to align their objectives if interservice networking and collaboration are to be effective. The conclusions appear to indicate that collaboration is accepted as standard practice in the education for sustainable development field

and may be most apparent in newly emerging areas where educational paradigms are evolving. This concurs with United Nations education scientific and cultural organisation (UNESCO) guidance and with the academic discourse relating to the imperative to link across sectors at both the regional and local levels.

The results from the evaluation phase should provide valuable insights into the effectiveness of collaboration particularly relating to bringing about the urgently needed changes in practice. Another relevant finding relates to the side effects of "e-networking" and "e-learning" that is of the possibilities for myriad unexpected and unplanned innovations for sustainable development.

At this stage, the research question can be answered with the statement, "Change is sought through linking," while the evaluation phase should enable a response to be given relating to the question "does linking promote change."

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KEY TERMS

Collaboration: Working together to solve problems that could not be solved in the same way alone.

Education for Sustainable Development: Education which supports development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Formative Evaluation: On-going evaluation which helps to shape the system it is evaluating.

Innovation: The development of new education methods in response to change

Knowledge Exchange: The transfer of learning from organisation to organisation.

Network: A group of individuals or organisations linked together in a non-hierarchical manner around a shared set of goals.

Personalised Learning: A highly structured and responsive approach to each individual's learning.

APPENDIX ONE: THE SIXTH PHASE OF THE RESEARCH

A Method for Evaluating Degree of Information Sharing or Electronically Induces Networking (E-Networking)

Proforma A: Intra-Service Information Sharing (Adapted from Kershaw, 2004)

Part of ESD	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
Please circle appropriate degree of collaboration with like minded organisations	0 25 50 100	0 25 50 100	0 25 50 100	0 25 50 100	0 25 50 100	0 25 50 100	0 25 50 100	0 25 50 100	0 25 50 100	0 25 50 100

A **External and internal contacts.** -Individuals and organisations which can support ESD in practice.	B **Organsational development in ESD.** -Awards, schemes of work and frameworks for delivery.	C Membership or client base. - the clients of ESD providers - the learners of educational establishments.	D **Diaries and knowledge of forthcoming events.** -training and awareness raising which will not financially benefit either side.	E **Legitimization of own work within international/national frameworks.** - United Nations. - DSCF. - Other environmental and social policy directives.
F **Resources** The built environment. Expertise and experts. Teaching and learning resources.	G **Practices and methodologies.** ESD providers methods of influence and adding value to schools' work. Teaching methods.	H **Conflicting agendas.** Actions and concepts at the local/global interface. Actions and concepts balancing environment/social and economic factors.	I **Shared agendas and cross cutting issues.** Participation. Personal development. Critical thinking	J **Funding streams internal and funding appropriate strategic drivers.** External funding streams from national and international sources.

Rationale for Methodology

The basics of the method originates from early work by Bromley (1986) relating to the case study method in psychology. In his preamble he presents the overall view that a case study means the " study of a major incident or event which is interesting in its own right. because it reveals useful information or because it can be used as a model example" (p. ix). The athor's interest first arose over his schematic representation of the way information might be shared. Recognizing that each group can contribute different amounts and sorts of information to a case he devised a lozenge diagram to show the extent of information sharing by two or more groups. The resulting diagram identifies that some information is not shared outside of the group and that no one person has access to all of the information and opinions: " the scene is set therefore, for confusion, misunderstanding and mismanagement". The review of his work was timely as the Victoria Climbie case had just prompted the combining of services for children in GB, creating Children's Services. The author's quantification of the method aims to increase potential for identifying collaboration through sub-dividing the body of ESD knowledge into ten parts A-K, and asking participants to record the percent of each part exchanged and in the previous trial the results

were revealing regarding both the extent of collaboration between sectors and across the environment/ development divide (Kershaw, 2004).

In applying this method directly to "LFC" the benefits of using a tested methodology are offset against the sub-divisions of ESD content based on a different sample. The diversity and size of this initial sample make a tailor made sub-division of ESD impossible and the tested method is used as a best fit.

A Method for Evaluating Degree of Information Sharing or Networking B etween Schools and Service Providers

Proforma B: Intra-Service Information Sharing, Measuring the Extent of Inter-Service Collaboration

Part of ESD	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
Please circle appropriate degree of collaboration with. organisations from other sectors.	0 25 50 100	0 25 50 100	0 25 50 100	0 25 50 100	0 25 50 100	0 25 50 100	0 25 50 100	0 25 50 100	0 25 50 100	0 25 50 100

Doorway 1 **Food and Drink** …all schools to be models of healthy, local and sustainable food and drink…. .	B **Doorway 2** **Energy and Water** …all schools to be models of energy showcasing wind, solar and bio-fuel sources water conservation	C **Doorway 3** **Travel and Traffic.** All schools to be models of sustainable travel where …facilities for healthier, less polluting or less dangerous modes of transport are exemplary.	D **Doorway 4** **Purchasing and waste.** …all schools to be models of resource efficiency, using low impact goods that minimise disposable packaging from local suppliers ….and recycling, repairing and re-using as much as possible	E **Doorway 5** **Buildings and Grounds** …all schools to be regarded as living, learning places where pupils see what sustainable lifestyle means through their involvement in the improvement of school buildings, grounds and the natural environment
F **Doorway 6** **Inclusion and participation** …all schools to be models of social inclusion, enabling all pupils to participate fully in schools life while instilling a long lasting respect for human rights, freedoms and creative expression.	G **Doorway 7** **Local well being.** …all schools to be models of good corporate citizenship within their local areas, enriching their educational mission with active support for the well being of the local community and environment.	H **Doorway 8** **Global Dimension** …all schools to be models of good global citizenship, enriching their educational mission with active support for the well being of the global environment and community.	I **Theme 9** **Every Child Matters** Methods and content specifically aligned with the five ECM outcomes: 1) Health 2) Safety 3) Enjoyment/ achievement 4) Positive contribution 5) Economic well being	J **Theme 10** **Critical thinking skills** -Methods and content specifically aligned with guidance in developing Pupil's learning and thinking skills. Particularly related to sustainable development issues, events and problems.

Proforma B has been devised for this research as an extension of the quantitative method in order to assess the extent of collaboration between schools relating to both the ESD doorways and the ECM objectives as well as the emphasis on critical thinking. This will allow any changes in ESD emphasis over time to be noted and for collaboration to be assigned to different aspects of ESD and thereby more closely understood.

APPENDIX TWO: A SELECTION OF ESD STATEMENTS FROM SCHOOLS

1. Sustainability is embedded in the schools ethos
2. We desperately seek some help please
3. The school views ESD as an important element in its development. It will be a focus in future SDPs
4. … is a long term project aiming to totally change the way our school consumes and generates energy. We want to educate and lead by example to demonstrate to the children in our care and to the wider community the notion that if we all do a small…
5. We are working closely with UNICEF in its pilot…
6. We have been working on this area for about ten years, working on about ten projects for WWF, listening to children, giving them a voice and empowering them to make connections- to act locally but think globally
7. Whilst awards have contributed to sustainable development they have not been achieved purely to contribute to sustainable development but to contribute to our work with our pupils
8. In past two years: pond development, allotment started, wormery, compost, increased recycling. Also we are currently investigating a wind turbine
9. Global dimension focussed on PSHE and RE curriculum
10. We are committed to reducing our carbon footprint and keen to increase concern for the local community
11. Our ESD programme links directly into the 5 outcomes of "Every Child Matters"
12. In KS2 the curriculum covers issues like climate change at home and around the world. Every class and office recycles paper with individual children taking responsibility each week
13. Our approach to ESD is to try to apply the principles and values of sustainable living to all aspects of school life. This is a gradual process, but key actions so far include: Employing an organic gardener who works with the children to look after our grounds…
14. The school is looking forward to the future and is creating a number of initiatives both within school and beyond to ensure that the children we are educating to day and their families are ready for the future and are aware of others' needs
15. Key actions tend to be dealt with as issues are raised in our awareness. We needed a travel plan to encourage more people to walk and not to congest the car park. the vision statement is "Creating Learning , Caring living" which encapsulates our ethos. The Eco-Committee is our school council and is pro-active in its approach
16. Our school approach is to encourage sustainable lifestyles. We have a building, which has " energy conservation" as a priority in its structure. Rain is collected to flush toilets. There are large energy meters for energy recording, underfloor heating etc.

17. We are very keen to incorporate as much ESD in our curriculum as possible and due to a new creative curriculum approach this is proving to be successful
18. Began with recycling projects then monitoring the amount of rubbish we produced and reducing it. Linked this to composting and "Gardens of Life" Project. "Power to Change" project next which enabled re-use and investigate ways of reducing it. Now working
19. We have taken the following key actions: International links, Whole school water project, Eco school bronze status achieved, Healthy schools revalidation, Schools council involvement, PSHE lessons. A similar idea was started to help schools with international links
20. Approach: Student led but involving whole community. We aim to develop the skills, knowledge, values and attitudes necessary to become more sustainable. We work with the wider community to develop and share good practices
21. Actually the essence of our problem with ESD is the word "sustainability" itself. In other words, not the literal meaning. but the fact that it is undertaken by keen and committed individuals with very little effective formal support structure
22. Zero waste lunches Composting Recycling Allotments Break time- healthy snacks Bog gardens
23. Annual focus week highlight ESD for example in 2004
24. are struggling at the moment within continuing projects: recycling paper waste, a wildlife environment area, the students have their own veg. patch and grow herbs for the school kitchen - these are within subjects
25. I would like the future to have a measurable impact on our pupil's knowledge and undersatnding
26. Global issues are covered within a progressive, discrete scheme of work but, in addition, opportunities to link with other curriculum areas are exploited whenever possible
27. The children have become ambassadors
28. If … village hall goes ahead the school will have continued involvement and learn more about sustainability. We are run to foster this understanding and the associated behaviours
29. Refurbished school and new extension. New playing field, game court and opportunity for development of garden wildlife area and outdoor classroom
30. The whole site is developed as much for sustainability as for a Teaching and Learning Resource
31. Not seen framework at the moment but we carry out lots of ESD as part of our School Improvement Programme (SIP) and within the curriculum

APPENDIX THREE: A SELECTION OF STATEMENTS FROM ESD PROVIDERS

- Surfers Against Sewage Operation Beach Clean is a free, fun, interactive and challenging online animated resource that allows pupils to work at their own pace, learn about the environment and engage with real scientific problems. It is relevant and empowering to young people, offering suggestions of how to organise and motivate a community. Young people often feel alienated within communities but this resource suggests a more positive model. It covers large parts of the KS3 Science, English and Citizenship syllabuses. Surfers Against Sewage's Operation Beach clean is the coollest damn education resource you'll ever see!
- Promoting behavioural change and sustainable lifestyles through a 3 stage learning event: Stage one - planning. We come to your school and meet with staff and students, reviewing the needs

and challenges of the school and deciding on the programme for: Stage two - Setting Up the Challenge. The "Be The Change Team" arrive, up to 5 young people in a van stuffed full of resources. They work all day with a group of 50-100 students. At the end of the day students are asked to sign their own "Sustainable Lifestyle" contract and commit to taking part in whole school change. Stage Three - 4-6 weeks later the "BTC" team return to the school to review progress and award certificates.

- We have a team of qualified and experienced teachers who work with schools on waste minimisation, including paper recycling, composting and buying recycled products. In our local area we provide free assemblies and hands on workshops for KS1 and KS2 and secondary, based on the three R's - Reduce, Reuse and Recycle and closely linked to the waste and purchasing theme of the National Sustainable Schools Framework. The workshops have cross-curricular links, including science, geography, literacy, maths, PSHE and citizenship. Our work always has some element in it that enables the pupils to take a practical environmental message home. We also have loan resources for KS1 and KS2 to help teachers incorporate the 3 R's into their Literacy work. We also sell resources for use in schools and in voluntary groups such as Brownies and Cubs. In our work we support lots of Eco-schools and we increasingly make links with other areas of ESD.
- "Plug into the Sun" have undertaken multi-media interactive workshops on all aspects of ESD in over 100 schools and with over 500 pupils over the previous five years. Our work has recently changed focus and we now specialise in installing renewable energy systems, concentrating on Solar, PV and wind. We are fully accredited with the low carbon building programme and Cornwall County Council. All installations are eligible for up to 50 percent grants and are combined with education resources.
- Presentation of renewable energy devices primarily made from re-used household items. Using sun, wind and water power sources: from Lego biscuit cutter to satellite dish, parabolic solar cooker to solar and bicycle powered electric equipment. Presentation and equipment can be adapted on request for different curriculum stages and subjects: design, technology, environmental or to complement work already covered in class. Purveyed with an eye to entertainment and enjoyment, aiming to enthuse positive activity, engender positive outcomes and contribution to the wider community.
- We work with schools to help school communities develop school travel plans. The aim of a school travel plan is to promote more safe sustainable travel to and from school by children, older students, parents and staff. By encouraging more children, parents and staff to include some walking and cycling in their daily travel to and from school, helps to promote more exercise, health and fitness for the school community. With fewer car trips to school and cars outside our schools, there is less congestion, pollution and carbon dioxide in our atmosphere. Using shared transport on travel to school also has an important role in helping to reduce pollution and carbon dioxide in our atmosphere.

Chapter XXXIX
Collaboration in the Service of Knowledge Co-Creation for Environmental Outcomes, Science and Public Policy

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ABSTRACT

Environmental sustainability and global climate change issues intensify the need for collaborations between scientists and policymakers. Working in virtual spaces exacerbates many of the challenges inherent in these collaborative efforts. Ideal collaborations promote social learning that delivers integrated knowledge through synergies that develop across institutional, occupational and other boundaries. However, impediments arise when individuals with different specializations and degrees of expertise inhabiting different physical and psychological spaces bring different problem-solving methods and presuppositions. Values affect the potential for synergy and the ultimate products of such collaborations. Addressing social learning challenges among different disciplinary traditions requires identifying and then addressing core differences. Through examining a study of occupational values and resulting behaviors of ocean environmental policy actors, this chapter considers collaborations through theories of discourse, actor involvement, social learning, and policy analytics and offers suggestions to improve knowledge co-creation as a potential aid to these critical issues and processes.

INTRODUCTION

Issues related to environmental sustainability and global climate change often include widely geographically distributed actors in scientific and governmental institutions. Institutional goals and definitions of successful outcomes may vary considerably. In addition, organizations are represented by individuals holding different occupational and personal values, and possess-

ing different degrees and types of technical expertise. Collaboration, particularly through information and knowledge consensus, is suggested as a positive approach to such differences (Dryzek, 1997; Keil & Desfor, 2003; Wondolleck & Yaffee, 2000).

The relationship of science to politics and to policymaking has led to widespread directives for building a democratic knowledge-based society (European Commission Directorate-General for Research, 2006; National Research Council, 2005) by addressing what has been described as a "mutual incomprehension between scientists and decision makers" (Clark, 2007). Such calls for meaningful inclusion of actors at all stages of the scientific and decision making process on multiple scales and across disciplinary boundaries is echoed by the former President of the American Association for the Advancement of Science (AAAS) in a call for sustainability science that is "interdisciplinary, intersectoral and integrative" on a worldwide scale (Holdren, 2007).

However, problems resulting from different standards and values continue to plague these collaborative efforts. Issues mirror the interaction of physical landscape (natural boundaries) and social landscape (economic or political boundaries), impeding implementation of either scientific or social directives in the absence of the other. Boundary issues hinder synergetic collaboration building processes which lead to knowledge co-creation, and are exacerbated by processes that must operate over geographic distances. Success depends upon factors including agreements on definitions of success, power, cultural influences, and professional norms as well as managing the unintended consequences of electronic collaboration. Even time zone differences exacerbate the difficulties, highlighting power differentials; virtual meetings are often scheduled for the convenience of the more influential partners. Internationally distributed teams are becoming more common with the recognition that environmental policy is global as well as national and local.

While knowledge co-creation literature spans education, business, electronic and distributive learning, information technology, and even psychology, it is a relative newcomer to natural resources/sustainability/climate change discussions. There, occupational cultures prefer scientific methods that encourage experts' directions and translating science to lay audiences and policy makers. With increased pressure for "inclusion," learning and decision processes have shifted towards knowledge co-creation among experts and even to community inclusion of impacted stakeholders. One such attempt is the European Commission's 5th Framework Programme's Social Learning for Integrated Management (SLIM) project (European Commission - DG Research, 2004). SLIM explores socio-economic aspects of the sustainable water use, focusing on understanding the application of social learning as a conceptual framework, an operational principle, a policy instrument and a process of systemic change. One SLIM participant explicitly states that a distinguishing characteristics of the process is the "co-creation of knowledge needed to understand issues and practices" (Blackmore, 2007, p. 516). The project's targeted outcomes of changed behaviors, norms, and procedures originate in shared actions and interpretations from knowledge co-creation's processes and outputs.

Despite such efforts, many environmental decisions emerge from scientific experts rather than as an emergent property of collaboration. The mandate for decisions based on "sound science" is frequently codified into law and rules. However, knowledge co-creation is appropriate when no single party has the answer to a complex problem (Dawson, 2000, p.171), or when multiple perspectives and multiple investigative methods are required. Applying social learning knowledge to policy and scientific expert processes requires looking at the intersection of theories and methods in new ways. Many human dimensions studies borrow from cybernetics a preference for coupled dualities over polarized ones (Maturana & Va-

rela, 1987). To address knowledge co-creation that involves multiple disciplinary perspectives, weaving multiple theories and research methods helps researchers emphasize characteristics of collaborative actors that can influence successful co-creative efforts. The starting point "… can be achieved through knowledge interfacing and sharing, but requires a shift from a view of knowledge as a "thing" that can be transferred to viewing knowledge as a "process of relating" that involves negotiation of meaning among partners" (Roux, Rogers, Biggs, Ashton, & Sergeant, 2006, Abstract ¶ 1).

THEORETICAL BACKGROUND

Collaboration involves social learning which is directly associated with making and developing relationships. A social constructionist analysis of relationships encourages designing a knowledge reflection process through which different researchers working on similar issues can gather insights by attempting to see the problems and processes from the perspectives of one another (Bryman, 1988). If, as social constructionists suggest, human behavior in organizations is primarily based on subjective and socially constructed perceptions, it is logical that environmental policy perceptions are heavily influenced by occupational norms. These norms are influenced by values held by individuals who are successful in these occupations and who have learned to reason and problem solve within the parameters of specific academic traditions.

Several social constructionist-based theoretical models overlap to inform the case study and the assertions made throughout this chapter. Other examinations of collaboration and knowledge creation between scientists and policy makers could call upon very different theories. Here, the focus is on social learning within the collaborative process of co-creating knowledge. Blackmore (2007) states that

> *learning theories are not mutually exclusive and do not have clear-cut boundaries … One example here is that appreciative systems, learning systems, complex adaptive systems organisational learning, knowledge management, and cybernetic theories overlap but depending upon whether a first or second order approach or positivist or constructivist epistemology is assumed can also be quite different* (p. 515).

In this chapter, a combination of learning theories categorized as discourse theories, social action theories, and network theories are used as the basis for examining the thorny problem of co-creating knowledge among natural resources, social scientific disciplinary experts, and other stakeholders within the complex adaptive system of environmental public policy. These theories provide the critical framework for the case study and propositions in this chapter. The approach adopted here is praxis, in which theory and practice inform one another through reflexive, iterative consideration throughout the research.

Social Learning and Action

Schon and Argyris argue that humans design action to achieve intended results. The authors distinguish espoused theories, or "theories of action" that people believe they follow and of which they are aware, from "theories-in-use" that are inferred from actual behavior and of which an actor is largely unaware. They also describe a hybrid alternative incorporating both theories in which individuals learn in the midst of difficult circumstances while acting as agents of organizational learning (Argyris & Schon, 1978). Argyris focuses on the reasoning processes individuals use to design and implement action (Argyris, 1974), while Schon focuses on the ability to act effectively in unique, ambiguous, or divergent situations, pointing out that most difficult problems are characterized by different parties holding incompatible "frames" or defini-

tions of the situation (Schon, 1983) that affect behavior. Ajzen and Fishbein's theory of reasoned action and planned behavior further explains what influences behavior—intentions, which can be predicted by beliefs. They contend that attitude towards behavior (individuals' subjective norms or beliefs), and the perception of behavioral control determines intentionality (Ajzen, 1985; Ajzen & Fishbein, 1980). The cognitive hierarchy model of human behavior (Homer & Kahle, 1988) states that values form the base of a cognition hierarchy that drives basic beliefs and attitudes, and as a result drives behavior.

Applied to organizational collaborations, these concepts inform the creation of the social capital that influences power structures, organizational integrity and synergetic potentials needed to move towards shared goals (Arnold & Fernandez-Gimenez, 2007). The impact of social theory on collaborations for co-creating knowledge between scientists and policymakers is evident in sustainability science discussions. Even when goals reflect synergetic partnerships among organizations and individuals, social perspectives affect modes and outcomes.

Network Theories

Policy networks share a common body of knowledge and a common allegiance to professional norms (Mingus, 1999; Schneider & Ingram, 1997). Actor Network Theory (ANT), known for integrating human and non-human factors and their agency in social affairs, considers methods by which actors are engaged and retained in networks. Policy Network Theory expands ANT to institutional networks for policy making. Power differentials within networks may be further considered through cognitive hierarchy theory which states that players who are not in equilibrium due to power, position or ability each assume the primacy of his or her strategy (Camerer, 2004). Some, like Schneider and Ingram, believe that appropriate policy networks share a reliance on a common allegiance to scientific and professional norms through which science and "utilitarian rationality" should govern decisions (Schneider & Ingram, 1997).

Collaboration and Conflict Theories

Another view considers intercultural collaboration and conflict theory in policy networks as analytical frames through which to assess the contribution of policy actors' values to environmental decisions (Wilson, 2007). Contributions by these theories are enhanced when informed by *phronesis*, or practical wisdom. The study in this chapter develops a process for revealing areas of potential agreement, even on issues assumed to be mired in intractable conflict, which may be discovered through inquiry into culturally influenced values and intentional actions. The value of this inquiry lies in aiding purposeful navigations of intergroup cultural commonalities and differences to improve communications, resulting in better and more durable policy decisions.

Collaboration has moved from the 1980s bureaucratic regulatory focus, through a period of emphasis on democratic discourse and public participation processes (Dryzek, 2000; Fisher 2000; Foster 2002) and into a concentration on the outcomes of collaborative efforts. As a caution, Koontz (2006) offers the idea that we are entering "the era of the collaborative state" (p. 2) without necessarily understanding the conditions under which collaboration actually improves environmental outcomes. One of those conditions involves evaluating the scientific evidence contributing to discussions and decision making which often requires a level of technical expertise not shared by lay public or policy audiences (Jasanoff, 2004; National Research Council, 2005).

Discourse Theories

Habermasian discourse theory claims that *communicative rationality* embeds fairness that is

essential to successful democratic process (Habermas, 1987, 1989). Communicative rationality challenges the positivist tradition of object-oriented *instrumental rationality*, showing that individuals understand one another and can work together through communicative action operating outside of the constraints of bureaucratic forms (Habermas, 1987). Rules-based discussion, debate, and communication in the public sphere provide ways to develop and extend democratic aspects of society. Habermas' theory of communicative action, a major contribution to contemporary social theory, posits that society acts and evolves through communicating, a process created by actors' "lifeworlds" (Wallace, 1999).

Some challenge the fairness of a process in which the better communicator prevails, opting instead for encouraging broader inclusion and respect for a variety of values and viewpoints to mitigate collaborations' challenges (Gibson & Gibbs, 2006). Dryzek's political theory of information consensus and public discourse (Dryzek, 1990, 2004; Dryzek & Berejikian, 1993) together with the debates surrounding approaches to discourse (Alario, 2001; Skollerhorn, 1998) provide a foundation from which to explore the roles of values within public discourse. These scholars rely on theorists who challenge the Habermasian contention that most environmental problems have to do with technological and economic issues requiring a reliance on experts rather than with value-laden human behavior (Habermas, 1987). Arendt claims Habermas' theories are inherently contradictory in their proscription against distorted communication because communication capability cannot be equal so long as unequal economic resource distribution creates unequal power distribution (Arendt, 1969). Rorty further invokes the postmodernists' refutations of logical thinking, reliance on experts and the scientific method (Rorty, 1991).

Dryzek's and Flyvbjerg's revival of Aristotle's *phronesis,* or "practical wisdom," offers a theoretical construct for analyzing values through discourse as a way of addressing these concerns by placing social science and its methods in specific relationship to scientific methods (Flyvbjerg, 2001). One criticism of social theories in general is that they are "cloaked in the garb of descriptive jargon, with too little historical context about the intellectual origins of key ideas, particularly with reference to their assumptions and intellectual commitments" (Perz, 2007, p. 424). The intellectually grounded phronetic approach requires purposefully and transparently examining the practical interrelationships of problem construction, agenda setting, and inclusion of actors and data at different scales and scopes of time, spatial distribution, and power differentials.

Values and Science/Policy Communication: Applications of Theory

The call for interdisciplinary and transdisciplinary processes as defined by Funtowicz's "postnormal science" (Funtowicz & Ravetz, 1992) requires blending social scientific and natural scientific principles, methods and findings. A process orientation to issues arising from this interface might involve the social construction of distance and delineations as clines or continuous variations in values and practices rather than as boundaries (Caulkins, 2001). Blowers, Boersema, and Martin (2007) suggest that for new environmental governance structures to emerge,

"It is the discourse that must change…a key element in the transformation will be a shift in values and related practices. There will have to be corresponding changes in the relationship between sciences and politics" (p.3).

Clark and Majone offer meta-criteria to address adequacy, value, effectiveness, and legitimacy both for and between scientists and policymakers and address the special needs for science in a policy context. They point to the enormous importance

of choosing language such as the definitional discourse surrounding global warming that seeks to avoid inflammatory terms that might prejudice economic growth in politically sensitive areas saying, "Experts often disagree on what science knows and on what that knowledge means for policy (Clark & Majone, 1985, p. 6).

Experts are often unquestioned by non-technical audiences. Alternatively, position-holders may create competing expert forums resulting in tension among experts, leading to suboptimum decisions. Hoppe (1999) says that "scientists *de facto* behave as if science were proprietary, local, authoritarian, commissioned, and expert" (p. 203) although influenced by the political climate. Dreyfus points to inherent dangers in favoring experts, suggesting that the expert approach purposely or inadvertently filters scientific information in ways that presuppose outcomes and decisions before the information is provided to the actual decision maker (Dreyfus, 1988). Ultimately, judgments that are products of values and norms determine whether and how to use experts' advice.

A STUDY RELATED TO KNOWLEDGE CO-CREATION ATTRIBUTES

Values-focused thinking as a decision-analytic tool considers that attention to values can serve as the basis for designing decision processes, developing more widely supported alternatives and recognizing opportunities to improve the range of available choices (Keeney, 1992). Concerns about judgments and values are concerned with what Vickers (1987) terms "appreciative settings." Values influence issue-based topics such as *what* should guide choices about scientific research agendas in fundamental research and practical applications of research. Further, values questions influence the relationships among strategic objectives, how research problems are identified and methods chosen for selecting levels of analysis and scales that are appropriate for linked decisions among disciplines and across political agencies (McDaniels & Gregory, 2004). Key judgments about such topics directly influence the study and practice of complex environmental decision making and applied social learning issues (Keeney & McDaniels, 2002). Mixing research methods that validate different disciplinary traditions represented in the discourse can aid in exploring the roles of values and norms (Wilson, 2007).

A recent study of the U.S. Commission on Ocean Policy (USCOP) process combines narrative analysis and V diagramming to inform and guide the logic used in the statistical Q Method investigation of discourse participants' values. The interrelationship of methods used intentionally mirrors the discourse (Wilson, 2006). Forty-seven interviews and 10 observations or participant observations inform the Q statistical study. Analysis is conducted within the framework of deliberative public policy and conflict theories and the debates surrounding approaches to discourse. Findings reveal that collaborative work between scientific and non-scientific policy actors may be aided by a more complete understanding of culturally influenced values and intentional actions that are influenced by occupational norms held by the respective policy actors.

The ways in which this study integrates methods, theories, and questions from the social and natural sciences to address these issues is applicable to emerging interdisciplinary fields including sustainability science. Traditional discourse and policy analytics framed in scientific methodological terms yield useful information to specific questions that are responsive to quantitative results but limit considerations of complexity regarding values surrounding human interactions. This study includes among its objectives a comparison of core and peripheral values held by the types of policy actors in the ocean policy conversation and assessing how those values influence the potential agreement zones between policy actors (Wilson, 2006). As a practical mat-

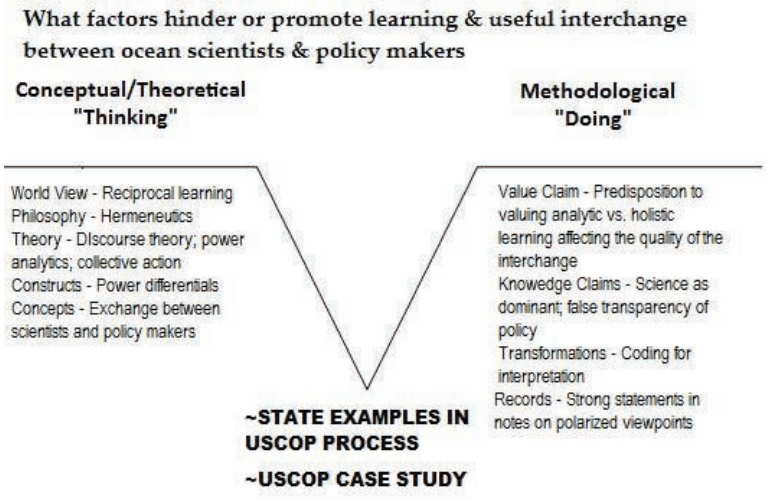
ter, the USCOP process was conducted face to face and electronically. This research about the USCOP process involved face to face meetings as well as telephone, Web, and Internet resources for data gathering and analysis.

Interrelationships of Theory, Methods and Data

Integrating V diagramming, narrative analysis and Q method concurrently and iteratively rather than sequentially creates results and processes that are integrally linked and results in new information about the roles of values in the science/policy interface. Early interview, text, and observation data used to construct research questions are combined with later interview and observation data serving as a filter through which to consider conditional judgments and decisions in research design and to create themes which reveal discourse characteristics and statements representing the breadth of the ocean policy discourse: the 400-statement Q concourse. V diagramming gives prominence to philosophy in structuring knowledge by "simplifying complexity without denying it" (Gowin & Alvarez, 2005, Title, Chapter 2, p. 23). This makes it an appropriate method for interpreting complex concepts and ideas. The V diagram is divided into two regions, the conceptual/theoretical, and the methodological. Each element relates to a focus question; the interplay between the two regions filters through that focus question. The left side begins with philosophical and theoretical underpinnings of the question to allow for testing the question within the literature surrounding the study before proceeding to the methodological right side of the V-diagram. Figure 1 shows an example of a values claim emerging as a well-supported data point from this process, helping to ensure that the range of larger ideas and statements was captured for use in the Q concourse which formed the basis for the statistical analysis of actors' values.

Factor analysis through Q method then reveals "ideal types" exhibiting scientific and policy cultural values sets calling for further interviews to yield deeper insights into values and reasoning. From this effort, four discourse types or "factors" carrying significant power and influence differentials emerge. Cross-referencing statistical findings with narrative and V diagramming results help to validate or challenge the strength of those findings. This study is guided by Q method's sensitivity and constructivist-inspired process

Figure 1. Sample V-diagram



requirements for data which emerges from the participants themselves.

Rigorous qualitative research process provides a strong Q concourse used as the basis for statistically analyzing the data to reveal "ideal types" that exhibit participants' values sets. Q stresses that discovering attitudes provides a way of indirectly knowing that which is unobservable. This is aligned with Weber's concept of explanatory understanding, but with a twist: knowledge emerges from the subjects themselves rather than existing in pre-determined categories to be tested (Addams & Proops, 2000). Q method is a structured approach to studying subjectivity including opinions, beliefs, viewpoints, or attitudes (Brown, 1993) that includes quantitative methods, rules and tenets from the natural sciences while augmenting factor analysis with new ways of knowing from the social sciences. It is in this realm that conventional policy analysts have started to see Q as a useful tool in integrating the natural and social sciences (van Eeten, 2000).

Ocean scientists and policymakers performed "Q-sorts" either online or face-to-face by rank-ordering sixty-four statements, reduced from a 400 statement concourse, rigorously observing Q protocol. Results were entered online. Rankings were subjected to factor analysis, correlating persons instead of tests (Stephenson, 1935) to reveal theoretical types by identifying statistically significant clusters of information. Collaboration potentials among actors emerged as patterns through correlations made across participants' values, providing deeper information about underlying issues surrounding potential agreement and dispute than in usual comparisons drawn from subjects' responses to particular questions.

Selected Study Findings

Four main factors emerged with an eigenvalue ≥1. These were selected for rotation (McKeown & Thomas, 1988) using the Varimax orthogonal method and verified against graphical manual rotations. They were then flagged to select the participants who showed characteristics of "pure" cases of each factor—those that explained more than half of the common variance—and were significant at $p<.05$. Factors with the least commonality typify more unique characteristics whereas those with high commonality exhibit less variation. This study emphasized large categorical differences, so unique types were sought by design in participant selection and through a leptokurtic forced sorting pattern in Q-sorts. The resulting factor arrays expressed the idealized points of view for the participants in this study.

Factor A: Expert knowledge
Factor B: Instruments of social and economic process
Factor C: Individualism
Factor D: Communitarian

Descriptions of four emergent factors illustrate distinctly different conceptions about what participants valued in the science/policy discourse and explain 62 percent of the total variance in the Q-sort set. After rotation, 13 of the 15 participants met the PQMethod flagging criterion for pure cases: Factor A, six (Expert Knowledge); Factor B, two (Instruments of Social and Economic Process); Factor C, three (Individualism); and Factor D, two (Communitarianism). As an interim step, correlations within the discourse context (Brown, 1980) among ideal types established broad areas of potential agreement before examining more basic value differences. Strong correlation does not presume statement consensus. Statistically identified positive or negative correlations signal discourse areas *where* common ground *might* be established and locate potential power differentials. For example, the strong correlations between Factors A (Expert Knowledge) and C (Individualism) at 0.4095 indicate a potentially important relationship between those factors but does not indicate what those commonalities might be. Highly negative correlations could signal top-

ics that would best be avoided in early discussions because they contain the seeds of basic values differences; and weak correlations indicate a potentially less consequential relationship denoting either less agreement potential, or fewer things about which factors strongly disagree.

Excerpted findings appear below to illustrate the type of information derived from interweaving methods throughout the analysis. Factor A accounted for 36 percent of the total variance, assigned the highest positive score to a normative prescription for science and public perception, and said that the process should be largely scientific and well-informed by scientific expertise. Factor B (9 percent) strongly favored natural science and human indicators, with a particular sensitivity to economic components. This factor criticized ocean policy as piecemeal, political, redundant and contentious, valuing summary arguments and favoring balance over precaution. Factor C (also 9 percent) preferenced individual interests and capabilities over either social or environmental concerns, distrusting large government; they showed a slight inclination favoring scientific expertise in decisions. Factor D (8 percent) valued actions at the community level, with community decisions based on scientific facts rather than political compromise, but with the benefit of summary arguments.

Strongest commonality among the factors was the *unimportance* given to technical aspects of technical report documents or processes (non-significant at $p>.05$). Factors attested to the need for more information before commenting, but for entirely different reasons: a critical nuance that would have remained undiscovered without further clarifying interviews to explore what statistical analysis alone could not accomplish, signaling areas of likely agreement or contention by the participants. In this case, beginning with technical issues before locating points of agreement showed the potential to impede discovering hidden commonalities. Starting with the "wrong" questions or problem statements may have unintended consequences by promoting deeper disputes. Learning why the various factors avoided technical policy issues offered clues about areas holding potential for agreement—a positive starting point for improving communication and understanding.

DISCUSSION OF THEORY, METHOD, AND PRACTICAL APPLICATION TO KNOWLEDGE CO-CREATION AND VIRTUAL COLLABORATION

The study illuminates many barriers impeding collaborative knowledge production. Why is there such emphasis on co-creating knowledge? The process is thought to lead to better, more informed decisions and tools for conflict mitigation and management. A praxis-based approach between interdisciplinary theory and practice can enable innovation that frees actors to see the nature of problems and potential solutions from new perspectives. Statistical information, such as results from the Q study's factor analysis, comes in discrete parcels that yield some value through modeling and reductionist strategies; at the same time the irreducibly rich nature of social systems and interactions such as policy discourses and outcomes encourage analyzing findings within a theoretical perspective. By combining the theoretical and practical aspects of the research, values in intergroup communications are placed within the realm of cultural factors in policy analysis. In this way, the framework is designed for a flexible, emergent and more in-depth investigation of this complex topic involving geographically dispersed actors. Such work which is sparsely populated in public policy literature (Geva-May, 2002).

A theoretical discussion surrounds the methodological one. Any inclination towards modeling social systems on ecological systems (Field, Hempel, & Summerhayes, 2002), must be carefully examined when applying scientific

rules to human learning and communication because the social world is even more complex than the natural world. Although long considered to contain primary rules of democratic discourse, rules-based communicative rationality has been seriously challenged (Flyvbjerg, 2001). Applying Dreyfus' five levels of learning to expert scientists and government agents charged with the development and promulgation of policy suggests that there is a more advanced position to strive for beyond the common definition of "expert" which is defined as technical proficiency (Dreyfus, 1988). Embedding higher-level social learning processes in the discourse used to co-create knowledge for environmental decision making (Keegan & Dyball, 2005) reaches beyond communicative rationality's rules.

In knowledge co-creation, questions must remain appropriate within and across knowledge systems, taking geography and new technologies into account. Old and instrumentally-based questions posed to address increasingly complex situations fail to meet new expectations. Framing better questions requires understanding reasons behind ecological and human systems' changes and unintended consequences. More complete questions acknowledge the requirement for social, technological, and political adaptations at a fundamental level rather than at reactionary and remedial levels. This involves not only crafting different questions, but using judgment to frame the discourse by appropriately including information from scientific studies while assigning technical "solutions" status as transitory tools rather than as end results—appealing to the wisdom inherent in human values. Operating in this intentional and holistic way can elevate environmental discourses from the current state of deep immersion in dialectic ideology that seeks compromise to a superior form of dialogue based in social justice and equity. Focusing on values using interconnected methods exposes dimensions in the discourse that may highlight less obvious commonalities and differences between actors. It also shows the inherent potential in allowing and encouraging instances to emerge in which interests may correlate on seemingly unrelated topics, revealing opportunities to recast the discussion along consensus trajectories or even reframe the problem.

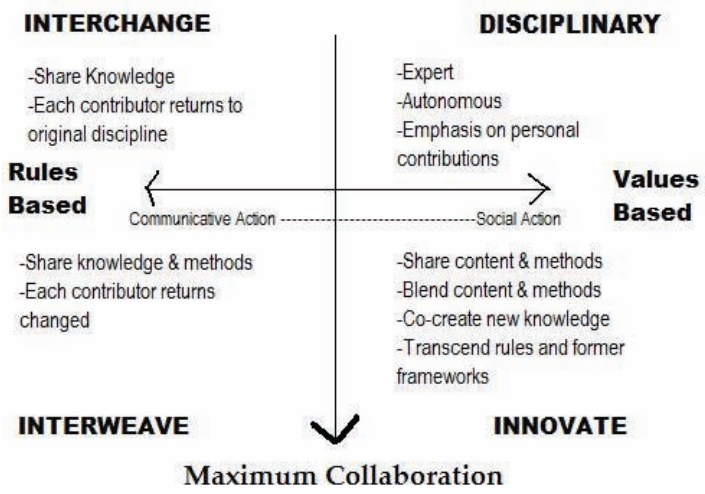
If the goal is participatory, open deliberative decision making, dialogue across disciplinary and cultural boundaries that divide scientists, policymakers and the public must incorporate appropriate consideration of how scientists and policy makers might co-create knowledge for complex multiscalar and integrated issues surrounding problems like sea level rise and coastal communities' adaptation to climate change (Wilson, 2004). Examining values and value-laden types through composite lenses like Q method, V diagramming, and narrative analyses, and then setting those findings into the practical structure of political events as modeled this study can provide useful information for framing new interrelationship strategies among actors and across virtual as well as non-virtual networks.

Electronic Collaboration and the Shift from Science *and* Society to Science *in* Society

Geographically dispersed collaborative groups require explicit attention to structuring social networks within virtual environments. Electronic collaboration does not necessarily level the playing field. Structures must consider questions of scale, expertise and access. Virtual collaboration may even create new problems since equality of power in such environments can be illusory.

Electronic environment changes participation. Convening or conducting collaborative activities electronically places the process within a visual medium in which it must intentionally address different communications issues. Tufte shows how even presentation software imposes a structure in much the same way as a voice mail menu, establishing a dominant relationship of the presenter over

Figure 2. From "Combining Information" to "Knowledge Co-creation" for Environmental Outcomes. Adapted from Salmons and Wilson (2007)



the community rather than as a tool for working together. He cautions that even simple bulleted lists in scientific presentations can suggest a level of thinking and inference which could neutralize participation and limit the dimensions of a discussion on complex topics (Tufte, 2003). In virtual science/policy collaborations, the environment preferences scientists, magnifying already perceived imbalances leading to an unwarranted deferential treatment of "experts."

In considering a new framework that accounts for the unique characteristics of the virtual environment while preserving the inherent issues in interdisciplinary collaboration, a recent study points to stigmergic communications as an indirect method used by individuals to communicate and create virtually by actually modifying their local environment within self-organizing emergent systems (Elliott, 2006). In order to maximize the potential for generating new knowledge in such an environment, training of all network members is particularly needed in two areas: communications dynamics and technology (DeMarie, 2004).

Such self-organization processes for knowledge co-creation emphasize people and their values, rather than information or technology per se. Virtual networks studies support deliberative theory's contention that participation in itself is insufficient to guarantee successful discourse. ANT adds perspective on using knowledge technologies and governance in specific spatial and temporal conditions to reinforce the importance of how actors are brought into a network, what they gain or give up to participate, and how they are defined and constrained by the rationalities of others (Lockie, 2007). ANT emphasizes that the ways in which actors in resource dilemmas are brought into and catalyzed to action within networks change both the actors and the networks. This orientation to the role of the actor in virtual social learning and networks is compatible with Q method's correlations of persons instead of tests—the actors are integral in defining or even creating the process. Virtually constructed social networks may logically emerge from communities of practice through regular interaction (Wenger, 1998). Elliott (2006) emphasizes recent research showing that "'participation' and 'reification' provide connections with stigmergy and its capacity to play an integral role in such communities on and offline." However, values also remain an integral part of virtual and non-virtual collaborative ef-

forts. Virtual networks must satisfy the same or even more rigorous requirements for negotiated norms as do non-virtual knowledge co-creation processes.

Perhaps a valid approach to virtual collaboration for co-creation of knowledge (as with any dynamic knowledge creation process) is participant involvement in design and interpretation of data throughout the life of the project. For virtual groups dealing with complex environmental issues, this may mean revisiting group composition and strategies regularly to reflect social changes and to build key interdependencies among people, technologies and ecologies. Lockie (2007) goes so far as to suggest planned interventions to foster virtual collaborative goals and to mediate competing knowledge claims.

CONCLUSION AND SUGGESTIONS FOR FUTURE WORK

This chapter shows how knowledge co-creation strengthens intersectoral partnerships for sustainable science and suggests an application of similar principles to other complex scientific and technical topics. One goal of human dimensions research, such as in the chapter's example, is to assist the community and key players in asking the "right" questions to achieve optimum outcomes. To do that, it is useful to acquire an understanding of basic values and beliefs among collaborative actors, and how they affect the differences inherent in virtual vs. non-virtual networks charged with co-creating knowledge. In work relating to occupational cultural norms, the role of actors' values remains under-investigated; applications to virtual collaborations are even fewer. The braiding of theory and practice in interactive social research on these issues includes traditional scientific research traditions and an engaged and situated approach of participatory design and reflective practice. It is suggested that future researchers combine theories, methods and models from relevant disciplines within a phronetic context as they attempt to make sense of co-creating knowledge across disciplinary boundaries and occupational norms. In so doing, new methodologies may emerge that more appropriately reflect the true nature of those interrelationships. A new methodology for understanding knowledge co-creation would be a contribution since, as Jiggins (2007) writes, "Methodologies for sense-making are in short supply" (p. 496).

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KEY TERMS

Correlation: The interrelationship between two variables. Described as a number, a statistical correlation describes the degree of relationship between the variables.

Interdisciplinary: Combining and integrating two or more disciplines, fields of study, disciplinary methods or professions.

Knowledge Co-Creation: A synergetic process of combining content and process from disciplinary traditions to synthesize new ways of knowing.

Phronesis: Aristotle's third virtue, frequently translated as "practical wisdom." Designed as a context for the other two virtues, "episteme" and "techne," it is applied as a philosophical guide for judgments required in practical decision making.

Q Method: A structured approach to studying subjectivity which is quantitative in its use of factor analysis and qualitative because it concentrates on the perceptions, attitudes, and values from the perspective of the person who is participating in the study, is self-referential and communicable by the participants and relies heavily on qualitative methods in developing the Q instrument.

Social Capital: Institutions, relationships, attitudes and values that govern interactions among people and contribute to economic and social development (Grootdert and van Bastelaer, 2002).

Stigmergy: A concept introduced in the 1950's to describe the indirect communication taking place among individuals in social insect societies, now used to explain many emergent phenomena that arise from individuals interacting only by modifying local parts of their shared virtual environment. Wikipedia is an example.

Synergetic Partnerships: Relationships that exhibit an open, integrated process that foster collaboration and encourage expanding connections, resources sharing and developing and work products beyond typical boundaries to achieve innovative outcomes.

Chapter XL
Networked Experiments in Global E-Science

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ABSTRACT

In current economic and scientific scenarios, interactions and organization models tend to be more and more oriented to flexibility of relationships, heterogeneity of elements, and collaboration among divisions. A possible approach, which is a technical solution and an organizing paradigm at the same time, is based on the concept of Virtual Organization. This paper, starting from the Virtual Organization paradigm and from workflows, shows an approach to the definition and execution of distributed scientific experiments as set of services executed on distributed collaborating sites at different heterogeneous organizations. The focus is on flexibility, reuse, orchestration, collaboration, and interoperability of services within a cooperation process. The workflow of the experiment can be specified by actors with low information technology but high domain knowledge. The context of the work is e-Science, in particular, bioinformatics, but the presented concepts can be easily generalized and extended to other classes of business interaction.

INTRODUCTION

Science nowadays is more and more a question of a critical mass of skilled people, often with complementary background, becoming a unique global organism in pursuit of a substantial common goal: this is the most interesting form of collaboration in science. For this purpose, traditionally in physics, specialized workforces have historically been concentrated in unique sites with special instruments like great particle accelerators. On the contrary, many of the faced problems in the present renaissance of biology do not need a unique big site, while other disciplines, like geol-

ogy, are intrinsically distributed as for obtaining significant data. The availability of information and communication technologies thus enables a full network to be built linking remote sites when only information gained from experiment possible at almost any site need to be shared. It becomes thus of interest to resort to a possible network of experimenters, physically not necessarily together, but logically co-present in the framework of the same cooperative big experiment involving all their complementary competences. In the paradigmatic bioinformatics application domain dealt with in this paper within the framework of e-Science, collaboration among different actors possibly with complementary background and expertise, may be even more needed than in other areas such as financial transactions (although any technologically assisted business interaction could be described in the same way). A proper virtual organisation is thus required in order to manage the flow of information over a given network. A networked organisation such as this may be logically defined through workflows acting over Web services, possibly exploiting a grid context. The technology addressed in this chapter would thus allow the most competent scientist to design the workflow even if he is not at a very high level of competence in information and communication technologies (which are, in a sense, logically embedded), as is common in application contexts like the bioinformatics one faced here, as well as in other application domains, where the proposed tools can also be applied. A framework is in fact proposed that creates, uses, and communicates information, whose organizational dynamics allows to perform a distributed cooperative enterprise also in public environments, even over open source systems. The approach assumes the Web services as the enacting paradigm, possibly over a grid, to formalize interactions as cooperative services on various computational nodes of a network. The responsibility of e-nodes in offering services are defined, as well as the set of rules under which each service can be accessed by e-nodes through service invocation. By discussing the bioinformatics case study, the chapter will detail how specific classes of interactions can be mapped into a service-oriented model whose implementation will be carried out in a prototypical public environment. Thus, problems linked to both virtualization of resources and orchestration of services in the heterogeneous and distributed context of e-Science (De Roure, Gil, & Hendler, 2004) are faced in this chapter: in this sense, approaches like the proposed one could provide a tremendous impact in globalisation, both by improving the capability to easily recruit a higher portion of the human capital not yet fully involved in global scientific research, fostering the diffusion of science and participation for local scientists in the developing world where labs might not be easily available, as well as by helping to overcome the subtle form of digital divide affecting people much more skilled in their own field than in instrumental information and communication technologies.

BACKGROUND

The concept of virtual organization has been developed in the recent few years also thanks to the grid computing paradigm (Foster & Kesselman, 2004; Foster, Kesselman, Nick, & Tuecke, 2002) as a general conceptual model, abstracted from specific technical solutions. Such virtual organization is a set of individuals and institutions having direct access to services, knowledge, tools, data, software, computers, and possible other resources in an heterogeneous dynamic way, aiming to achieve a common goal through collaboration. The basis of virtual organization is the virtualization of resources, consisting in creating and associating to resources a generic interface to allow services to be used through remote control, possibly by ensuring a given quality of service.

Thus in our context, a distributed scientific experiment can be defined on the basis of aggregating, sharing, using, and re-using virtualized resources. Such resources may be human beings, data, information, and communication technologies components, computational power, and in general services, in an heterogeneous and distributed context, according to the service oriented architecture paradigm (Comm. of the ACM, 2003). Some of them could be pre-existent and made available by some organizations within the pool, while others have to be virtualized in a suitable way and shared within the scientific community. "e-Science" is the term currently applied to the use of advanced computing technologies to support scientists (De Roure et al., 2004). Because of their need for high-performance computing resources, as well as cooperative information and communication technologies like Web style ones, many scientists are drawn to grid computing and to the Web as the infrastructures to support data management and analysis across organizations. High-performance computing and communication technologies are thus enabling computational scientists, or e-scientists, to study and better understand complex systems, like in cognitive neurophysiology via analysing, sharing and correlating the rich information provided by functional Magnetic Resonance Imaging (Baraldi, Manginelli, Maieron, Liberati, & Porro, 2007). These Information and Communication Technologies allow for new forms of collaboration over large distances together with the ability to process, share, and disseminate information. Global-scale experimental networking initiatives have been developed in the last years: the aim is to provide advanced cyber-infrastructures for e-scientists through the collaborative development of networking tools, advanced grid services, and data-intensive applications (Newman et al., 2003). Grids provide basic facilities for robust computation, efficient resource management, transfer, and sharing, and they support distributed computation. Moreover, on the other side, the Web vision too has been motivated since its beginning by the need to support scientific collaboration, by addressing multidisciplinary distributed science research at the end-user level and enabling semantic integration through transparent document sharing and metadata annotations. Since both grid computing and Web services deal with interoperability, from the e-science perspective they are both useful: neither technology on its own would probably enable to achieve the full e-science vision. The integration of the two of them, often called semantic grid, is reasonably the enabling infrastructure for such goal.

NETWORKED E-SCIENCE EXPERIMENTS

Issues, Controversies, Problems and Findings

The involved organizations (like universities, healthcare centers, research centers, enterprises, or even single researchers) are distinct sites, not just physically, but often also logically in term of competencies and missions. The links can be arbitrarily complex as for logic (sequence, parallelisms, cycles …) and institution (for crossing the borders of different organizations, and for exception handling in conformity with the policies of competence), length (support for long length processes with feedback, stops and programmed restarting), or type of actor (human or software system). The set of organizations participating in the experiment constitutes the virtual laboratory. The aim is to enable a set of remote scientific (but possibly also commercial) co-workers to design the workflow of distributed experiments, and to allow the execution of the experiment on distributed cooperative nodes, each providing and using a set of services. Typical services are the use of mathematical tools, specific applications and scientific methods, database access services, as well as even whole existing portions of other experiments seen

as parts of the present experiment process flow. Virtualization issues of resources may be easily achieved using Web Service technologies (Alonso, Casati, Kuno, & Machiraju, 2004). The general process of a problem solving strategy in a Virtual Organization can thus be seen as the whole of all the single collaborative procedures (Travica, 2005), provided a suitable competent orchestration is guaranteed. Orchestration may be achieved by interpreting each single virtualized resource as a component of a distributed cooperative process, modelled in terms of workflows (van der Alst & van Hee, 2002). Each procedure may be seen as the flow of input data through a computing core, producing output data. The desired orchestration (Peltz, 2003) of such single procedures constitutes the aggregate workflow related to the particular scientific (or any other business) activity.

In other words, within such a paradigm, collaborations are the joined efforts made by the involved organizations to achieve a common goal through some services described with a workflow, recalling other formalisms for specifying execution procedures like Petri nets. The single procedures, in general, can represent tasks performed by human actors, with various and possibly repetitive interactions with the system. The geographic, logical, and institutional location of the procedures is often distributed on more than one organization. The orchestration of the workflow is typically defined and supervised by a human actor competent within the application domain, possibly partially assisted by an expert system. Such workflow designer is in charge of selecting and composing the distributed resources of the experiment without caring about the implementation and technical details related to the physical distribution of the experiment workflow parts. Among the advantages of such kind of approach, a few are worth mentioning:

- **Efficiency:** The workflow definition procedures should help to discover and localize the resources, hence leveraging the workflow designer from technical and repetitive tasks and contribute to the creation of best practices that can be evaluated, compared, and shared with other people.
- **Reproducibility:** The workflow can automatically be precisely repeated, also by third parties possibly belonging to external organizations, even on instances of different data and parameters
- **Reuse and automatic enhancement of knowledge:** The produced outputs are potential new inputs to some of the subprocesses: a virtuous cycle is set up, incrementally augmenting the knowledge about the experiment, the domain, and also its execution needs or requirements, like speed enhancing, or experiment resources better allocation.
- **Traceability:** The workflow is monitored within an environment where the data sources and tools can be traced and checked.

As already introduced, the application domain of this chapter is bioinformatics, or more generally e-science (Hey & Trefethen, 2004), although the concepts can be generalized to generic business interactions. In the e-science context, where the concept of collaboration can be considered stronger than in other areas (like for example financial or economic transactions areas), the term virtual organization is often replaced by the term collaborative environment, to denote a collaborative laboratory (Bosin, Dessì, Fugini, Liberati, & Pes, 2006a). The design and use of a collaborative laboratory by means of Web services and workflows, possibly over the grid infrastructure, is the main goal of this chapter.

On this premise, our approach goes in the direction of laying the groundwork for developing support methods and tools for virtual laboratories, that is, virtual organizations where cooperation to execute a scientific experiment is supported. Web services and the grid are the enabling technologies considered by the approach to support the

simulation and the execution of different classes of experiments, from visualization (like browsing and search interfaces), to model identification through clustering and rules generation, in application fields, such as drug discovery, microarray data analysis (Garatti, Bittanti, Liberati, & Maffezzoli, 2007), or molecular docking (Sacco, Farina, Greco, Busti, DeGioia, Fantinato, Liberati, Alberghina, & Vanoni, 2007), just to mention a few. By applying Web services and the grid, an experiment or a simulation can be executed in a cooperative way on various computational nodes of a network, that get aggregated dynamically for the specific experiment, in a virtual laboratory, also allowing knowledge exchange among researchers. Upon termination of the experiment, the virtual laboratory can be released and the cooperation network closed.

A correct design and set up of the experiment workflow, visualization methods, and information retrieval tools (e.g., for searching similar protocols, or descriptive datasheets for chemical reactors) is proposed, in order to support cooperating scientists who perform joint experiments, for example requiring specialized tools, like data mining or database tools, or computational power, like for protein analysis based on their spatial structure, available only at specific nodes. The visualization part needs special care, considering friendly interfaces and graphical simulations enabling an improved comprehension of currently textual explanations.

Solutions and Recommendations

The exemplificative distributed experiment used in this chapter refers to a process of DNA-microarrays clustering, based on techniques illustrated in (Bosin, Dessì, Liberati, & Pes, 2006b; Ferrari Trecate, Muselli, Liberati, & Morari, 2003; Garatti et al., 2007; Muselli & Liberati, 2002). In our prototypical implementation, the governmental Italian National Research Council do orchestrate the process from a workstation at Milano Institute of Technology, linking MIT public repositories for data and University of Cagliari not just for part of computing power, but mainly for competency about processing procedures there developed, and also for the restricted local availability of peculiar software there resident. Besides such core, other, less necessary to the present experiment, but useful nodes can be allowed to complement the network, being the architecture technically open, as described in the following. The involved organizations (universities, hospitals, research centers, enterprises, single researchers) become members of a virtual laboratory who have decided to cooperate to a specific experiment run. As for the workflow, we need to take into account at least: sites where the experiment is defined and launched; sites where the experiment can be invoked; sites where data are located; sites where the elaboration is performed; and sites where results can be visualized. The decomposition in modules and the high interoperability of the elements favours reuse both inside and outside the organizations, at different levels of granularity. More in detail:

Site where the experiment is defined and launched: The workflow designer associated to the leading organisation creates the workflow model that characterizes the distributed experiment by selecting the needed resources, either local or available on the Web, and specifies their choreography in the experiment workflow. The results of the experiment will usually be delivered at that same site. The results are accessible both to a human actor and an automatic system that may have to perform adequate storage into local archives for analysis and for future and/or remote reuse. The main actor operating in this area is the domain expert, such as the researcher, or scientist. Usually, he/she is not deeply skilled with technical aspects of information and communication technologies: as a consequence, the proposed solution allows this actor to skip technical problems in such field. The tool used to support this

actor in specifying the experiment workflow is a workflow editor, in particular Taverna[1], allowing scientists to define and execute their workflows, and to analyse the deriving outputs, through operations of Web service discovery, selection, and link, which can be executed through a graphical support. Once the definition of the experiment has been completed, an instance of a workflow model is created and produces results, usually in the Simple Conceptual Unified Flow Language (SCUFL) format/ XML file. SCUFL (Oinn, 2004) is a workflow description language similar to the Business Process Execution Language (BPEL) language, more known in the commercial and software engineering environments (Andrews, Curbera, Dholaki, Goland, Klein, Leymann, Liu, Roller, Smith, Thatte, Trickovic, & Weerawarana, 2003).

Sites where data are placed: A possibly different organisation stores and has declared as available, according to the Web service standard way of operating (Booth, Haas, McCabe, Newcomer, Champion, Ferris, & Orchard, 2004), all the data necessary for the experiment. The data resources can also be drawn from various sites, possibly belonging to different organizations: in this case several instances of the experiment have to be launched at the same time, in order to achieve the best parallelisms and resource allocation policy. Data can be found in any location on the Web provided that they are identified through an URL.

Sites where the computation takes place: The computation is usually done on selected machines, whose computational power is adequate to the goal. In our example the processing is done using the Matlab[2] tool, modelled as a Web service implementing, among others, the clustering process described in Garatti et al. (2007), the Bayesian networks described in Bosin et al. (2006b), the logical networks described in Muselli and Liberati (2002), the piece-wise affine identification described in Ferrari Trecate et al. (2003), the neural networks described in Drago, Setti, Licitra, and Liberati (2002), the de-convolution described in Sartorio, De Nicolao, and Liberati (2002). The computation can be partitioned in functional sub-modules. Single functions of the processing are isolated, made independent, and published, possibly assigning to each single procedure physical different sites. This way, modularity and reuse are facilitated both inside the organisation, with respect to hardware service and licensing, load balancing, security, and parallelisms, and outside it, with respect to collaboration, knowledge sharing, possible distribution of provided services under payment. Analogously, workflow computing processes of external organizations can possibly be included, in order to achieve collaboration, knowledge sharing, and externalisation of procedures. The granularity and the terms of the contract about collaborations taking place outside the virtual laboratory are negotiable and adjustable upon specific demands and according to the usual variables of complexity, performance, and costs. At this site, additive modular potentialities are available through foreseen interfaces, that can be linked and referred to existing services like as Web service definition language interfaces (Christensen, Curbera, Meredith, & Weerawarana, 2003), with possibly additional information regarding the modalities of execution of the experiment. For example, if data localization is at the same node that will be involved in processing, the download of dataset will probably need a reduced time with respect to the general case. There is the possibility to add a module that caches the last used datasets; this way, if the experiment needs to be reset, datasets will be already formatted and locally ready.

The site(s) where the experiment results can be displayed and analysed is usually the same where the experiment has been defined and launched. However, since data are identified through an URL, these can be visualized also on other sites, belonging to other organizations. The visualization will be the same on all the nodes, independently of the platform used at the various sites, due to interoperability issues provided by

the support environment. The results are provided in XML and they do not need appropriate rendering tools, because results are presented through a standard Web page.

Site where the experiment is invoked: The whole experiment is itself viewed as a service, carrying an added value for the virtual laboratory; hence, it is potentially interesting for external organizations, which can invoke it from within a complex Web service. Through the additional myGrid[3] tools, our environment allows scientists to save the experiment, or parts thereof, into a repository of reusable experiments, from where it can be discovered and reused inside the consortium and within the whole scientific community for subsequent experiments.

Architectural scheme: as for the implementation of the key components of the virtual laboratory support system, three macro-modules are worth mentioning, each implemented as a Web service and placed in different physical nodes.

- **A Data Extraction Module.** Since a variety of data sources (like: on patients, on medical cares, on health protocols) are currently available online, often on public sites, the data extraction module executes a pre-processing of the data discovered on the sites, in order to take different dataset categories into a single kind of internal representation, useful to start the data clustering procedures. Other types of pre-processing can be added to this module.
- **Experiment Engine.** This module is in charge of setting a link with the Matlab software (or in general the computational language) and running the classification algorithms, like, in the proposed example, clustering, principal component analysis and Bayesian networks
- **Visualization Module.**

The decomposition of the virtual laboratory support architecture in such functional modules provides the well known benefits of modular systems, such as flexible composition, addition - deletion and reuse of modules, isolation of faulty modules. In particular, benefits come from the possibility to substitute, reuse and update single functional parts, without affecting other modules. More in detail, in our case:

The *Experiment Engine* interfaces the Matlab environment and executes the code for the clustering procedure. The core of the elaboration is a Matlab function. This is made active by Java code through a suitable interface JMatLink[4]. The whole Java code is exposed as Web service. Single functions can be isolated as independent Web services, and allocated on different sites according to a reuse principle. For the creation and deployment of Web services, Apache Axis has been used, installed on the Web container Apache Tomcat[5].

Data Extraction Module: Nearly the whole totality of DNA-microrrays data is available in a few standard formats. Each can be further distinguished in different variants. A wide choice of data is available for example on the Cancer Program Data Set of Broad Institute[6]. The data extraction module is a Java module that can express these different kinds of formats into a sole representation. The module, exposed as Web service, can be adopted and invoked also by other clustering processes of other organizations as an independent element placed backwards in the respective supply chain.

The *Visualisation Module* deals with problems related to the most suitable visualization mode of the experiment results. The results can be presented as graphs and textual descriptions, and can be put in an HTML page available to any Web browser. Also the visualisation module is a virtual resource and, as a consequence, can be included in other experiments as an independent module in the workflow of other organizations.

FUTURE TRENDS

Starting from the architecture presented above, an evolution can promote an even more flexible execution of the experiment. In particular, the use of agents (Wooldridge, 2002) can allows for dynamic automated selection, at run time, of the services that execute the activities of an experiment.

The improved architecture can make use of two kinds of agents. A supervisor agent is in charge of supervising the overall execution of the experiment, belonging to the organization in which the execution of the experiment has been launched. For each activity of the experiment, such agent discovers from a yellow pages directory service the set of agents able to provide the needed service(s). These resource agents represent and manage the actual services, modelled as Web services and described with various properties, among which the quality of services parameters, like time, cost, availability, robustness, and security that are needed to select the Web services. The basic role of the supervisor is to assign each activity to the most appropriate resource and to supervise its execution. For example, the activity assignment can be done according to the contract net protocol (Smith, 1980), in which a supervisor announces an activity to some resource and awards it to the best offering one. A given organization of the collaborative network can have more supervisors, implying more experiments running at the same time, and more resources made available.

In this scenario, the workflow designer does not need to be aware of the physical structure of the network that will be used to execute the experiment in a distributed collaborative way. For example, the workflow designer does not need to specify that the initial activity of the workflow will be executed by a service from a specific organization. The workflow designer has only to specify the kind of the initial activity and, then, the supervisor in charge of supervising the execution of the experiment will find the most appropriate service to execute the activity, according to quality of service parameters. Note that the service from a given organization will execute the activity if it is the only available service for the activity or if it is considered by the supervisor to be the best service, for instance requiring minimum time and with high degree of security, to execute the activity.

Setting up this improved architecture requires addressing a number of issues, including the dynamic negotiation of contracts between agents and the interface between agents and the workflow engine and between agents and Web services.

CONCLUSION

In this work, starting from the concepts of virtual organization and workflow, we have described an approach to the realization of virtual laboratories for e-Science. The architecture of a prototype has been illustrated to show how a distributed process can be modelled and executed in the bioinformatics field. The technologies of Web services in synergy with the Taverna tool have adequately answered to the pre-fixed goals: flexibility, re-use, interoperability of the components, possibilities of parallelisms, simplicity of the workflow creation made by actors with poor information and communication technologies knowledge and a certain general robustness. When the grid service (Foster & Kesselman, 2004) will have reached a full stability on the market, it will be sensible to build a prototype that implements the presented work by also using such technology. The goals to reach will be the ones that the grid services take from Web service: quality of service, security, load balancing, self-configuring, self-healing, self-optimizing support to semantics.

The approach is general, and with the opportune tuning, easily extended to wider areas of business interaction. The evolutions in the commercial area will be the ones offered by the virtual marketplaces of services, where the

modalities of distribution are characterised by ways of payment, for subscription or for amount consumed for single transactions.

Also privacy and data security are among major technical concerns in our future research, considering both methods to select trusted nodes within the cooperation network and to obscure or encrypt the transmitted and stored data, to preserve their sensitivity, according to user security requirements.

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KEY TERMS

Cooperative Information Systems: Independent, federated information systems that can either autonomously execute locally or cooperate for some tasks towards a common organizational goal.

E-Marketplace: Internet-based electronic market that allows online business-to-business communications and transactions.

E-Science: The co-operative work of scientists with various competences at different sites over an ICT connection in order to achieve a common scientific goal.

E-Services: Software paradigm enabling peer-to-peer computation in distributed environments based on the concept of "service" as an autonomous piece of code published in the network.

Interoperability: Possibility of performing computation in a distributed heterogeneous environment without altering the technological and specification structure at each involved node.

Virtual Enterprise: A new form of economic undertaking where several actors associate their strengths to provide specific products and services traditionally provided by a single enterprise.

Web Services: Software paradigm enabling peer-to-peer computation in distributed environments based on the concept of "service" as an autonomous piece of code published in the network.

Workflow: The automation of a business process, in whole or part, during which documents, information or tasks are passed from one participant (human or machine) to another for action, according to a set of procedural rules.

ENDNOTES

1 http://taverna.sourceforge.net/
2 http://www.mathworks.com
3 http://www.mygrid.org.uk/
4 http://jmatlink.sourceforge.net/
5 http://tomcat.apache.org/
6 http://www.broad.mit.edu/cgi-bin/cancer/datasets.cgi

Chapter XLI
ICT to Facilitate Emergency Response in The Netherlands

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ABSTRACT

The implementation of GMS (Integrated Emergency room System) in the Netherlands has had a tumultuous record. A direct consequence of the governmental decision to hand over the empty basic system to the emergency rooms is that a large deviation in local systems emerged. A case study in one of these emergency rooms explains the consequences of this action and theorises the local construction of these ICT environments. The theoretical perspective that is found most relevant is the emergent perspective. Next to information system development the process of interdisciplinary collaboration started in the emergency room. For the first time all three emergency services (the police, medical services, and the fire department) took place together in de emergency room. In this article the influence of the ICT system on the interdisciplinary collaboration is explicated.

INTRODUCTION

In 1995, the Dutch cabinet decided to implement a single national communications network for the police, the fire brigades, and the first aid teams. This decision was part of a policy that aimed at simplifying the emergency response operations internally as well as its presentation to the general public. As part of the public emergency response interface emergency number 1-1-2 was

introduced around the same time as the number to use in emergencies. The changes internal to the safety response consisted of an organizational regrouping of the dispatch functions of the three main disciplines involved—fire brigade, medical emergency services, and police—into a co-located emergency room. The information and communications network to support it consists of two parts: a software environment and mobile communications system. One decision was to build an emergency response software system GMS (Integrated Emergency room System) to integrate emergency response and support it with crucial information. The other decision was to construct a safe mobile system to be called C2000 (communication 2000). Its aim was to make digital voice and data communications between all emergency services possible—not only in the emergency room but also on the street—and to replace the existing 100 analogous networks, which had obstructed such communication.

GMS and C2000 are prime examples of information and communication systems designed to facilitate cooperation between organizations. Indeed, they are intended to make the integration of different organizations in the field of security possible. Yet, when such systems are implemented, it often turns out that the differences between the "information domains" (Bellamy & Taylor, 1997) the partaking organizations constitute provide almost insurmountable barriers to actually realizing such systems. Organizations literally speak different languages and have different operating procedures. Moreover actions are taken at different levels and at different moments in time thus preventing operational practice to be determined completely in the design stage. Trying to overcome operational difficulties beforehand also often leads to heavy political infighting between the responsible organizations. In the C2000 and GMS case actors at the national level realized early on that a necessary strategy was to leave the integration of the organizations to the local level. Relevant considerations and processes therefore need to be charted by following how groups manage and work with these systems on the shop floor. For this contribution we studied the implementation of C2000 and GMS in one dispatch room, the dispatch room of the security region "Gooi- en Vechtstreek," which has its centre in the town of Naarden, but encompasses several municipalities. The implementation took place in the broader perspective of nation wide roll out of the systems over a period of about 6 years with a preparation period taking nearly as long. (The decision to develop GMS and C2000 was taken in 1995.) The development and implementation of GMS in the dispatch rooms thus was a relatively long trajectory.

BACKGROUND

The developments in the starting phase of the GMS system can be depicted according to two different perspectives. The *initial infighting perspective* regards technology as an instrument for the restructuring of social relations. It is based on the emphasis of actor contribution in the design and implementation process. Actor interests are represented in the policy development phase when the important choices for implementation are made. When sensitivity to external stakeholders is paramount, as is the case in many policy domains including policing in the Netherlands, concessions to stakeholders in the initial phase are an important part of decision making. In this view that is comparable to a systems implementation when design is stabilized it should be implemented according to plan. The responsibility of policy makers and senior management at the lower levels is to consider the best appropriate techniques for implementation.

The second, *emergent* perspective is derived from insights of different studies on the developmental course of information technology systems. It is empirically defined, based on observations in different contexts of the implementation of ICT

systems. The explanations are less deterministic about the manner in which technology choices are carried forward over the course of time. Technology choices are made and may be the outcome of power relations between stakeholders. However, such choices do not necessarily determine the manner in which technology is taken up. Thus technology development and use constitute an ongoing evolutionary process. The processes of development and implementation are not separated but consist of a flow of events and decisions. While technological choices restrict certain options for people that work with the systems those people can also tweak the system and develop applications while ignoring others. These micro processes might explain the phenomenon that has been addressed as the drift of large information systems. For instance Holmström en Stalder argued that large systems require a fit between technological networks and social networks, which can only be reached when the technological system is not rigid. Drift originates because of the required fit between system and social world. Ciborra, from a slightly different perspective, argues that large systems are characterized by subsequent decisions and steps in development that are not completely clear at the outset. Continued tinkering, changes in power coalitions supporting systems lead to unintended shifts and changes the system. While information managers and senior management fear drift, it is better to accept it. When drift is considered as a natural outcome of developmental processes that continue with the use of the system, we can accept that systems cannot be controlled in detail or reach a final fixed format (Ciborra, 2000). The success of the system in the emergent and drift perspectives is a consequence of its adaptability and the possibilities to adapt it to new uses and users.

Emergent Systems

Let us look in more detail at how local practices are shaped by and shape technologies according to the set of theories that we combine under the heading of dealing with emergent systems. Nardi and O'Day make use of the ecology metaphor. It stands for the systems environment and its interactions with this environment (Nardi & O'Day, 1999). The information ecology influences the development of the core system. The ecology itself is constantly changing therefore a recurrent need to readjust the core system occurs. Two main elements characterize the information ecology: diversity and dominant work process. In their view the ecology is driven forward by a variety of active groups that perform specific roles. One such role in the work processes is that of gardeners that help to nurture the system at the shop floor because they develop the linkage between system developers and users. The second role is the stimulation of interaction between the varieties of disciplines involved in information work. This diversity is necessary to tap into the variation of functionalities that each system harbors (Nardi & O'Day, 1999, p. 142). Orlikowski has brought forward a similar view which she labeled as theory in practice *"the set of rules and resources that are (re)constituted in people's recurrent engagement with the technologies at hand"* (Orlikowski, 2000, p. 407). Central in this theory is the relation between human action and technology. She argues that interpretative schemes, facilities and norms of workers are embedded in technologies in use. The structure of the technology is thus not given but is stabilized by the recurrent action of the workers interacting with the system (Orlikowski, 2000). Users make fundamental choices about how to engage with technology, for instance they use or adopt certain features of the technology. Technology in practice is not static, it is reshaped by the actions of its users.

From the emergent theories we take a number of elements that can be used to understand the case of GMS. The ecology vision suggests that use will be made of the differences between the three disciplines to specify the technological features that will be enhanced or ignored. Their

different ways to work with the system and how they adapt it determine what functionality will be used. In order for system development to be successful the ecology vision requires users of the system to actively build on their own experiences to develop it successfully. Theory in practice is less specific but also states that the only way for systems to work is that they need to have a significant degree of flexibility to allow users to bend it to their needs.

The dilemma that holds for dispatch rooms in the Netherlands is the degree of standardization at the national level and the freedom to form the system at the working level. Because of basic variations in tasks and the local management, the dispatch rooms regional differentiation became more dominant during implementation. Looking at an example of the processes at work in one of these dispatch rooms should allow us to draw broader conclusions. We will start with a description of the basic features of the information system and the work processes that interact with it.

GMS SYSTEM DEVELOPMENT

Elsewhere we assessed that the initial planning and development of technologies supportive of emergency room work was driven by decision makers that believe in the first perspective (Groenewegen & Wagenaar, 2006). We argued that steps taken during the process led to a situation where practices deviated from the planning-implementation scenario. Because the home office opted for regional implementation of GMS these regional dispatch rooms became responsible for final workflow and their ways of using the choices related to the system adapted it to local circumstances. Moreover as the system was conceived as a part of larger drive aimed at improving the emergency response of hitherto separate disciplines the GMS implementation policy also can be regarded as an essential step in developing cooperation between emergency responders. However, this broad and historic account suggests underlying processes in the dispatch room and we focus on these processes in this contribution. Because cooperation, mutual understanding and the history of local emergency operations play a role, each of the emergency rooms has a unique set of problems to solve and undertakes integration accordingly. In line with the emergent perspective we focus on the manner in which the system is used and adapted locally and therefore this paper focuses on one site where local design work is undertaken. Working with and around certain aspects of GMS creates a localized practice with the system that can best be understood as emergent: new procedures, adjustments and communication practices develop on the shop floor.

GMS Structure

GMS has been designed with the aim to support the processing of emergency calls through set procedures and protocols that are embedded in the system. GMS standardizes the information taken from an incoming call and connects the standard elements to the size type and numbers of units that are needed for reacting to the call. Therefore it supports the operator in taking operational decisions. GMS is an intelligent system: it uses terms from the input and values them in such a way that it supports proposals for reaction to the operator including supporting information from other systems. The final decision still rests with the emergency room personnel. The intelligent part of the system is connected to a scratch book function. Whenever text is entered into the scratch book the system is alerted by so called parser terms. These (for example “incident,” “car damage”) induce the suggestion to send an ambulance and police patrol car. When injuries would be associated with the term “being trapped in a car following a collision” a fire vehicle would be send as well. In this manner the system connects to so-called incident classification and location that helps to organize the response.

GMS as a system is tied into other information systems, each of which has a different logic and design attached to it. Important systems in this information network are: C2000 as mentioned, the system that allows communication between emergency workers in the field and other services; BPS and RAVIS, which are data collection systems; CityGIS a geographic location system; and, the OMS an automated fire alarm system. Increasingly, also different mobile systems are connected to GMS that allow the sending of specific information to the units in the field. An example is the use of "Routeplanner," that suggests the quickest approach to an emergency site.

Working Routines with GMS

The GMS system settings in the dispatch room in Naarden influence the manner in which work is done. The didactics behind the system consist of the three basic elements that are represented by tabbed windows. The first is a screen in which the incident call is recorded, the second consists of a window with available units, and the third window consists of connections between the incident and the units attached to it. The main actions undertaken by operators are entering information into the system. The input required concerns three sorts of information: information on the caller (who), classification of the emergency call (what) and the location (where). At the incident page a scratch book is attached as well in which the essential facts and actions are reported. Without information on the three elements GMS does not react. It therefore is a matter of life and death to react quickly and entering information correctly is the key to that. Interviewees confirmed that correct input is essential for reactions as well as for communication inside the dispatch room. The scratch book and the information on the incident code are two ways to have the system react with suggestions for unit dispatch. When use is made of a classification code after the other two items are entered automatically a priority is assigned and indications for the disciplines to be dispatched are given. When the information is entered in the scratch book, parser terms are used by GMS, which also suggest dispatch options and priority. Thus the system contains decision-making routines preparing the emergency response. These responses can be adapted by the operator according to earlier experiences or other considerations at this time. When the combination of these decisions is surveyed by the operator the information on the incident will be send to the window with active incident reports, subsequently by looking at the available units one or more units can be connected to the incident, and units are dispatched to the scene. Whenever multidisciplinary response is necessary the open incident window is accessible to all disciplines concerned. The multidisciplinary incident calls and their handling in the system form the key to an integrated emergency dispatch system. Whenever multidisciplinary responses are necessary more than one operator is working the incident sheet. It then becomes essential that the information on this sheet is correct and controlled. One of the activities in the dispatch room to address the cooperation issue is to have a time out in which the operators come together and discuss the incident response. The person-to-person discussion and the time-out as part of the procedures is the key to achieving a multidisciplinary response in this particular dispatch room. We will return to the issues this procedure raises later on.

The main hurdle with multidisciplinary incident calls is that because of the complexity often more than one call is received through the emergency phone number 112 or other means. In order to avoid confusion GMS is configured with a DUB button. This button will start to blink when overlap in the information occurs. The DUB button, according to interviewees, is not functioning very well. The operators do not trust the system and start to enquire verbally with other operators whether they received information on the same incident. Thus the general practice is to adjust in

person and not through the system. Because of this form of communication, the incoming radio calls from units in the field, and decision time-outs, the emergency room can become quite noisy, which hampers interaction.

A conclusion on the day-to-day routines is that GMS plays a central role but that the use of its functionalities is also determined by a variety of short cuts and improvised measures that the operators take to organize their work and solve problems at hand. In addition to the variation and work around in the core multidisciplinary process the disciplines also have their own changes to the system.

Differentiation Between Disciplines

The police, fire brigade, and emergency medical services have a different background and work in different ways. The diversity in emergency calls and necessary follow on actions are based on disciplinary routines as well as on characteristics of the multidisciplinary tasks to be undertaken.

The police integrates the emergency room work with general dispatching of patrol cars and therefore is the heaviest user of GMS. As a consequence more calls come in and there are more operators. Having the heaviest workload and making use of GMS incident classification most frequently, the police were the first to air discomfort with the actual diagnostics possible on this basis. Together with systems developers they found the solution in closer connections with the police administrative system (BPS) used for registering police work. In BPS incident codes are employed in order to be able to classify calls according to fixed subject categories (P-codes). The incident codes were translated into parser terms that could be employed in the scratch book module of GMS. In this manner extant knowledge of the police was translated into the work domain of GMS. The operators with a police background now mainly use P-codes and not the descriptive incident classification that is part of the scratch book.

The medical services are designated as Central Post for Ambulance services. Their responsibility concerns two central work processes. The first is the reaction to emergency calls. The second is the organization of so called transport on demand. The last service consists of transport of patients between hospitals and between the patients' homes and the hospital. The units are dispatched by working with an internal communication section within GMS. All this communication is based on text messaging relayed by GMS and C2000 to ambulance units. The messages contain—in case of emergency as well as in case of regular transport—the medical information on patients. Text messaging in a secured environment is used in order to guarantee confidentiality of patient medical information. The operators do not use the incident codes derived from their police colleagues. They manually enter the information in the scratch mode of GMS. In contrast to the police they use the original parser terms that were developed for GMS.

To the firemen the emergency room plays yet a different role. Fire alarms may come in along two routes: through a system called the OMS, which is connected to the automatic fire alarms in buildings within the region. Its follow up requires its own procedures. OMS is connected to GMS and the operator obtains the factual conditions of the building concerned directly. In the other case there might be a call through 112 or other means about a fire, smoke or someone being trapped in a car following a collision.

The fire brigade is the only part that is directly engaged from the emergency room by classifying the type and size of the incident. The operator, by entering the incident classification, automatically gets a proposal from GMS about the type and number of units (including the locations) to be send to the incident. This proposal for the reaction type and volume is based on the use of B-codes.

The differences sketched above between the three disciplines contain the examples of how work procedures and information technology interact. The system is shown to be adapted to and therefore not to constrain the way of taking emergency calls. Each discipline maintains part of its own routines. Consequently the basic process is not yet integrated. The above shows the emergent nature of the system. The manner in which the system is understood to need information is adapted by two of the three disciplines. One of the disciplines even does additional programming.

The Emergent Perspective: Local Design of GMS Features

The continuous interaction between the disciplines and between the operators and the system are a consequence of the development of new work processes and finding out how they will fit with the information system. The most pervasive development in this respect was the development of local P, B en C-codes in the dispatch room. The use of these codes enables operators to handle incident calls much faster. The selection of the incident classification is included in the application of one of these codes. This was clearly an improvement on the use of parser terms.

Another example concerns the function of GMS for the fire brigade. The proposals for units deployed by GMS are regularly revisited by the fire brigade and its operators. When codes suggested by GMS are followed by the dispatch of wrong or too few units the local suggestions made by GMS are adapted. In this tinkering with the decision mode of GMS operators actively reconstruct the underlying basis of dispatch suggestions. In cooperation with system technicians exercises or workouts are designed, and are then used in the practice of fire brigade actions. These actions are monitored and adapted again, when they prove to be unsatisfactory.

An important role for the system technicians is to make sure that the assignments and questions of the three disciplines are not conflicting. Also adaptations need discussion in order not to harm the actual work of the other disciplines.

In the dispatch room trial and error is used to look for matches between working routines and the contents of the ICT system. This view supports a more collective interaction between users and the system in contrast to a view of every individual tinkering. Users do not have complete freedom to individualize the system; system security does not allow such intrusions. The interaction with the system therefore needs conscious efforts where users and system technicians cooperate to modify elements within GMS such as the fire brigade routines.

In comparison to the observations by Orlikowski the constant interaction between user and system is produced by intermittent interventions of the users with the system. Therefore it is not necessarily so that larger systems limit options for local redesign (Orlikowski, 2000, p. 409). Alternative user applications may lead to modification through local combined efforts also.

A third element that can be discerned are the main concerns the operators have with the systems failures. Objects and locations cannot be uniformly put into and retrieved by GMS. The local input of geographic information leads to a lack of fit and uniformity. In addition the main complaint is the core system feature that fosters cooperation: the scratch book. The scratch book only shows the three most recent mutations. On these mutations the operator can also view the information attached. However, when he zooms in on this information the remainder of the incident information is not visible. Because the operators act on the information provided through the scratch book, they change the information too. Yet through such queries these previous incidents become invisible, and the operator looses sight on what is happening around the earlier incidents. This is particularly problematic when multidisciplinary cooperation is involved.

These three elements suggest that system development in this case occurs in two ways: through adaptation between system functioning and work processes, and by local interventions and changes to the system. It also becomes clear that a tension between dispatch work and the system remains, which suggests that future interventions and work arounds will constantly develop.

Interdisciplinary Cooperation

A specific element of the dispatch room is the required cooperation between three different disciplines part of the complete and ongoing re-design of the public emergency response function. Therefore intermingled with getting the work done the ICT system needs to be regarded as a situation where interdependent disciplines need to learn to cooperate. In the daily work processes there is a clear separation between fire brigade and ME services on one side and police at the other. The first two work together quite frequently while police dispatchers work more on an individual basis. The integration of the work between fire brigade and ME has occasionally hindered disciplinary reaction to emergency or led to errors.

Cooperation also led to new tasks and procedures such as entering information understandable to other disciplines in the scratch book, and, maintaining and guaranteeing the information exchange. Being co-located also inspired the use of each other's support organizations such as asking the police to attend to incidents where ME was called. It therefore led to a more flexible attitude in dispatching. Also, dispatchers assist the other disciplines at times of work pressure inside the operating room.

The design of the operating room and the development of GMS clearly fit with a required cooperation. In order to provide the public with essential services of good quality as well as to assist first responders GMS needs to support such interdisciplinary cooperation. However, the tinkering with the system and the experimenting with interdisciplinary cooperation does not automatically go very well together. In the co-located situation it is difficult to deal with the specialties of the other disciplines. Tasks start to be exchanged without proper training. When role assumptions are intermingled, errors occur, which can be related to lack of training or lack of working knowledge of the organizations involved.

In order to keep working, changes to the software have been implemented, such as reduction of the list of parser terms, the creation of p-codes enabling integration in the police information environment and feedback and discussion on the functioning of GMS. At first sight this suggests that the cooperation and the development of ICT are interwoven, however ICT is not the only factor in catalyzing cooperation. For instance, as mentioned before, the dispatchers develop work arounds when the system is not flexible enough to support them: increasing face-to-face interactions. One of the main reasons for this work around procedure is the problematic functioning of the scratch book. Its layout does not enable information exchange in one easy view. Also for other reasons such as background noise and slow response of the system etc. easy exchange of information is not available. Dispatchers therefore walk around and talk with each other to find out what happened in a specific situation. Of course this face to face interaction not only bypasses the system, it also leads to the situation that the system does not show the relevant information. In the interviews it is made clear that it is also a consequence of uncertainty whether the intended user of the information understands it. In oral exchanges the check of this understanding is added and is a valued part of interaction. Apparently software systems such as GMS fail to enable the communication in a way that enables the development of trust by the other party. The social interaction is also valued because of the possibility for a well coordinated joint response. However, because the dispatch room functions as such a zone of interaction, at the same time other calls are coming in, which tends to distract

from efficient responses and the organization of dispatches. The lack of transparent information in GMS might also hinder the information flow to the first responders.

One last point that has not been addressed explicitly in the literature is the physical outlay of the dispatch room. In our case study this is an open room, which enables direct contact. Therefore the social work arounds compensate for the glitches and design problems of GMS. Having said that, it is clear that the flexible work arounds also do not provide strong signals for the adjustments of the systems.

SOLUTIONS AND RECOMMENDATIONS

The system implementation and interdisciplinary cooperation in the Naarden dispatch room are an example of integration of ICT in work processes. It shows that working software systems require a number of conditions to be fulfilled. The case also supports the view that such systems can best be regarded as emerging.

One of the most visible critical functions in systems design that appeared after the initial phase of implementation is the limited capacity of the scratch book. The visibility of only three incidents and also the lack of an overview of mutations seem to be serious hindering use as well. While the overview can be obtained by a zoom function, the dispatchers tend to neglect this function. Thus a clear recommendation is to improve the scratch book function. A second issue that emerges is more organization oriented. The central function of the ICT system introduces focus but also hinders taking distance. Thus work practices are not evaluated in terms of improvement of work processes and ICT at the same time. In stead small changes are implemented such as limiting the list of parser terms or adopting the P-codes, changing dispatch suggestions as in the case of the fire brigades. The interviews showed that assessing the overall structure and interaction should be a regular item on the organizational agenda. In addition it might be wise to reflect on the manner in which various aims of the co-location, system use and coordinating, first responders interact. In our case study in particular the lack of insight in the essential knowledge required led to some miscommunication in emergency cases between the cooperating disciplines working together most intensely: the fire brigade and the ME. In order to foster cooperation either clearer definition of responsibilities or better-specialized training of the fire dispatchers should be undertaken.

The intense use of face-to-face interaction where the system fails suggests that the central communication function should be considered when redesign of the system should be undertaken. This, however, is also dependent on the interpretation of the various interactions that occur. For our purpose it is clear that redesigning without also considering the underlying reasons would lead to new problems. Thus a solution would be to look more at the joint effects of system implementation and potential reorganization of the dispatch functions. As we derived from interviews not only system functioning but also the need to make sure that other disciplines understand the information is a reason to opt for personal interaction. One way to deal with this is on the one hand simplifying procedures as attempted with the P-codes but another additional way would be to invest in more work related training in contrast to pure systems training. The intense verbal communication is a work practice that might have different effects for small incidents compare to large incidents. Acquired communication habits certainly would increase the chance of miscommunication and errors when larger incidents occur.

Lastly, while not discussed extensively, it is clear that the physical lay out of the dispatch room and the system implementation and work processes interact.

FUTURE TRENDS: FROM THE NAARDEN DISPATCH ROOM TO NATIONAL GMS FUNCTIONING

The problems with ICT introduction we discussed can be related to three policy levels: the national level, the local level of interaction between services and the work processes in the dispatch room. We gave most attention to the last level. However, it is clear that the standardization of an ICT system cannot be undertaken without careful consideration of work processes. In relation to GMS local coping mechanisms showed some unwanted effects including effects on the standardized core or lack of routinization of work processes. These local variations hinder the cooperation between safety regions, which is one of the new targets. The national level reaction has been to prepare the development of a new system called NMS (Nieuw Meldkamer System: New Emergency room system). It is clear from the case study that local conditions are hard to predict, that the interaction with the back office organization is broader than envisaged in the original design and that training of dispatchers for specified procedures might be crucial. In order to build working systems a well known option either is too much complexity or shielding the development of the new system from "unnecessary" complications. The emergent view on systems development would suggest that providing and developing arenas for interaction is important and that systems outcomes will deviate from initial design parameters. Therefore flexibility in design and resources for interregional coordination of a combination of adjustments, work processes, training, and ICT tinkering seem to be crucial aspects to take into account.

CONCLUSION

Considering earlier problems with implementing, GMS was introduced as a broad system that could be used as a resource locally nevertheless. However, this explicit option to allow for local variation did not provide a clear support of well-defined work processes. Important changes in the case we discussed did not affect the core of the system but still important local adjustments were made, such as changes in search and parser functions. The scratch book, flexible at first sight, did not function well as input tool. Moreover, coordination functions seemed to be poorly designed. Thus, a unique combination of adjustments in tools as well as in work processes emerged. In its adoption the connections with known practices played an important role.

A second conclusion is that combining the aims of co-location as well as an excellent communication system can only proceed when adjustments in social and information systems can be undertaken are attuned to each other. Otherwise a new round of operational disconnections between system and work practices will occur. However, when the institutional environment including the organizational design of safety response organizations keeps changing predictably issues of adjustment will be permanent in stead of only part of the implementation process.

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KEY TERMS

Bedrijfs Processen Systeem (BPS): A data system designed for the police departments to aggregate all information gathered in policing. Accessible to all police employees.

C-2000: The new digital communications network in the Netherlands designed for al the emergency services.

City-GIS: The geographic location system used by the operators. It shows all available units and their location in the region. In addition it follows and shows the units most recent whereabouts and their current status.

DUB Button: Button in GMS that flashes when an incident shows significant similarity to another previous entered incident.

Geintegreerd Meldkamer Systeem (GMS): Integrated Emergency Room System: Emergency response software system designed to facilitate and structure the input and output of all information needed for handling emergency calls and dispatch units to the scene.

NMS (Nieuw Meldkamer Systeem (NMS): New Emergency Room System: The new emergency room ICT system designed to replace the older GMS system. This system is still being developed.

OMS: Automated fire alarm system used by the fire department that reacts on automatic fire alarms in buildings connected to the system.

RAVIS: A data system designed for the medical department to aggregate all information gathered by medical responses.

Chapter XLII
Enhancing Collective Memory with a Community Repository

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ABSTRACT

This chapter discusses a project for the implementation of a digital repository in a specific context, namely a small Italian town. The latest developments of Web 2.0, as well as recent concepts of the libraries as places where 'conversations' are fostered, can enable new ways of managing library collections, by allowing every member of the community to collaborate in the process of selecting and acquiring sources of information. The author hopes to provide evidence that such a project can represent a valid approach to enhance co-operation among people with different backgrounds who share the common aim to build a community repository that can represent all of them.

INTRODUCTION

"For years … the mantra has been: aggregate, virtually collocate, and federate. The goal of seamless federation across distributed, heterogeneous resources remains the holy grail of digital library work" (Mischo, 2005).

Despite a virtual landscape where various national and international projects are available to users (such as the European Digital Library, Gallica in France, the Michael Project, Biblioteca Digitale Italiana in Italy, etc.), the development of digital collections into organized digital library services is still in progress.

Development of technologies suggest to small-scale project promoters the possibility of access to local collections as well as to well-established projects of nationwide or international digital libraries (Mischo, 2005), such as the Bricks Project, Diligent (cited in Petrelli, 2006), Digital

Library Reserve (cited in Meinhardt, 2007), and the others mentioned above.

To provide this broad access it is necessary to establish partnerships from the beginning, in order to aggregate and disseminate resources more efficiently. Frequently, these partnerships are sought not only between similar institutions, but also between different ones (museums, archives and libraries), in order to compile and share databases and repositories. As Dempsey (2006) points out, resources fragmentation is one of the major problems facing library managers, since the new network environment causes a loss of "gravitational pull." This means that only experienced and acquainted users will explore and find needed resources, while other potential users may not reach them. The solutions proposed are either to aggregate demand above their institutional level, or to join major Web-based search engines, booksellers, and so on—that is, some of the virtual places most visited by real and potential users of digital resources.

It is widely believed that the most important issue about sustainability of digital library projects will be the digital preservation capacity of the institutions that started and implemented such projects. According to Mischo (2005), this issue will involve both the individual and the nation, as it might attract "increasing commercial interest, as well as growing unease and concern from the general public." This opinion finds a counterpart in the urge to introduce agreed frameworks for metadata, taxonomies, and folksonomies organization, affirmed by some authors like Bruce (2006), who emphasizes the impressive trends in the use of Web 2.0 facilities.

Another shared opinion among information professionals is that the success of a community digitization project depends on the level a community develops into a real learning community, wherein, according to Sévigny & Prévost (2006), six levels of interaction are to be identified, namely the project management, the portal, the local government, citizenship, networking, and local development It seems, then, that digital libraries will constitute a constant challenge to the institutions and communities that decide to invest in such projects. Nevertheless, they will always be part of the changing information landscape, and represent a stage of transition from present to future technologies (Mischo, 2005).

Three main issues emerge from these considerations. First, to assess the technical aspect that involves the choice of the adequate technologies to create a digital library. Secondly, to develop the managerial aspect that implies staff has to evaluate critically the costs and benefits of such projects. Finally, it is necessary to determine the users' interaction level with the digital library resources, in order to measure the success of the project in itself and the users' engagement with new technologies.

This final point could exemplify the key implementation factor in small-scale digitization projects, because small populations must sustain high digitization costs and therefore participation and interest of all potential users in the community has to be favored.

As devised in the IFLA UNESCO Public Library Manifesto in the 1994 version, "constructive participation and the development of democracy depend on satisfactory education as well as on free and unlimited access to knowledge, thought, culture, and information."

Recently, Lankes, Silverstein & Nicholson (2007) merged this need for participative culture with the developments of the Web 2.0 into a series of recommendations that exemplify the role of the library as facilitator of conversations.

The digital library can be oriented towards its community, and act as a means to allow the community to participate in the process of building the digital collections. By being open to the contribution of all members of the community, the library enhances the visibility of the institution and the project, thus attracting potential stakeholders and sponsors.

Similar initiatives in many developed countries have developed with the aim of "networking members of a community through a virtual platform" (Sévigny & Prévost, 2006). These experiences have been then defined in various ways ("connected city," "intelligent city," "digital city"), but their primary aim was to generate interaction among volunteer members.

This chapter describes a specific case for planning a digital library project to ensure that community members can benefit from the progressive dissemination of their local cultural heritage. The project is in the planning stage and still needs carefully preparation and discussion between stakeholders. This chapter discusses relevant issues and, based on current research, proposes a strategy about how a community can integrate knowledge from different sources into a shared repository, focusing on social networking.

The objectives of this chapter are as follows:

1. Explore current research on community and social networks;
2. Discuss current trends and practices of digitization projects;
3. Design an appropriate methodology to ensure integration of different information sources into a shared repository;
4. Discuss evaluation criteria and performance measurement indicators for the future assessment of the success of the project;
5. Indicate future research topics in the context explored.

BACKGROUND AND CONTEXT

The International Context

The 2005 IFLA and WSIS Alexandria Manifesto affirms that "Libraries and information services contribute to the sound operation of the inclusive Information Society. They enable intellectual freedom by providing access to information, ideas and works of imagination in any medium and regardless of frontiers. They help to safeguard democratic values and universal civil rights impartially and by opposing any form of censorship." (IFLA WSIS *Alexandria Manifesto*, 2005). These features can be generally applied to digital libraries, and to Web 2.0 applications in particular, as observed by Savelsberg & Stenzel (2006) and Searls & Weinberger (2001), who highlight the future peer acting role of libraries and users.

The younger generations are mostly keen at interacting with their communities, parents, and relatives by means of the Web (Internet, e-mail, etc.). It is commonly argued that their connections happen more frequently in virtual than in real places. Their lives depend on the present and future of the Web developments: Web 2.0 and beyond, with all its sharing facilities. My Space, Flickr, Second Life, and so on—just to remind of a few of the present digital commodities—enable users to engage in virtual environments to leave a trace of personal memories that, when uploaded, become immediately public (see Buzinkay, 2007 and Topper, 2007 for a discussion on these topics).

The Italian Context

The convergence among institutions (archives, museums, libraries) is particularly flourishing in Italy, where cultural heritage is not only in the major cities but widely spread all over the country. Archaeologists and historians periodically scan potentially interesting sites, in order to ascertain the presence of ancient vestiges. Librarians, museum officers, and archivists, on their behalf, indicate to their institutions the possibility of acquiring valuable materials from private citizens that frequently own precious books, maps and artifacts of the past centuries.

The usual and, until recently, undisputed way to collect new materials for the institutional collections has been a top-to-bottom method, that is, the institutions were responsible and adequate bodies to locate and acquire materials, not the

public, although some materials could frequently become part of the institutional collections subsequent to a private donation.

In November 2007, an international conference organized in Arco by the Italian Libraries Association, Trentino-South Tyrol Section, explored the ways in which digital collections of periodicals have developed in the last few years (AIB, 2007). Information professional of different European institutions (Italy, Germany, UK, Latvia) debated several topics, among which the urgent need to consider the creation of a international body that monitors and aggregates the various digitization experiences in order to avoid record duplication and thus improve efficiency.

Two major issues emerged during the discussions. To begin with, despite the public recognition for some wide-area efforts such as the European Library Project, it was generally felt that at a lower level than that of the National Libraries and institutions, professionals are not actively involved in digitization processes. Thus, they cannot benefit from the new ways in which libraries can engage in conversations with their users. Secondly, the distance felt by professionals towards the national institutions' projects expresses the need to be included in, and not marginalized from, the digital process.

In this respect, the connection between institutions should facilitate participation of small bodies either in national or international projects. On the other hand, small-scale projects could provide fertile terrain for experimentation and evaluation of results.

A Small-Case Project in the Italian Context

Ala is a small Italian, multi-cultural town of about 8,600 inhabitants, situated between Verona and Trento, in the Pre-Alps Region. The town administrators in 1991 decided that the library collections, which include 60,000 modern books, 20,000 antique books, manuscripts, maps, and periodicals, had to be stored in the same building with the municipal historical archives and the local museum collections.

Consequently, a single municipal body with a staff composed of five people is now in charge of all three institutions and shall provide services for users interested in the various collections. The library building is the main centre for research activity in town. Since the archives, the museum and the library collections are very well preserved and easily available, the public is formed not only by the local historians, but also by students and researchers from surrounding areas (Verona, Trento, Bolzano, Brescia, etc.).

The community, as well as the library, is very active as a conversation producing entity. Several associations organize cultural events and exhibits on local history. Local schools (with pupils until 14 years of age) are engaged in activities and projects regarding local history, literature and legends. In this context, until the 1960s, local traditions of the older generations were passed on to the next generation during the nightly conversations that took place in the homes' warmest rooms. There, grandfathers smoking their pipes narrated their stories and the legends they had learned from their ancestors. Children listened to these oral memories, thereby watching mothers, aunts and grandmothers caring for little children, sewing or knitting. This way of life persists in the habit of the older generation to recollect memories of the past in their visits to the schools, where they share their experiences with the younger generations. The digital *Memory Project* aims to continue this cultural sharing.

Cultural institutions of the town are in touch with the institutions of the province of Trento, where the attention to preservation of cultural heritage began still in the 1970s with a project for the collective cataloguing of all library collections. Since then, information professionals and librarians share a common culture for co-operation. Museums and archives' collections were not included in that cataloguing project, so that they

followed a different path until very recent years, when the Memory Project was developed for the creation of a provincial digital repository.

This picture offers a series of strengths to build on in the perspective of creating a digital library. There is, nonetheless, a downside of the matter: a stronger co-operation among local associations is needed to achieve and enhance effective cross-cultural and cross-sectional teamwork. Moreover, while until the 1980s the immigration rate was low and mostly limited to people coming from other Italian regions, the massive immigration from different countries has dramatically increased since the early 1990s and particularly in the last few years, making it more difficult to cope with specific educational and social needs. Due to the manufacturing and industrial factories and the commercial enterprises, the immigrants' number from other parts of Italy and abroad is on high increase and settled over 10 percent in 2005.

As a solution to address the perception of social exclusion of every potential "borderline" subject, the library, whose mission as an institution is to foster participation and communication activities, could engage them in a process of sharing their "values, resources, and practices" (Wylie, 2001). On the other hand, the complexities of new residents' lives might enrich the local cultural landscape (Carpenter, 2006). Local skills and partnerships could be devised to "imagine new settings," as it has been for the case of the Art of Community Consultation in Bolton, where users and citizens have had the possibility of creating settings in a co-operative way (Keane, 2006).

If a project of a digital repository about local history fails to start in the next five years, soon the memory about local facts of the last 30, 40, or 50 years might be lost and replaced by the image of a very recent past. The "long," "ancient" memory of the town could be saved through the last witnesses of these facts, who could be involved in a dissemination project of their individual perceptions and memories of the "old town" for the benefit of the younger generations.

On a different level, newcomers who are starting their businesses and activities in town could provide information about their migration experience, thus enabling former inhabitants of the town to appreciate diversity, acquire first hand experience to comprehend the complexity of the migration process. In doing this, they would interact with people of different backgrounds. Every individual should feel responsible to disseminate their own knowledge, to share their own viewpoint, in order to allow information exchange and openness to collecting new meaning for events, to embed as *collective knowledge* (Orefice, 2001). Newcomers and settlers of the last five years have experienced the town as a place with old renovated buildings and modern facilities. However, this is a very recent picture of the place.

The library offers a unique observation standpoint of these trends, being one of the first places where newcomers go and ask for information. Here, every human being, regardless of age, sex, race, and religion, is accepted, and the staff tries to meet their needs, which most frequently are in the field of communication (Internet, e-mail, etc.).

Interviews and feedbacks from many users have confirmed that there is a need for implementing a project for a digital repository about the collective memory of the town.

The institutional project built with the help of all available community members could enhance effective cross-cultural teamwork, and mutual understanding.

An interesting paradigm is that envisioned by Fischer (2006) through the "distributed intelligence" concept, where socially created content be developed by defined groups who are distinguished in form of peculiar "voices" of their community:

1. "voices from different places": migrants of the present and of the past;
2. "voices from the past": elderly people, personalities from the past centuries;

3. "voices from different communities" (communities of practice or of interest): associations in the town and outside, that co-operate with citizens and people working in the town.

This paradigm might find application in small-scale digitization projects like the one hypothesized above. Participant observation, in this case, could be important to gain insight into the users' level of confidence with ICT as to be ready to provide assistance: a matter already explored in some Australian projects, as highlighted by Foth (2006).

In this process, each generation, cultural and expert group can have a specific role in ensuring that all community voices are heard.

The Project

The project will start before the end of 2008, with the help of two major cultural associations, and in co-operation with the Museo Storico del Trentino, which is in charge of the provincial Memory Project based in Trento. The aims, to be discussed in future meetings with the organizers, are to enhance participation of the community in the development of a digital repository containing electronic aliases of maps, documents, artifacts and objects that qualify to represent the collective memory of the community.

Every year will be devoted to a particular topic, as to facilitate co-operation and participation. Since 2008 is the anniversary of the end of War World I, this year will be devoted to the digitization of materials regarding the years between 1900 and 1920.

The Memory Project will collect materials in different areas.

Some issues are on the drawing board at present:

1. How is the electronic database or digital library to be organized and implemented?
2. Which already available instruments, technologies, materials are to be used?
3. Which human resources are to be involved in the planning of the project?
4. Which stakeholders are likely to take part in a partnership / collaboration?
5. How is the project sustainable in the long term?

PERSPECTIVES, SOLUTIONS, AND RECOMMENDATIONS

Organization of the Digital Collections

Being the scope and principal aim of the project to ensure the creation of an electronic database and digital library preserving the local cultural heritage as well as providing useful and knowledgeable contents and services, it will be advisable to draw upon already successful projects. As far as the target group formed by children and young adults are concerned, there are project such as those of the International Children's Digital Library, described among others by Druin (2003), Hutchinson, Bederson and Druin (2005a), and Hutchinson et al. (2005b). In particular, the design of the digital library interface shall follow in this case the guidelines of Hutchinson et al. (2005a).

Selection of the Documents from Institutional Collections

Various types of documents that refer to various historical periods are to be digitized and uploaded into the repository:

1. Maps, diagrams, tables, charts about the demographic, social, economic structure;
2. Documents proving the starting or closing date of a commercial venture;
3. Documents referring to the noble families and their possessions; and

4. Documents referring to famous guests dwelling in town.

These contents will be captured as images, but texts will be transcribed as to allow browsing functions. Contents will have to be introduced by general descriptions, enriched by links to other related Web sources such as those used by teachers for their lessons (Web sites of official institutions, digital objects created by other classes or schools, etc.). As '*documents*' are meant all supports available for the project, such as Xerox copies, photocopies, original pictures, audio recordings, video recordings. These will need different times for acquisition and management inside the collections (Cattaneo, 2003).

Collection of Other Documents from External Sources

Apart from the links to other institutions mentioned above, perhaps the most interesting external sources not yet exploited by the whole community are those abiding in the houses of the town citizens. In recent experiences of exhibitions about locally produced 17th-20th century velvet silk tissues, some people in the public has revealed that they still have other similar materials or documents at home. This piece of news made the organizers unhappy for the delay in knowing about these precious artifacts that could have been included in the exhibit or in a catalogue.

In the meantime, it has been acknowledged that a certain number of citizens possess interesting and valuable old artifacts and documents of various kind (coins, stamps, letters, certificates, photographs, etc.), and first hand memories that—if recorded through interviews—could immensely contribute in building a diachronic and synchronic diagram of the town history. Examples of the value and success of oral history collections, already known through the reports by Kniffel (2005), Pinnell-Stephens (2005), and Duncan (2005), will be valued and considered as possible implementation models. In the near city of Trento, an "Archive of people's writing" (Archivio della scrittura popolare) has been established some years ago with the aim of collecting letters, postcards, and diaries of people living in the region or abroad. In this Archive, manuscripts written by people living for a time in the town are also available.

Instruments, Technologies, Equipment

From past activities with local schools the librarians know that the ICT devices used in schools are more frequently updated than in the households, so that the mission of the library is to advise on possible drawbacks in the use of technologies that cannot be fully operated with older software or hardware versions. Oddly enough, this aspect aligns with the diachronic study of the town history. Young adults (14-19-year olds) are the age group to be involved in the choice of the technologies and equipment necessary to the implementation of the project. They are very keen on trying out new software and hardware. They also are the age group who will profit most from the use of the digital library in the future.

How Will People Participate in the Project?

The community will be as a virtual place where a social learning cycle takes place as a sort of "connecting device" towards *common knowledge acquisition* (Fabbri, 2003, p. 151). This process means starting to think about the town as a *learning community* where individual information is shared, knowledge is embedded in the social tissue and participation mediated (Fabbri, 2003, p. 35) through various referents: children and young adults, teachers, librarians, administrators, officers, and so on. Younger generations are the target group for the digital library project, so they shall be invited to participate in all

the phases that will bring to the creation of this *collective knowledge*, which will reinforce the separate existing individual knowledge (Fabbri, 2003, p.155). Taking part in activities, adding new contents, contributing to a common project like a Web site or repository can result in enrichment of one's own personally attained knowledge and in a new learning perspective, such as devised by Carpenter (2006).

Motivational Tools and Methods

Knowledge will be shared individually and across the community. Every individual can be important to his community if he accepts his role and fosters dialogue among his peers, in a synergetic continuous exchange of ideas. Little steps will allow involved people to see results quickly and to be motivated in going on for the future. If the project is explained to all stakeholders, every little step will be conquered and results welcomed, looking forward to seeing what the next ones will bring to the community.

Actors to Involve in the Project

Organisers, Leaders. Librarians, archivists, museum officers will form the leadership group of the project. Their responsibility is technical and managerial. The library is going to bear the leadership of the project. Thus, the staff will be trained to achieve the aims of the project. Librarians shall be the input unit of the process and should plan every step carefully and be ready to accept advice as well as remarks from all stakeholders involved in the project. They will fulfill a co-operative approach as long as there are experiences and facts to be shared among the members of the community. They will also be expected to provide access and information so citizens can effectively use the digital collections. In this respect, particular attention will be given to the different categories of potential users and the selection of appropriate metadata (Bruce, 2006) in order to let them find resources.

Technicians. Information systems experts and external technicians will provide technical support and assistance throughout the implementation of the project. Their suggestions will be valued to choose the best technologies at hand.

Partners. They will be found in provincial (Museo Storico del Trentino, Museo provinciale d'arte, Archivio di Stato di Trento, Archivio di Stato di Bolzano, Biblioteca provinciale italiana "Claudia Augusta" and Landesbibliothek Tessmann in Bolzano, etc.), regional, and national institutions (Biblioteca Digitale Italiana, BDI, etc.), to ensure visibility of the project.

In particular, the Memory Project already active in the province will be the first body to be contacted for help in technical and financial issues, and for research activities.

Participants. Generation groups (divided into different age groups, such as children, young adults, adults, elderly people), cultural groups (cultural associations and institutions), expert groups (individuals with specific competence or skills) will be involved in the process. Local schoolteachers will be invited to share curricular programs as to inform the steps of the project with materials apt to be immediately exploited by the pupils. Every year, teachers could plan to contribute with a theme to be developed during the lessons from which materials for the digital library could be created and implemented. Educators will be informed about the project, so that they can refer to it in their work. Citizens will be involved in the search for documents, materials, testimonials to enlarge the basis of the selectable sources. Every inhabitant should know that he could provide useful information about the history of the town, even with a personal interview on how a particular place looked like in a different period. Volunteers such as former librarians, reporters, or professionals in the media, information, and communication sectors will be welcomed as

experts in the project. In general, tasks could be the following:

1. Finding valuable sources from people they know (parents, grandparents, relatives, friends, etc.);
2. Collecting sources (interviewing older people, making photographs, digitalizing documents, drawing sketches, etc.);
3. Choosing sources and deciding in which formats they should be uploaded on the Web site (e.g. images, audio files, text)
4. Organizing the Web site according to different search options (historical periods, famous people, chronology, etc.)
5. Evaluating the effectiveness of the Web site (questionnaires, interviews, etc.)

Sponsors. Administrators, institutions, companies, and businesses will be contacted as to ensure financial resources and support to the project. Apart from asking local administrators to grant financial support to the project, librarians should be able to relate to them after the conclusion of every step in the process, so that they can appreciate the results and disseminate valuable information among the community members.

Advocates and Promoters. All previous subjects can develop their talents and attitude as advocates of the project. Every citizen of the community will be invited to participate freely in the project, according to their personal abilities, skills, and resources, as well as the specific roles they play in their lives. Their participation will be finalized to increase the community "conversations" fostered by the digitization project, peculiarly in the following activities:

1. Identification of potential sources, materials, documents of any interest for the project
2. Collaboration with the library staff for the management of the sources
3. Co-operation with all actors involved in the project
4. Development of common and consolidation of specific information technology skills

Library staff will ensure that all these parties collaborate and co-operate to develop into a "conversational" community. Participants will act as a "group of people who share social interactions, social ties, and a common 'space' (Kozinets, 1999); as a social network of relationships that provide sociability support, information, and a sense of belonging (Wellman, 2001), building a set of relationships where people interact socially for mutual benefit (Smith, 2002)." One of the key factors in ensuring this process takes place is building on mutual trust, which can lead to the development of a set of shared interests and common goals inside the community (De Moor & Weigand, 2006).

Choice of a Valid and Shared Paradigm for Implementation

The result of the project should be a process of sharing experiences and memories, through which citizens and library users are in the condition to exploit materials regarding the history of their community and to improve their skills in information literacy. In doing this, they could reach the higher objective affirmed by Sévigny and Prévost (2006), and try to avoid the limitations expressed above.

The sharing process will be divided into the following phases:

1. Collecting materials and documents (finding sources);
2. Choice of interesting and useful materials and documents (selecting sources);
3. Digitization, cataloguing and indexing of materials (preparing sources);
4. Upload onto the Web site (building up the digital library);

5. Retrieving information from the Web site (sharing sources);
6. Evaluation of the process (exchanging views about the digital library).

Implementing point 1 and 2 of the list above will imply that the collections shall be "driven by local perception of need and available resources: collection development activities exist to balance resources and need" (Dempsey, 2006). Furthermore, point 3 to 5 would mean that the users shall be actively involved in the discovering experience of the resources, either through the access to content mediated by metadata, provided by a "*consolidation process*" or sharing metadata with the users, a so-called "*syndication process*" (Dempsey, 2006).

An energetic core for this process should be the younger generation, considered both as a strategic stakeholder and as vital cooperative group. The whole process could be contextualized in the personal portfolio of students aged between 11 and 19 years. In particular, the 11-13 year-old group, who are still in town attending the middle school courses, and the 14-19 year-olds, who are studying in the surrounding cities but still live with their families. These students have developed specific IT skills in their curricula so she could contribute in an active way to the implementation of recent technology into the repository management system.

The project, then, could implement the following points, also raised by Druin (2003):

to allow and foster direct involvement of the children (and young adults) in the project, as to "overcome the teacher-student or parent-child paradigms invoked by groups of older and younger researchers in favor of co-equal partnerships" and to "change the focus from working for young people to working with them" to negotiate team decisions and be aware of customization needs.

Sustainability of the Project

The digital library collections will be built with documents that exist in both private (personal belongings, letters, archives, etc.) as well as public places (local library, archives, manuscripts for which the Municipality is either the only or one of the copyright holders).

A strong commitment towards the general aim of the project and clarity about the digital rights management will be necessary to overcome the "mind barriers" of taking part in the project. Some of them have collected pictures or postcards from the whole region, so they shall be reassured about what the future of their belongings in the digital collections will be.

As Kormos (2005) argues, "the connection of people to information is the primary value and objective of libraries and librarians." Following this assumption, the first support to the project should come from the library staff itself, who should promote a positive view about cultural heritage in general and digital cultural heritage in particular, following the IFLA/Unesco guidelines for development (2001), and, at national level, the recent advices on digital libraries by the Italian Libraries Association (AIB, 2005).

Secondly, the citizens—and first of all the children and young adults—are going to be motivated throughout the process of identification and collection of valuable documents, year after year. From a recent study, "significant numbers of youngsters preferred using 'more exciting' resources such as the Web and CD-ROM software" as to informative collections (Shenton, 2004), so that we can imagine in future younger generations being more and more keen on using digital collections rather than traditional print supports. Thus, the chance of being involved in a digital library development project should be welcomed with enthusiasm by these age groups.

How Will the Impact of the Project Be Measured?

Without significant aid from the administrators, sponsors and financers, the future of the project would be uncertain. However, the financial aid must find reasons to be granted, and these should come from a periodical evaluation of the project, whose performances shall be measured in the following terms:

1. Impact and effects in the community: satisfaction scale for digital library collections from the children's, young adults' and adults' side (survey method);
2. Information literacy progress through the project: rate of individuals (children, young adults, adults) who will have gained and improved IT skills either with or after the start of the project (survey method);
3. Involvement rate of potential users in building and operating a digital library: how many individuals, apart from young people directly involved, will prove to be ready to participate in the project?
4. Promotion and safeguard of the digital library: will people increase their sense of respect for the documents and materials that constitute their cultural heritage?
5. Effectiveness of equipment used: will technologies, software, hardware, etc. prove to have been chosen correctly for the project?
6. Effectiveness of digital library collection: apart from surveys and interview with participants, Web log analysis will be necessary to explore how and how often users will have exploited collections.

Performance indicators used will be in line with the guidelines of the international associations of the institutions involved in the project (IFLA, International Federation of Library Association, for the library collections; ICOM, International Council of Museums, for the museum collections; IAML, International Association of Music Libraries, Archives and Documentation Centres, for the music archives; and IASA, International Association for Sound and Audiovisual Archives, for the future audiovisual archives).

Results and perspectives will be compared with similar experiences in other places and countries, as to inform future decisions.

FUTURE TRENDS AND CHALLENGES

Future Developments of the Project

The project is expected to provide local users with information about their native place, neighborhoods and related communities. The library staff is confident that, in the next five years, a repository and a Web site will be created, with links to the virtual objects and collections, both owned by public and private institutions, which bear valuable information for our community. In the meantime, a network among all stakeholders will be established, so that the community can engage in virtual and real conversations.

Challenges for the Project

The major challenge for the project will be the implementation of the "Library as Conversation" model and its integration into the everyday life of the individuals. Another will be the project sustainability, which means not only ensuring the financial resources over time, but also the participation in the long term of all volunteering subjects, the renewal of agreements between institutions and partners, and finally the motivation of staff.

These issues will be positively overcome if the "conversational" aim of the project is achieved. Hopefully, a community engaged in enjoyable conversations and mutual understanding will be

longing to continue this experience. Since this project will provide a manageable size of qualitative and quantitative data, it could be a proper context to explore some research topics related to the use of digital libraries.

CONCLUSION

General trends in the development of the digital library show that there will include the aims of the traditional library, that is, the implementation of user-oriented services. In the global information society, these needs will be accomplished through an increased role of co-operation among institutions. The same will be strengthened by the inclusion of new actors and stakeholders, which will have an active role in the process of collecting, selecting, and describing the materials to be included in the collections.

The topics mentioned above will apply also to small-scale research projects such as the one addressed in this chapter. This small-scale project, in fact, combines the idea of "Library as Conversation" with the aim of an institution to be present in the community life.

The author hopes to have sufficiently explained how even a small community can exploit its resources, however small they are, in order to develop and foster information exchange among its members.

It would be advisable that every community, in its journey towards a true Information and Learning Society, attains all these levels of interaction, collaboration, and co-operation within its members and with the members of wider communities.

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KEY TERMS

Collective Knowledge: Information within the context of an organization, created by the application of context sensitive personal knowledge as derived through the personal knowledge creation cycle, as well as the explicit information contained in systems (process and or technology-based). In this cycle, information shall be acquired, shared, and finally exploited. This process is performed at personal and collective level, with a recurrent information feedback among individuals.

Common Knowledge Acquisition: The process of being acquainted with what "everybody knows," usually in reference to the community within which the term is used, through interaction with members of that community.

Consolidation Process: Process in which "fewer but larger pools of metadata to support discovery" (Dempsey, 2006) are created and consolidated by the cataloguer / librarian in order to allow users to retrieve information.

Cross-Cultural Teamwork: Actions and achievements of a group of people from different cultural and ethnic backgrounds working together in a co-operative way, or, the work produced by that group or team.

Cross-Sectional Teamwork: Actions and achievements of a group of people from different professional backgrounds or interests working together in a co-operative way, or, the work produced by that group or team.

Learning Community: A group of people not necessarily sharing common values, beliefs, and/or objectives, that are willing to learn together from each other.

Social Network: Social structure made of various subjects (individuals, organizations) connected together by one or more ties.

Syndication Process: A process in which "moving the metadata to where it might more readily rendezvous with the reader" (Dempsey, 2006) will provide feedback about the user behavior in retrieving information.

Chapter XLIII
ICT and Tourism Enterprise Collaboration in Rural New Zealand

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ABSTRACT

This chapter examines the development and associated outcomes of two government funded projects designed to support small tourism enterprise (STE) collaboration in rural New Zealand. Following a review of literature on the importance of networks and information and communication technology (ICT) in STE and local development, we discuss "Kiwitrails," a five-year program designed to develop a Web-based virtual community of businesses in the remote and relatively impoverished East Coast of the country's North Island. We then review an ICT enabled STE network in Western Southland, a region with a strong farming base. The cases reveal that local "champions" are vital in initiating and sustaining collaborative organizational activity, and in facilitating the environment within which STE networks can flourish. We argue that locality and embedded cultural dimensions must be factored into government and/or community attempts to develop ICT enabled collaborative initiatives in tourism.

INTRODUCTION

The rural economy of New Zealand has undergone significant shifts in its structure and character in recent decades. Many rural areas have turned to the tourism sector as an important source of supplemental income and employment generation. Unfortunately the shift from traditional agricultural enterprise towards tourism is not always an easy one. Small tourism enterprises (STE) often struggle to attract the "elusive tourist," and find it difficult to form the types of collaborative business networks that underlie successful destination development.

In an attempt to develop rural tourism in New Zealand, governments at both the national and local scales, have adopted strategies that embrace information and communications technologies (ICT) as tools to build collaboration and enhance enterprise performance. This chapter examines the implementation and outcomes of two such publicly funded projects that have been undertaken by the New Zealand Tourism Research Institute (NZTRI). The projects use ICT to increase collaborative activity between tourism enterprises and to generate broader networks between STE and the surrounding economy (schools, agriculture, arts, and cultural activities).

The first project was focused on the East Coast of the North Island (Figure 1) and involved a five year (2000-2005) program to develop "Kiwitrails," a Web-based virtual community of businesses and communities using "Web-raising," and open-source "community building" software. Since 2004 the work initially developed for Kiwitrails has been refined and implemented in the Western Southland region of the South Island. This ongoing project has gained momentum with the spread of broadband through the region and the emergence of a range of new opportunities to create and disseminate user generated content (including the use of locally produced pod-casts). In both cases, STE and the broader community have been involved in the establishment of destination Web-sites that represent both individual businesses and the surrounding community.

We discuss the major issues that have emerged during the establishment, implementation and ongoing development of these projects. In reviewing their successes, and also failures, it becomes clear that the role of local leadership is vital in not only initiating, but also sustaining, collaborative organizational activity. "Place" and "culture" are further vital influences in shaping STE collaborative structures and outcomes. We must never forget the important role that locality and embedded cultural dimensions play in creating sustainable collaborative outcomes.

THE CONTEXT

The rise in significance of rural tourism has led many commentators to analyse what enables the formation and growth of successful STE and

Figure 1. New Zealand and the case study areas

destinations. Wilson, Fesenmaier, Fesenmaier, and Van Es (2001), identify 10 factors needed to achieve successful rural tourism outcomes, several of which revolve around notions of collaboration and participation, including: good community leadership; support and participation of local government; coordination and cooperation between business people and local leadership; coordination and cooperation between rural tourism entrepreneurs; information and technical assistance for tourism development and promotion; and widespread community support for tourism.

Successful rural communities are reflected in the match between the cultural norms of the community, capabilities of the local people, and the organizational infrastructure of the region. Economic prosperity for rural communities, including the effective development of rural tourism, will be achieved by bridging the distance between themselves and the rest of the world, and in applying knowledge and technology for the exchange of information with local, national and global markets (Fesenmaier & van Es, 1999).

The "embeddedness" of the tourism product in the local area is a vital ingredient in the development of rural destinations. This means connecting local resources, the community, tourism businesses and the visitor, to create experiences in the tourism setting (Braun, 2002). As Oliver and Jenkins (2003, p. 293) note: "Enhancing the sustainable economic potential of rural landscapes requires partnerships among rural people and the sustainable yet productive use of rural resources." Underlying these partnerships are networks based on trust and reciprocity (Milne & Ateljevic, 2001) that can act as informal coordination mechanisms for the exchange of information (Pavlovich, 2001). Networking between tourism enterprises, and other local sectors such as agriculture, is vital as it also allows the benefits of tourism to spread through the local economy (Shaw & Williams, 2000).

McNaughton and Bell (2001) observe that factors which inhibit effective network formation include the tendency for natural networks formed by entrepreneurs to be more informal, and to often lack any strategic focus and intent. However, as Putnam (2000, p. 95) explains: "informal connections are very important for sustaining social networks," which are the basis for more specific formal interactions between individuals, groups and organizations. Rural communities in particular have strong personal networks (Wilson et al., 2001) and information shared through social exchanges helps with problem solving. MacGregor (2004, p. 66) suggests that informal social ties "may provide a higher and more stable flow of information in the small business environment" than more formal networks. In their research on New Zealand STE Pavlovich (2001) and Ateljevic & Doorne (2004) report that informal social structures can provide vital support for more formal network coordination and the exchange of knowledge in small tourism communities.

Braun (2002) suggests that networking should be encouraged first through informal processes such as attendance at seminars and local association meetings, progressing incrementally to more formal collaborative activities. In this way, trust and network relationships can be built gradually from the embedded social ties of participants, and a variety of business and community interests can become linked for potential participation in local planning and development projects.

A specific action is often required to bring together people to focus on issues of local economic development, and individuals driving a specific project can be a significant catalyst for network action (White, 2002). Many successful local economic development initiatives start with the involvement of one or more "champions" from the public and private sector. In small tourism enterprises, champions use ICT to build collaborative relationships with other businesses; they are interested in establishing a community and are strategic planners who find intellectual property a new product (Nodder, Mason, Ateljevic, & Milne, 2003). Champions tend to be highly motivated

from an economic and emotional perspective about a particular project, and are able to identify and involve other stakeholders through their passion, energy and networks (Blakely & Bradshaw, 2002; Thomas & Thomas, 2006).

Government also has an important role to play in planning and regulating the environment for sustainable economic development and in stimulating local STE growth (Shaw & Williams, 2000). Governments can provide infrastructure and legislate to control the broad effects of tourism, while encouraging individual regions and communities to develop a tourism industry which protects local rights, social and environmental resources (Hawkins, 2004). In New Zealand, local tourism and economic development organizations (LTO, EDO), often part of the local elected council, are responsible for supporting businesses with the aim of generating regional development. Their role includes marketing local tourism, recruiting business start-ups, providing technical assistance, and stimulating the development of the networks that underlie successful tourism development (Hawkins, 2004). These regional tourism organizations are an especially important source of support and information for individual operators who cannot always afford external expertise (Wilson et al., 2001).

Policy makers are increasingly aware of the importance of information technologies in enabling economic development through the enhancement of collaborative activity, especially network formation. Fesenmaier and van Es (1999, pp. 81-82) argue that:

"Technology can strengthen networks and communications, increase the use of skill, knowledge and abilities to make people better decision-makers; strengthen community initiative; integrate the local business community in the local development social network; and promote growth toward increasingly diverse and healthy economies."

ICT offers the potential to change the structure of communication from hierarchical top-down exchanges to organic, "flattened" relationships that link together multiple players. These networks create new forms of knowledge that are "intensive, agile, and constantly adapting as new knowledge links are added and dysfunctional ones dropped" (Fesenmaier & van Es, 1999, p. 84). By supporting each other STE can become a force in using, and capitalizing on, the opportunities technology offers them in the global marketplace.

Nevertheless the promise of technology and its ability to forge collaborative networks between firms is not always easy to recognize. Barriers to ICT adoption in small firms include: lack of access; high cost; lack of skills; lack of strategic sense of how to proceed; and fear (Hughes, Golden & Powell, 2003; Koh & Maguire, 2004). At the same time cultural and economic constraints may prevent networks forming—regardless of the intervention of ICT. Attitudes toward government can also work against network formation (Simpson & Docherty, 2004, p. 322). Locals' may perceive a lack of government understanding of their specific context. Small business operators may also exhibit a strong psychological need for autonomy in operations.

CASES FROM RURAL NEW ZEALAND

A range of government policy initiatives focus on the interaction of tourism, ICT, and rural development in New Zealand. One of the key policies in this respect is the New Zealand Digital Strategy. The strategy is designed, in part, to assist leaders at the "grassroots" level to improve quality of life in low-income communities by ensuring access to ICT infrastructure and services, including broadband and wireless technologies. Building ICT capacity and capability through the provision of education, training, and technical support is seen as vital to economic well-being. The strategy

prioritises Web-enabled interaction between enterprises, customers, trading partners, employees, and the broader community.

The current New Zealand Tourism Strategy emphasizes the importance of Web-based marketing tools in increasing visitor numbers, and in particular, in reaching the high yield "interactive" traveller who is willing to spend money on authentic natural and cultural experiences. The strategy also focuses on the role that technology can play in the dissemination of information and the creation of networks that enhance STE performance. Local and regional governments are also attempting to increase the use of ICT as a tool to achieve greater economic benefits from tourism. A key focus of much of this policy is on breaking down what Wilson (2002, p. 11) calls the "stubbornly self-sufficient and competitively focussed" character of the nation's SME and on getting businesses to engage in networks and clusters (Nodder et al., 2003).

The two cases presented below are drawn from very different rural contexts. The East Coast region of New Zealand's North Island is one of the poorest and least accessible in the country and a high percentage of the population are indigenous Maori. In contrast Western Southland, situated at the very bottom of the country's South Island, has a productive farming sector that has responded relatively well to the opportunities that have emerged from a more open, globally-focused, economy. Both areas are, characterized by outward migration among younger sections of the population.

The East Coast and Kiwitrails

The East Coast remains very much off the tourist "beaten track." Transport infrastructure is comparatively poor, there is relatively limited ICT penetration, and access to government services can be difficult. These problems are compounded by long-term unemployment and relatively low education levels. On the other hand, the potential for tourism is high. The area has spectacular scenery, a large conservation estate, benign climate and a fascinating mix of Maori and European culture and history (Milne, Mason, Guenther, & West-Newman, 2005).

Tourists currently visit in small numbers and often tend to pass quickly through the region's communities en route to the major town of Gisborne which receives approximately 50,000 international visitors a year. While statistics on visitors outside the major urban area are limited there is no doubt that this is an industry that is performing well below potential in terms of rural income and employment generation. One factor underlying the disappointing return from tourism is the relatively limited information available to tourists, especially about the predominantly Maori communities. As one resident of the small community of Nuhaka, stated during a tourism development workshop:

"We have a few (tourists) come to these events (monthly community meals on the marae—or community meeting place)—they really like them—but it's hard to find out about them. A lot of tourists wish they could know more about us and our land before they come here."

In an attempt to support Maori owned tourism enterprises produce employment and wealth for local communities the national government supported the formation of the Te Urewera Tairawhiti Tourism Forum Charitable Trust (Forum). The Forum's mandate was to build Maori tourism enterprise within the region with an emphasis on developing tourism as a way to create jobs, community wealth, and entrepreneurial activity; to build local pride in the culture and natural resources; to preserve and strengthen art, culture, and customs and to create a higher awareness and use of ICT.

With this mandate as a focus the Forum and NZTRI began work on developing Kiwitrails in 2000. A series of community gatherings, industry

interviews and Web audits were used to establish awareness of ICT, and to begin to build a Web site that could achieve broad-based goals of improved business performance and marketing, while also enhancing collaboration between STE and with the broader community. A detailed Web audit conducted by NZTRI in the early stages of the project revealed that most STE Web sites were technically competent, but that relatively few highlighted or enabled inter-enterprise relationship building and economic linkage creation. STE tended to view the Web as a static marketing tool, rather than as an effective mechanism to manage information and foster customer relationships and inter-business networks. In simple terms the internet's true potential was not being grasped by the bulk of the businesses and communities in the region.

A Web-based tool was therefore designed to provide STE with an opportunity to gain a Web presence that they could manage and develop as their skills evolved. By accessing a template program in PHP and interfaced to a database, SME operators and other community groups were able to establish a small Web page in only minutes (see Milne & Mason, 2001, Milne et al., 2005). No programming skills were required. Operator's simply entered (or edited) information about their business via a continuous roll-down screen, with instructions and examples provided for each question. Most users were coached through the process in a local workshop, or by someone who had already used the package and had volunteered to become a trainer. The creation of a virtual community was facilitated by providing each operator with the option of linking their page to others. Businesses could choose pre-determined links to everyone in the local area or they could customize their own links.

The software catered to businesses that did not have a computer by allowing the owner to nominate a proxy, usually the local tourism office, who could receive bookings on their behalf. This meant the STE could enter the market without the overhead of a computer and internet service but still get the benefits of being listed with the business community, and participate in the booking and payment system.

Community level content was gathered using a method called "Web-raising" (Milne et al., 2005). Residents and local businesses were brought together to share experience and skills while creating Web content. The aim was to create a site that would be a resource, and decision support system, for both the local community as well as visitors.

The resultant Kiwitrails site focused on a geographically-based community/business concept and allowed visitors to gain detailed knowledge of particular localities and enterprises (Figure 2). The next step was to enable particular kinds of activities, or certain places, to form part of a trail. A series of workshops with communities and STE in the East Coast region were held to produce "themed trails" of interest, which could then be represented by a map. Appropriate structures were then identified and developed for these "lateral communities" and the software adapted to accommodate them.

The Kiwitrails Web site was fully operational for approximately two years and showed considerable promise. Over 50 small businesses were represented on the Web site along with numerous communities. Dedicated mini-vans began to ferry visitors around the region and a head-office with marketing assistant was established in the nearby Maori tourism hub of Rotorua. The trails were listed in several international tour guides and the Web site was linked to numerous regional tourism information sites. Research at the time revealed that both STE, and communities, saw the site as a useful tool to attract visitors and build links (Milne et al., 2005). As one participant at a workshop noted: "it really shows what we can do by working together, not alone …" Certainly some of the business and clustering/network dimensions of the project developed well—with trails and clusters emerging around themes as diverse as hunting and garden tours.

Figure 2. Screen shot of Kiwi trails

However, by 2004/2005 a number of failings were becoming apparent. Tourists were beginning to complain about the van service being irregular and in some cases non-existent. Trails were sometimes incomplete and competition, rather than cooperation, began to emerge between some of the community groups. By 2005 a decision was made by NZTRI researchers and the Forum to close down the Web site as while its content grew, the community will to provide the experiences it presented was greatly diminished.

Ongoing research, together with some reflection on the Kiwitrails project, enabled us to identify a number of areas that led to the demise of the site and much of the collaborative activity it was beginning to support. Perhaps most importantly the project lacked consistent "champions" who could push more than just their individual interests for the good of the broader "community." It became clear that NZTRI, as outside researchers, were being relied on heavily to manage the development of the site and coordinate the content and collaborative dimensions that it embodied. Despite a range of training efforts local champions remained scare—with most participants in the project showing limited interest in developing site content beyond that which was directly related to their business.

While Web-raising can aid in gathering local content and facilitating collaboration between different groups there are a number of issues that must be addressed before, during and following the capture of information. The approach used went some way beyond the top-down Community Informatics (CI) approaches criticized by Loader, Hague and Eagle (2000) but there are still issues about what "stories" will be told and by whom—again the region lacked champions to coordinate this process

There is also an important cultural dimension that must not be overlooked. In some of the communities involved in the Kiwitrails project, the Maori population have considerable scepticism and discomfort about the public use of

personal information because of the way it has tended to be presented inaccurately in the past. As a consequence, some Maori have become very distrustful about giving out information (Te Puni Kokiri, 1993). While Web-raising processes enable greater community control over the content of marketing images, the very nature of the Internet means that any site when finally completed is accessible to everyone with Internet connections around the world.

A further key issue was one of a broader "buy-in" from the community to the project. This issue is best exemplified by the situation with the mini-vans often "borrowed" by family groups for their own personal use rather than being available for the role they were purchased for—to transport visitors along the routes highlighted on the Web site.

While there has been occasional talk from communities and STE in the region about trying to re-establish Kiwitrails, the lack of any local champions has seen the site remain dormant in recent years.

Western Southland

The Western Southland (WS) region covers a diverse landscape of farmland, forest, coastline and hills; the region has a population of 3,800. Farming, forestry, and mining are traditional industries in Southland, and there has been a surge in land conversions to dairy farming occurring in the last decade. Tourism, however, is an increasing driver of social and economic development with approximately 10-12 percent of Southland's workforce employed directly in the industry (Venture Southland, 2005). Local government and industry recognize that tourism represents a complementary activity to other sectors and can enable diversification of the region's economy.

The case presented here is based on a program of research and development focused on the development of a community and tourism oriented Web site www.westernsouthland.co.nz (Figure 3). The project was initiated in 2004 but gained momentum in 2006 and has been developed collaboratively by STE, local communities, and NZTRI. The organizational champion of the project is the Western Southland Promotions Association Inc (WSPAI).

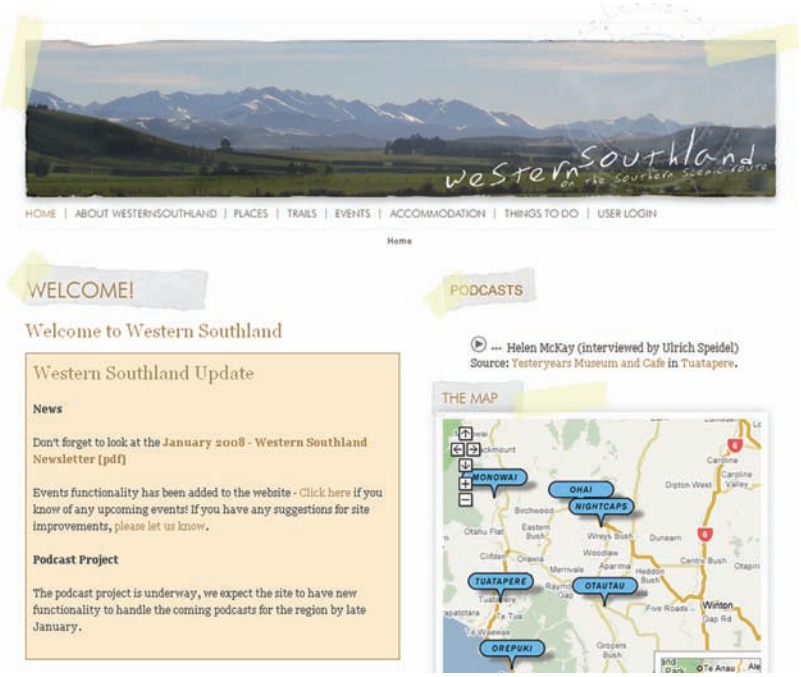
To support the tourism industry and build capability in WS several initiatives are required including informal networking among operators. The local economic development agency argues that the industry needs to foster a supportive and cooperative approach "a sustainable industry can only be established if the community participates, directly or indirectly, in the management and delivery of tourism products, services and infrastructure" (Venture Southland, 2005, p. 35).

Semi-structured interviews and a survey of local STE (33 responses from 118 relevant businesses) have shown that Western Southland tourism operators are strongly embedded in the society and culture of their surrounding communities, providing a good basis from which to develop business-oriented ties growing from strong social ties (Clark, 2007).

Operators generally do not feel that businesses in WS compete a great deal, yet they also do not support each other in an organised or comprehensive manner. Competition is perceived at different geographical scales depending on the individual and the nature of the business. Interestingly there are a considerable number of operators who try to encourage networking, one of whom has been a consistent organizational force in the implementation and development of the WSPAI/NZTRI project. These individuals recognize there needs to be some compelling reason to turn "working together" from an abstract concept into concrete actions, as one explained:

"The push for working together has not really been at the grassroots level—there's been a lack of understanding of why businesses should support each other."

Figure 3. Screen shot of www.westernsouthland.co.nz



A vision for the region needs to be combined with a driver to motivate businesses and the communities into action. Local communities also need to understand how the tourism industry in the region can improve their quality of life. Giving local people a reason to engage with tourism through a regional project such as the www.westernsouthland.co.nz Web site portal will both enhance an understanding of tourism in the region, as well as encouraging participation in industry development and planning.

"If people could see positive changes through the Web site network project for example, if there was something they could hang on to, you'd get huge participation in the industry."

Discussions with tourism operators in the region confirm that they are usually involved with a range of community activities. In Western Southland, business people are embedded deeply in the community as the small, rural communities are very close-knit (Clark, 2007). At the same time though STE ability to participate in ICT related activities and to build networks, has been limited by the fact that broadband services were only recently introduced.

In terms of ICT skills and confidence, nearly half of STE in the region use e-mail daily while two-fifths have their own Web site. Just under two-thirds of STE have listings with tourism directory Web sites (Clark, 2007). All operators, irrespective to attitudes towards, or use of, information technology, view ICT as playing an increasingly important role in both personal and business aspects of daily life. As one operator explained:

"It's absolutely critical to get onto the internet. For the last few years I've had a negative attitude to the computer, but I see it as the way of the future. I see the need to upskill and do more training ..."

Involvement in the Web site has been very strong. Over 100 businesses are now linked into the portal and growing amounts of community based content is being added on a regular basis. Recent funding from the Community Partnership Fund of the New Zealand Digital Strategy has also enabled new layers to be added to the site—with a focus on local stories and heritage being added through pod-casting. In addition to initial Web-raising workshops the broader community are now being trained in how to make and upload pod-casts.

To help ensure the long term sustainability of the project, journalism students at the local technical institute, and interested high school students are being trained to maintain and develop the range of content coming into the site. At the same time proposed developments in the area of wireless access mean that tourists will be provided with a range of new opportunities to download information from the Web site, including pod-casts, as they travel through the region.

Not only have key members of WSPAI been vital in developing the project and building local awareness of the work—a number of other factors have played an important role. Members of local historical societies and museums have been actively involved, as have miscellaneous community groups. Also significant is that fact that the main heritage museum for the region has just been refurbished and re-modeled and is working closely with WSPAI and the NZTRI team to develop further marketing dimensions and increase heritage/community profile of the site.

It is, as yet, too early to have any definitive information on the ability of this ICT based project to facilitate long-term collaborative activity or create local jobs and income. Ongoing NZTRI work in the region shows, however, that the project is being well promoted by a range of champions and has captured the imagination of many local businesses. The project has moved beyond a relatively narrow initial base of STE support and is now engaging the broader spectrum of community—a process vital to creating sustainable rural tourism development (Wilson et al., 2001).

CONCLUSION

The marketing campaigns of Tourism New Zealand celebrate the uniqueness of New Zealand's regions, natural resources and cultures, and promote an authentic visitor experience. Rural areas are an important component of this experience—and the communities and STE within these areas are increasingly turning to tourism as a potentially sustainable source of livelihood.

A key factor in fostering dynamic and flexible STE, and communities that can effectively interact with the tourism sector, is collaboration and networking—between enterprises and also among tourism and the broader community. Government policies relating to tourism and economic development are placing a relatively heavy emphasis on the role of ICT in facilitating and developing these networks, enhancing visitor experience and marketing rural destinations.

The two cases of publicly funded initiatives presented in this chapter both use ICT to foster networking and collaboration between STE and surrounding communities. The cases have highlighted a number of themes and issues that appear to influence both the implementation and outcomes of such initiatives.

It is clear that local "champions," whether individuals or organizations, have a vital role to play. The chapter argues that such "champions" are especially significant in facilitating the environment within which rural STE networks can flourish. These individuals (and organizations) have particular backgrounds, attitudes and skills that are vital to building sustainable collaborative activity.

This research indicates that considerable effort needs to be spent on explaining the benefits of networking and its relationship to the achievement of individual, business and community

goals. ICT focused rural tourism collaborative initiatives need to be developed based around trusted social networks that can foster attitudes amenable to learning and development. The integration of tourism operators into the wider fabric of the community through social activities and committees means that these champions, and the broader STE network, can spread an awareness of the goals of any projects, and encourage the participation and collaboration of a broad mixture of local community members.

Certainly it is clear that the embeddedness of STE in local "place," and the existence of champions in some shape or form, are both vital ingredients in creating successful collaborative outcomes in rural tourism. A range of complex cultural, and place specific factors must be built into any attempt to understand the success and failure of cases such as those outlined above. Indigenous culture, past relationships between communities, and the general environment and history of local collaboration, will also shape development outcomes in complex ways—it is this area that now requires further attention from researchers in New Zealand and elsewhere around the world.

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KEY TERMS

Information and Communication Technology (ICT): in this chapter the focus is placed primarily on the Internet and World Wide Web.

Maori: The indigenous people of New Zealand.

New Zealand: Country of 4.5 million people situated in the South Pacific Ocean. The economy depends heavily on the export agricultural produce and international tourism.

New Zealand Tourism Research Institute: Not for profit research grouping focused on enhancing the sustainability and performance of the tourism industry (www.tri.org.nz).

Rural Tourism: Tourism (both domestic and international) that occurs in rural environments and involves rural experience.

Small Tourism Enterprise: Any enterprise that derives revenue from the tourism sector and employs fewer than five staff members. STE account for approximately 85 percent of all tourism enterprises in New Zealand.

Web Raising: A community focused and generated Web site development approach that focuses on direct content generation and design input from the community and revolves around community interaction and collaboration.

Chapter XLIV
2007 Leadership and Human Resources Training in Rwanda

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ABSTRACT

This chapter originated as a reflection of the communication between U.S. facilitators and a Rwandan host as they ecollaborated in planning international leadership and human resources training for Rwandan leaders. The authors maintain that electronic collaboration or e-collaboration is a viable practice for use in effective communication with persons in developing nations. It can be used as a way to reduce the cost of providing support and services. For this action research project, facilitators accepted an invitation to train, collaborated to complete all planning via the Internet, and traveled to do the work successfully addressing all of the substantive requirements. In preparing this chapter, the authors have shared pre, during, and post work considerations hoping to make a case for increased use of e-collaboration in establishing effective work relationships and improved international communication. The chapter includes substantial details for context and the issues that necessitated the training.

INTRODUCTION

Conducting training requires planning regardless of where it is done. When it is done around the world, it requires additional levels of understanding and planning not normally considered. For this training, a Rwandan host requested that U.S. facilitators provide assistance. The facilitators approached the training initiative based on a single question: How might U.S. facilitators provide leadership and human resources training for Rwandan leaders onsite? To address this question, the preparatory work was done using e-collaboration.

The process of planning the conduct of this training for Rwandan leaders provided an opportunity to study the process and the adjustments needed to succeed. As such, action research was the process used to methodically track what was done, why, and how. In that some of those involved were working from international locations, it was necessary to find an economical way to collaborate and e-collaboration was chosen.

According to Dick (1997), action research is a process by which change and understanding can be simultaneously pursued. This process is usually described as cyclic, with action and critical reflection taking place in turn, and with reflection used to review the previous action and plan the next one. This meant that this team could have an experience, reflect on what occurred, change, and use the new action. Clearly this collapsed the time for the work.

Similarly, Earon (2005) explains e-collaboration as interactive sharing of information with the potential for increasing productivity and efficiency. The e-collaboration used for this project included completing an assessment, formulating the requirements, scoping the work, designing the work, and proposing the follow-up. In the pages that follow, we explain how the research unfolded using the online collaboration.

BACKGROUND

There was good reason to expect that much of the leadership literature would not be appropriate in that it explained concepts used in U.S. bureaucratic organizations. One could also expect that there would be limited universalism of the leadership and human resources constructs. These positions were unfounded. Though parts of the African continent have been in turmoil for years there is a strong desire on the part of the Rwandans to become more businesslike. This is in spite of the fact that turmoil in certain areas has been manifest as devastating violence. In Rwanda, a country in the African Great Lakes Region, this generation has seen violent conflict erupt into genocide, taking the lives of 800,000 people during a 90-day period in 1994.

Since the genocide, many individuals and groups have worked to stabilize and support the country. The Africa Great Lakes Initiative is one such group. For years they have worked with the Rwandan Yearly Meeting, a Quaker organization, to host peacemaking workshops. In October 2006, a Rwandan Yearly Meeting leader requested onsite Leadership and HR Training for leaders desiring to do a better job of leading. In planning this training, it was important to understand that the leaders were volunteers and represented 25 organizations such as elementary/middle/high schools, programs for HIV infected women, orphans programs, peacemaking training, and a seminary correspondence program for religious leaders.

For years, the Rwandan leaders have worked to understand change, prepare for change, and respond to change—both internal and external—to their organizations. The internal changes, especially the foreseeable ones, have in some instances afforded the leaders time to understand their needs, plan, and act to change. Rarely has that been true for the external changes where they have simply needed to react. This has been true for war, disease, and weather.

Presently, the leaders understand that all around them the world is changing and they must change, too. They must learn new ways and new tools. In doing so, they will create strategic and contingency plans in their organizations to address ongoing conflicts, disease, shortages, and environmental concerns.

It is also clear to them that they cannot manage organizations that serve larger numbers of people, with the same level of expertise they have had in the past. As a result they are seeking knowledge that they can use to help them be proactive rather than simply reactive regarding change. This leadership and human resources training was part of the preparation.

Having seen leaders in other nations address change—successfully and unsuccessfully, these leaders understand that when they are better prepared they can establish programs to prepare employees in their organizations. Some examples of success have been nations in Southeast Asia, specifically Singapore and Malaysia that are rapidly growing (Association of Southeast Asian Nations, 2007). They also realize that in preparing the employees, together they will be positioned to prevent problems and develop more options and better options to change and grow.

In deepening their understanding, the leaders have acknowledged that change is often based on an as-is and a to-be state. They are taking the time to assess the current state of affairs, individually and collectively. Based on their assessments, they will have specific needs that will be used to craft logical, practical plans.

When the genocide occurred, many did not have an opportunity to choose from an array of options and plans. They did what they could and today consider themselves fortunate to have survived. Of the survivors, some are still tragically healing from the trauma and others are advancing recovery plans. Together these views comprise the as-is state of affairs. One description of the state of affairs published by the Africa Great Lakes Initiative (AGLI) (n.d.) follows:

The countries of the Great Lakes Region of Africa—Rwanda, Burundi, the Congo, Uganda, Kenya, and Tanzania—have been beset with violent political movements and its after-effects since before independence in the early 1960s. These conflicts have escalated in Burundi (1993), Rwanda (the genocide in 1994), the eastern Congo (1996, 1998), and Uganda (1986) and have continued to the present with the possibility of large scale renewed violence and war. The African Great Lakes Initiative works to break these cycles of violence in the region by working at the grassroots level to teach people to resolve their conflicts without resorting to violence and to heal the trauma from the years of conflict both on the personal and societal level.

From around the world, governments and individuals have sought ways to help the leaders and the people of the country move beyond the tragedy. According to Bacon (2003), there are directive and non-directive ways of helping individuals change. In this case, both ways have been successfully used. Directive ways have been used to equip the leaders and their staffs with specific skills, such as democratic government practices. Non directive ways have been used to allow them to explore options and choose the optimal approaches for themselves. Decision making based on their priorities is an example.

Regardless of the way chosen to help with change, understanding what is needed to promote change has been the critical first step. As such, they have clearly identified their needs and are seeking responsive training to meet the needs.

In preparing for this training it was determined that most of the leaders had participated in conflict resolution training (Alternatives to Violence Project/USA, 1975) oriented towards self esteem, improved communications skills, ways to engender cooperation, community building, and conflict resolution. During the nonviolence training, it was determined that there was a need for healing of trauma. This training was added and now training in both of these areas continues.

A subsequent need surfaced. It was determined that to be at peace and free of trauma did not provide life's necessities—food, clothing, and shelter. With peace, there was still a need for employment, a nationwide issue. The host wisely understood that many unemployed people would likely find themselves involved in another major conflict. Endeavoring to be proactive, he extended the invitation and identified leadership and human resources as the topics.

Building on the prior training, information was required to design the needed training. Rather than have expensive onsite assessments, the facilita-

tors used e-collaboration as the optimal method (Earon, 2005). It was chosen after considering onsite as well as audio, video, and Web conferencing. The other methods were eliminated based on time, funding, and the available bandwidth. Due to funding, the onsite planning option was not selected. When it was determined that the host did not have high speed Internet available audio, video, and Web conferences were eliminated as viable options. The decision was made to structure the collaboration in a way that e-mail could be used for the entire process. This proved to be satisfactory.

With e-collaboration, the facilitators asked questions and received responses regarding the organizations, culture, language, behavior, and gender of many of the leaders slated to participate in the training. The responses from the host were shared and clarified before being used to design new training materials and modify some existing training materials. The intent was to ensure that the content could be understood by the leaders as well as shared with persons in their organizations, community groups, and families. As is typical for action research, there were iterations required to ensure accuracy regarding what was shared, what was understood, and how the training materials were designed and redesigned.

The leadership and human resources training modules were designed with components addressing Rwandan real world concerns. Since many of the exercises were planned for outdoors, the intention was also to locate local materials that could be used for training in the future. Hayashi (2005) wrote of the value of using local materials that in this case ensured the training could be replicated. It was also beneficial because it did not burden these leaders with obtaining resources that were not readily available and possibly costly.

It is worth noting that in planning the training, the pre identification of possible exercise resources could have been done via e-collaboration if video communications had been available. That being the case, the leaders could have taken a camera outside and shared video with the facilitators. Instead, upon arrival, the facilitators scouted the local area and identified no cost materials for all of the exercises. This approach was consistent with the accelerated learning practice (Meier, 2000), where facilitators demonstrate how many readily available materials may be located quickly and used to promote learning. In this case, the resourcefulness in using the local materials, modeled for the leaders that it would be possible for them to conduct no/low cost training in the future at other locations around the country.

The e-Collaboration Process and Training

Many times there is a desire to provide services and support with very limited understanding of the customer or client. When the client is around the world, it is a challenge to obtain information needed to really understand. For this action research, it was necessary to request information for a deep level of understanding to ensure that the materials shared were suitable and useful. The more information obtained the more we learned during each step in the process. A number of times the facilitators needed to make adjustments based on new information obtained during the collaboration.

One of the first steps was to better understand the work environment of the leaders. This required both a historical and contemporary view of the environment of the leaders.

Rwanda is a complex, small nation. Of the nearly 10 million people, 78 percent are rural dwellers (Encarta, 2007). Many are seeking change of one sort or another. The current issues, conflicts, and problems were topics that were usually too sensitive to discuss. To ensure adequate preparation, some of the information was taken from the Internet, but required discernment to prevent decisions and actions based on offensive and at times biased reports. It was also just unwise to take the information written as the whole story.

Instead it was necessary to approach the work from a position of curiosity, asking many questions and listening deeply. Some questions were so delicate that they could not be asked; it was simply necessary to wait until answers surfaced in conversation or revealed themselves in travel.

Understanding the history was greatly enhanced by the information provided by the host. Unfortunately it was not possible to detect subtle, audio/visual information that may have been available in audio and video conferences. Instead, the e-mail discussions were used to gather information about the languages, culture, and practices. Through this sharing, it was clear that Rwanda had been greatly influenced by non Africans. Though the mother language is Kiryawandan, many of the people speak Swahili, French, and English. Their centuries old culture reflects the countries of their travels, missionaries, foreign travelers, TV programs, CDs, and DVDs. These influences are evident in the clothing, music, speech, jewelry, hair styles, and practices. None of this was evident via the e-mail, but it would have been with video conferences.

When it was recommended that below the knee dresses were most appropriate for the onsite training, it was unclear why. Rather than create tension, the decision was made to do so in a spirit of cooperation. Once onsite, we found the Rwandan women, often because of religious practices, wore stylish modern long dresses of colorful fabrics. Though this had little to do with the outcome of the leadership and human resources training, appropriate dress and other cultural nuances would have been evident during video conferences. Had the facilitators chosen Western dress, the training might have been less successful.

During the collaboration, it was learned that government leaders, in particular, understand the long term economic impact of unemployment, but lack a long term clearly articulated national plan to address it. Rather than do nothing, the national leaders are taking some actions to address this situation. For example, President Kagame and a 45-member delegation visited China with the intention of furthering trade and investment (Sihao, 2007). Other issues were also being addressed that included infrastructure and agriculture (Sihao, 2007).

Understanding these Rwandan challenges, made it possible for the facilitators to include exercises supporting these local leaders in working to help strengthen the skill base at their level. Presently, the sense making regarding daily life is that Rwanda is actively seeking partners around the world to strengthen their economy and better their lives. It is believed that e-collaboration will be an essential practice in developing effective international partnerships for many persons wanting to be involved will not travel there, but may be willing to provide support from a distance.

RESEARCH ON INTERNATIONAL PLANNING

This project used action research (Dick, 1997). Given the inability to see or hear all involved in this process, it was necessary to share and adjust practices and products via e-mail as needed. The adjustments were required to ensure that the training materials and approach met the needs of the leaders. One could expect that given the cultural dimensions it would have been unwise to assume that training materials suitable for the U.S. could be used unchanged and still be understood. The change process required asking targeted questions, seeking to understand, confirming what was understood, and carefully selecting and adjusting material for each step before proceeding to the next one.

This e-collaboration (Earon, 2005) occurred over a three-month period. The process saved resources while allowing for prompt submission of requests, shorter response times, and fewer overall resources.

Population

Around the world societal institutions-public, private, academic, non profit, and for profit-exist in some form in nearly every nation. These institutions deliver products and services for the citizenry. Most people are familiar with the major institutions, for they include education, entertainment, economy, labor, law, religion, government, family, defense, and health (Welsing, 1991). Within the institutions are different types of organizations. In education, there are schools ranging from pre kindergarten to university level. Some provide general education, while others advance technical skills training. Labor also exists in a wide range of organizations that cover many industries. Though different, there are similarities across the organizations. For example, an organization accomplishes its purpose when it has several key elements that are often referred to as leadership, management, research and development, manufacturing, services, marketing, sales, human resources, finance, IT, and customer support. Not all of these elements exist in every organization. These elements are rarely thought of as equal. Instead leadership is considered as a core element. This is not just any leadership, but effective leadership that does not happen by accident. In most cases, it is the result of deliberate self development oriented towards noble purpose and strategy. Covey's (1989) habits of successful people (leaders) are frequently referenced when preparing leaders to lead, for they are based on research regarding the practices that serve organizations well.

Leaders also understand that valuing people is neither a haphazard nor an ad hoc process, therefore it was important to understand human resources as a functional area in the organizations of these leaders. With this understanding, the Rwandan host requested leadership and human resources training for the group of 25 leaders.

Leadership and Human Resources Training

Theory and experiential exercises were used for the training modules that built on the peacemaking training provided earlier and endorsed by the president of Rwanda. The facilitators worked with the leaders to promote a deeper understanding of how organizations work, the organizational possibilities that result from effective leadership, standard human resources practices, and the use of technology. The host leaders knew that leadership was much more than simply hiring, training, controlling, rewarding, and firing.

Using explanations of the various leadership models—trait, group, great person, transformational, transactional, servant leader, team, and situational (Northouse, 2004), the leaders were able to understand how some of these models could be applied to their organizational issues. They also knew that it was important to understand how to lead so that persons serving in their organizations would willingly follow.

The leadership materials also contained content intended to prepare the leaders to address change. Included were ways to view power (Burns, 1978) and Kotter's eight-stage change process (1996)—establish a sense of urgency, create a coalition, develop a clear vision, empower people to move beyond obstacles, secure short-term wins, consolidate wins and keep moving, and anchor the change. In that the change stages are outlined in a specific order, it will be interesting to assess, in the future, if this order is confirmed in this culture.

The human resources modules addressed basic and effective human resources practices, focusing on change. The selection included organizational requirements, workforce planning, human resource development, strategic management, and organizational management.

FINDINGS

This chapter highlights the noted issues, controversies, problems, and findings of a professor/executive coach and leadership consultant/trainer in the e-collaboration preparatory work, onsite training, and possible follow-up.

Given the technology available for all involved, the lowest common denominator was e-mail for the collaborations. We did not use audio, video, or Web conferencing. Use of e-mail for e-collaboration meant that the communications lacked the detailed discussions that are possible with audio conferences. The communications also lacked the body language that supports effective communication with video or Web conferencing.

As part of this e-collaboration, it was necessary to read between the lines for words behind the words. In so doing it was possible to understand the feelings as well as the needs in what was assumed, expressed and not expressed, requested, expected, and negotiated. At certain points in the dialogue, it was clear that ways of expressing information differed. This made it necessary to listen for values, perceptions of justice and injustice, and experiences that affected the measure of cooperation and collaboration. For example, this deep listening was necessary when one of the final e-mails before the departure made mention of funds that were needed to cover the travel expenses for the leaders. At no time during the process had it been explicitly stated that the facilitators would be responsible for paying these travel costs. In a matter of fact way, one day an e-mail arrived asking when and how the travel funds would be made available. This expectation had not been expressed in the early communications and could have derailed this training. Instead, with the realization that assumptions and miscommunications occur daily among people without the layers of different nationalities, expectations, culture, and technology, the requirement was added and the process continued.

There were other moments of frustration when parts of the planning were unclear on both sides. When this was the case, it was not possible to see the expressions of others as would have been the case via a video conference. On one occasion, we simply trusted the good faith of the others and focused on the purpose of this important work—the men, women, and children miles away hoping for better lives. This realization made it possible to keep moving forward, ever motivated by the desire to model cooperation where all could succeed. This had both a short term and long term benefit of helping leaders understand that when there are misunderstandings, it is important to consider options other than simply quitting, conflict, or firing.

This topic was especially important because in their country jobs are hard to find and must work out. For an individual to quit or be fired means the family may be without food and other necessities, or worse, left homeless. It also means that there is no going back to a previously-held position because someone is always in line waiting to take the position. This was clear during the planning, and confirmed during the side discussions onsite among the leaders, especially when they discussed the outcomes of mentoring. With high unemployment, they concluded that if you help another too much, it may result in your job loss. Wisdom and balance are necessary. As part of this action research, this information required a change in the training materials.

This mentoring perspective was also held at an organizational level. If an organization cooperates too much, it may lose business and income to another organization in an environment where there are not many perceived new customers. It will be interesting during the future e-collaborations to listen for ways that the leaders have mentored and how mentoring has resulted in answers to some of the unasked questions—dreams for better education, jobs, housing, better pay, and improved living conditions.

Issues, Controversies, and Problems

Based on the assessment, the leaders knew how to keep people on the job, but not how to inspire them to levels of high performance. Collin's (2001) theory of selecting people who are already motivated and supporting them in staying motivated was offered as a viable approach. This was well received. During the periods of reflection, they shared the ways that they will work in the future to ensure that they place the right people in the right positions and support them (Collins, 2001).

Because it is difficult to think about effective leadership without technology (Scott, 2003), this was a topic of discussion for these leaders. Presently they have no sophisticated policies, procedures, practices, and tools. Their policies, procedures, and systems are simple, and for the most part are adequate to support current initiatives. In time, it is expected that the procedures and tools will need to change. For instance, the low bandwidth communications (e-mail) will be insufficient to support their increasing collaborations around the world. They will need to invest in new infrastructure. As they work to improve operations across their organizations for higher quality products and services, no doubt e-collaboration will be a contributing factor, with audio, video, and Web conferencing being more practical for training, meetings, negotiations, evaluations, and similar purposes both nationally and internationally.

Different organizations have been established to address the most pressing needs. Many employees have social skills, but need greater leadership skills and human resources knowledge. They also need contacts. An example of the need for contacts was a query by the director of the HIV infected women's program, who wanted to know more about a U.S. program, The Balm of Gilead. This leader was put in touch with that program. The hope is that they will eCollaborate in ways that will allow this Rwandan program to better serve the local women. This is an example of the type of exchange that was one of the goals of this initiative. It is expected that there will be other international partnerships to exchange wisdom, strategies, and processes that shorten the time to declared success.

While much time was spent addressing leadership, it was not enough. Those selected and appointed to serve must ensure that followers understand, too. One way of doing this is effective international mentoring. Mentoring by busy international organizational leaders who are committed to quality will vary depending on the situation. According to Ensby (2005), substantial business knowledge, experience, and ideas may be used when considering the political and economic situation of these leaders and what may be needed to be successful. These ideas will ensure that training material when revised and shared addresses not simply theory but the real world issues affecting the lives and future of the people in this nation.

In a world ever concerned about ethics, these leaders also will have to ensure that their actions are ethical. For years, some of the African nations have had leaders who deceived. To promote trust among all involved in the fragile e-collaborations, these leaders, while being mindful of the fast paced world described by Blanchard (as cited in Gupta, 2005), must be ethical in all interactions and act from a moral foundation if they are to influence others and achieve their objectives (Kanuga, 2001). Behavior of this caliber will engender trust in all future e-collaborations.

Their society in many ways operates in a paternalistic manner. The men lead most of the organizations, with women in supporting roles. This appears to have been true for generations. However, the numbers of women leaders are increasing. This is evident by the number now serving in government, specifically Parliament. They, too, will be visible and involved in e-collaborations nationally and internationally.

Unemployment is the major problem. To address the problem, there is a need for knowledge-

able leaders from both government and private sector prepared to create economic development and work effectively with trading partners. Leading to this end, the president has sought the help of leading U.S. business schools for onsite and offsite training of government leaders. The leaders involved in this project represented the private sector, who took the initiate to begin to prepare themselves as the government leaders are being prepared. Though these private sector leaders do not have access to the audio and video conferencing facilities now, they are aware that they exist and are preparing to use them when they are available.

Given the subsistence level of many of the people, leaders in the different types of organizations clearly need to work cooperatively, with everyone committed to moving in the same direction. This implies the need for a national strategic plan that can be supported by the local organizations. Understanding and supporting the plan will help to eliminate redundancy and waste in a country that can ill afford them. It is quite possible that e-collaboration will offer powerful, efficient methods and tools for seeking support, getting answers, and more effectively using resources.

The leaders who are aware of audio, video, and Web conferencing and are receiving training will hopefully have the foresight to use the resources in the academic institutions. Doing so will allow them to tap international resources that may be used to better prepare the youth to fill positions in the growing private and public sectors. All leaders at every level need to understand this vision. Through powerful conversations (Wheatley, 2002), among themselves and those who have purposed to support them, it is possible that these leaders will realize significant change in this generation using e-collaboration. With the availability of audio, video, and Web conferencing, this change process may be more inclusive, simpler, faster, and without the travel costs.

With knowledgeable leaders, the country will be better positioned to attract investors for factories and large enterprises that will employ the masses of people. Economic growth in these areas will create larger customers for the small enterprises that now serve as the base for local markets in the country.

The U.S. and UN have invested to a degree in the nation, but have been criticized by local people for not having persons who understand their needs and get involved in helping to improve institutional operations. There are many ways that this type of nation building support could be provided, for it has been done in regions around the world successfully. Singapore and Malaysia are often referenced as examples, even by the President of Rwanda (Busharzi & Juuko, 2007). With the increasing world-wide visibility of this nation, it is likely that other nations and groups will choose to invest more and they will manage their investments using e-collaboration. This type of management via the Internet will require communication and methods that were discussed in the training.

Plans exist to formalize the materials as a Leadership Guide. The guide will be used to establish a train-the-trainer leadership program using an interactive lecture approach (Thiagarajan, 2005) with exercises. When completed, the guide will be available on the Internet to ensure that it will be accessible, given the limited bandwidth currently available.

Some of the leaders have requested access to additional leadership training opportunities, so in addition to the guide and mailed books, they are being referred to online courses that they will be able to complete in an asynchronous way, for no or low fees. In that many speak English, this will not be an obstacle. The online instruction will likely include e-collaboration for group course work. In this way, the leaders will gain experience.

CONCLUSION

All training requires planning. In this case, the planning was accomplished using e-collaboration to achieve the goal. Following the initial request, e-mail was exchanged to determine all of the details associated with the requirement. There were numerous questions asked and answered that included the following: Background of the leaders? Types of organizations? Needs of the leaders? Prior training? Length of training? Main focus? Types of AV resources that would be available? Materials that could be carried to the country? Arrangements for translation? Local resources for reproduction? Space available for the work? Future goals?

Getting answers to these and other questions up front saved an inordinate amount of time and allowed for data dissemination, collection, design, document reviews, distribution of comments and recommendations, and final plans. Following the planning, there were no problems that affected the program delivery. No changes were recommended.

Solutions and Recommendations

Going forward, these leaders would likely benefit from partnering with other international organizations that have integrity and are trustworthy for mentorship in generating income and investing in the nation. To do so will build economic strength rather than unhealthy dependence. Use of audio, video, and Web conferencing may be invaluable and allow them to leverage their limited travel funds.

FUTURE TRENDS

The future and emerging trends indicate increasing Western involvement in this East African nation. The U.S. Embassy is under construction and more aid is likely. There are places in the country where funds are being used for training and infrastructure. While some of the needed skills will be obtained onsite, there is a great probability that many will learn and work online (audio, video, and Web conferences) in partnership for development and growth. It is expected that this will be true regarding operations in many of the institutions—government, health, education, law, and religion. Already the existing government and academic alliances are growing stronger and expanding to include more of the Rwandan people.

The long-term (one year) support will be provided via Internet, using basic coaching for success (Kimsey-House, Kimsey-House, Sandahl, & Whitworth, 2007). The intent is to support these leaders in problem-solving, identifying resources, and completing action-oriented projects that address the significant education, health, employment, and housing issues. With coaching, there is the foundational assumption that all individuals are "creative, resourceful, and whole" (Kimsey-House et al., 2007). This foundational belief makes it possible to embrace a sublime declared intent for these leaders to receive and share information. Similarly, it is believed that they will succeed in their work to transform their organizations into higher performing places for all—those who serve and those served.

Naturally to succeed in their programs, adjustments will be required. The main adjustment will be effective leadership and management. Right now, the leaders have many requirements, projects, heavy workloads, and limited staffs. There is the expectation that they will continue to serve growing numbers in need. To prevent self and staff burnout through these changes, there is a need for effective leadership and project management, a combination that Prabhakar (2005) studied and documented involving twenty eight nations. Just as this combination has been a challenge for other leaders around the world, it is believed that this combination has been and will continue to be a challenge of significance for these leaders.

Coupled with leadership and management will be the need to leverage technology, meaning expanded use of communications tools and methods. In this area, e-collaboration may be helpful in modeling the way for leaders in outlying areas, as they seek to locate and secure assistance and resources.

Building for the future will also require leaders who clearly understand and consider leaving a legacy as one of their decision-making responsibilities. Dobel (2005) described this important consideration as a universal concern not having a basis in simply ethnic social domains. What will be left for future generations? How might the legacy be best preserved? Who are the best stewards? Given the history of divisiveness in this country, these questions and others will merit attention by these leaders and many others.

To answer the legacy questions and many others will require these leaders to be open, teachable, and coachable when it comes to learning new ways to promote change in this nation. These leaders, who expressed great desire to improve the quality of service and support for individuals, groups, and organizations, are moving forward. It is likely that the new knowledge and skills will help in clarifying what they know, expanding awareness, taking action, and assessing progress to achieve their goals. Surely e-collaboration will be a critical tool in communicating across the country and around the world.

The Future

Presently economic development and employment are major priorities. Realizing this, the current governmental leaders have identified initiatives, but have not been successful in major economic development to support a high level of employment. That was true in the past, and it is still true today.

This has not gone unnoticed. Nationally and internationally, there are established partnerships with religious, governmental, and academic organizations working to create a strong economic knowledge base. As a way to contribute to the initiative, this host group of leaders has begun to understand economic empowerment and self direction.

With this increased economic awareness expanding beyond the government, non political organizations are acting in entrepreneurial ways. The leaders seem to understand that there will come a time when international donors and government aid will be reduced. At such time, many of the Rwandan organizations will need to have developed ways to be self sufficient. They seem to also understand that it will be important to help those they serve understand this, too.

Among the 25 leaders who participated in the training, many seemed to clearly understand the need to generate funds. They had some sense of the effort involved, yet there was limited understanding of the process. The sessions, both formal and informal, detailed this information. One method explained in the training was the establishment of revolving funds that would allow a portion of their income to be spent on current operations, a portion to be put aside for the next cycle of operations, and some saved for growth opportunities. In that the organizations were non profits, only recently had they discussed ways to begin to generate income, especially for the HIV-infected women and the orphans. This topic was explored in the training. It is expected that this discussion will continue in the months ahead via e-collaboration.

Of the 25 participants, five were women. They were not involved in the planning. In the training, they spoke little, but shared the perspectives of women in the discussions and participated in all of the exercises. Just as in the U.S., where women are entering academic institutions in record numbers, the same is true in Rwanda. They are also leading organizations and participating in the legislative processes in increasing numbers. In a side discussion, it was mentioned that female leaders work in many different types of organizations

at entry and mid levels, rather than in strategic leadership. They noted that this is changing and when women are elected or selected for strategic level positions, they require, just as do men, a network of others in support to be effective. The use of e-collaboration will make it possible for women to be seen and heard in institutions where they have not been present. This will especially be true with the use of national audio and video conferencing.

Since quality is always a consideration regarding products and services, the leaders stated that two of their schools were selected because of their outstanding programs that were visited by the U.S. First Lady Laura Bush, when she toured Rwanda in 2005. Following the visit, First Lady Bush (2005) spoke to the Heritage Foundation and said, "In 2003, President Bush announced a five-year, $15 billion plan to fight AIDS in the most afflicted nations. The President's Emergency Plan for AIDS Relief—or PEPFAR—supports care and treatment for people affected by HIV, and funds efforts to prevent further transmission of the disease." Some of the leaders inquired about the availability of the funds. It was determined that we all shared the same access to public information on the Internet. If we searched we would possibly be able to determine what had been given, when, and where. Given the war in IRAQ, some government initiatives have received less than what was earmarked and others have gotten nothing at all. The status of the funds designated for Rwanda is unknown.

Controversies and conflicts still exist in the region. In fact, there still are unsafe areas in the surrounding countries, specifically the Congo. As such, peacemaking and conflict resolution training is needed and continues with fruitful results.

Having lived through the genocide, many of the adults have purposed to teach their children peacemaking to ensure that they will live to be grownups in a nation that will never again respond to conflict in the way that many did during the genocide. To continue to learn and share new conflict prevention and resolution skills, some of the leaders have traveled to the U.S. following this leadership and human resources training. Specifically, the host received additional peacemaking training, in Kentucky, for use with the youth in Rwanda. This training will be offered as a new peacemaking training model, with age appropriate exercises, for youth who also need to understand how to resolve conflicts. Based on these initiatives, the Rwandan leaders are demonstrating their commitment to peacemaking training for their youth.

When the training materials are shared in other locations, it is believed that language will not be an issue because many of the people speak two, three, and four languages. At each training location, someone will likely understand the language used for the training and will be able to translate to the mother language that is Kiryawandan. This was true for the onsite sessions, where an interpreter was hired who effectively translated the facilitator's training materials from English to Kiryawandan.

For greater reach, it is believed that many of the training materials will be videotaped and broadcast. Hereto, e-collaboration may prove useful as leaders in organizations around the country plan and use video training to reach more youth and adults.

Summary

It is said that the world is small. We have access to more information immediately than at any other time in history. We also share info around the world faster than ever. While many people in the world benefit from access to these resources, there are many who do not. Leadership and human resources information has been shared to better prepare the Rwandan leaders to be among those who benefit. This assistance hopefully will help make a difference in the lives of those they serve.

As the leaders increase their knowledge and skills, they will be better prepared to work through the societal issues, problems, and needs to increase the quality of life for the Rwandan people.

In the months to come, Rwanda will receive UN aid that will be made available to organizations of various types. The UN Development Program will detail procedures for distribution. It is possible that some of these host organizations will be recipients and will use this training and the funds received for growth and change in their organizations.

It is likely that these leaders will make history in ways that others years hence will reference their work. Five years from now and possibly 5,000 years from now the world will remember the Rwandans and how they changed. Future research might address unanswered questions regarding their future plans, how these leaders will use the Internet to connect with other national and international organizations for change and growth, a comparison of face to face versus online planning, and how the Internet will be used to expand their training initiatives.

Given the success in the e-collaboration planning and conduct of this onsite engagement, the follow-up will likely be done via the Internet. When all parties have improved technology, these collaborations may in the future be facilitated using audio, video, and Web communications. Use of these tools and the many ways to collaborate will likely prove to be of great value as these leaders communicate internationally. The expectation is that they will find ways to communicate with people at all levels around the world, forging mutual agreements that may potentially expand the social and economic institutions for all involved. It also is hoped that they will find that for every issue they have many options to choose from, and they will be able to work effectively with others to negotiate win/win solutions.

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KEY TERMS

Action Research: A cyclic process by which change and understanding an be pursued at one time.

Communication: This is the ability to effectively share with another using any of the many media available.

Community: Deliberate and purposeful operations with others that include social, economic, and political exchanges.

Conflict Prevention: Use of practices and methods to avoid conflict.

Conflict Resolution: Use of practices and methods to solve conflict without violence.

Cooperation: Voluntarily choosing to share in or participate in an act or completion of a task.

Electronic Collaboration: Interactive sharing of information where it is possible to increase productivity and efficiency. The eCollaboration

can take place via audio, video, e-mail, and Web conferencing.

e-Management: The management of resources and processes using communication networks.

Nation Building: The establishment and development of institutions and organizations that promote communal activities that are often social, economic, and political in nature.

Self Esteem: The degree to which an individual values self.

Social Capital: Social, economic, and political interactions oriented towards positive outcomes for the larger society. These interactions make it possible for increasing numbers of people to have basic/adequate health, education, employment, housing, and general welfare needs met.

Success: The achievement of goals.

Chapter XLV
Collaboration through Municipal Motivators

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ABSTRACT

This chapter reveals the common theme three rural Minnesota communities used in their collaboration efforts in to install and deliver broadband Internet as a municipal utility. The author discovered that the reason for this broadband initiative was a municipal motivator, unique to each city and not related to economic development. It is hoped that other rural communities in search of high-speed Internet, after having digested the results of this study, might conduct their own research in order to determine their true, underlying motivation for delivering improved Internet service. By agreeing on the motivator for each community, local leaders are better able to collaborate on achieving this common goal.

INTRODUCTION

A qualitative study conducted in July, 2006 using grounded theory determined that three rural Minnesota communities all had a common theme running through their collaboration efforts in securing broadband Internet for their respective cities (Smith, 2006). While the vast quantity of literature regarding development of broadband Internet into rural communities focuses on the purported improvement of the local economy, this study found communities were motivated by other factors. Each community had a concern which served to unify local leaders and produce a collaborative effort in achieving what individual committees or private firms could not accomplish, namely installing high-speed Internet service to residences and businesses.

The study applied grounded theory as the means for establishing which characteristics were dominant in assisting the municipalities in delivery of broadband Internet. The participants inter-

viewed in each community were represented by the following roles: city administrators, economic development directors, public utilities directors, operations managers of municipal telecommunications system, directors of marketing, members of telecommunications commissions, community development directors, and city council members. Data were analyzed qualitatively with three levels of coding applied: open coding, axial coding, and selective coding.

The findings indicate the major factor that drove the broadband Internet initiative was that each city had a purpose beyond simply wanting to install high-speed Internet service as an end in itself. This purpose was identified in the study as a municipal motivator, unique in its nature within each community, but vital to project success. Collaborative efforts, focused on the common municipal motivator, by local leadership played a major role in driving the broadband Internet initiative to completion (Smith, 2006).

RESEARCH METHOD

With a lack of studies providing a theory on the dynamics contributing to rural municipalities' development of broadband Internet, the constant comparative method of grounded theory was selected as a means for establishing which characteristics were dominant in assisting the subject municipalities to deliver broadband Internet. The constant comparative method produces "many categories, properties, and hypotheses about general problems" which when studied and analyzed provide an integrated theory arising from an "evolutionary body of knowledge" (Calloway, 1995, p. 1). Since no known theories exist regarding the characteristics of municipalities which have developed broadband Internet service, inductive research was used in an attempt to establish a new theory (Glaser & Strauss, 1967).

The interview method was chosen as the source-type because it allowed each person who had a key role in the project to express their own, unedited recollection of events (Hage, 1972). Through numerous interviews many voices were heard, analyzed, and categorized enabling a theory regarding the phenomenon of rural broadband Internet adoption to be constructed.

Cities selected for this study are located in rural Minnesota. Their broadband Internet experience was summarized in case studies generated by the Blandin Foundation of Minnesota (Blandin Foundation, 2004). Cities were selected based on four criteria. First, each community is located in rural Minnesota. Second, all of the cities have a long history of providing municipal utilities beyond the basic water and sewer services. Third, each community chose to develop their own high-speed Internet service without engaging any partners. Fourth, each municipality has a different method of providing broadband Internet. Windom provides Fiber To The Home (FTTH), Barnesville delivers Digital Subscriber Line (DSL) through their municipal telephone system, and Detroit Lakes offers wireless Internet.

Windom, Minnesota

Located in southern Minnesota with a population of 4,500 and a business community represented by manufacturing, agriculture, and medical enterprises, the city of Windom took a very aggressive broadband service approach in the fall of 2003. After completing telephone surveys, focus groups, and personal interviews, the city designed a plan to deliver a fiber to the premises (FTTP) network for businesses and residents (Optical Solutions, 2003). The city's first referendum, which went before the voters in the fall of 2000, attempted to secure funding for developing a feasibility study. This $8 million referendum failed, due largely to the Incumbent Local Exchange Carrier's (ILEC) promise to provide DSL service. Following the ILEC's subsequent decision to not install DSL, a second referendum met with success in 2002. (Sheehan, personal communication, January 27, 2005).

The network, the first municipally-owned fiber optic network in the nation, provides 100 Mbps service over a 12-mile radius, serving 2,000 households and 300 businesses. Services include broadband Internet, streaming media, hundreds of digital and analog television channels, and telephony (Optical Solutions, 2003).

The city of Windom has a long history of providing utilities to residents. Dating back over 100 years, Windom Municipal Utilities has provided electricity, water and wastewater services. Windom Cable Communications, another department within the municipality, has provided cable service for over 20 years (Gumpel, 2005).

City officials began researching broadband Internet options in the late 1990s, motivated by the need to upgrade the existing cable television system. Actual construction including underground installation of fiber optic cable began in June 2004 and was completed in May 2005. Of the 2,300 buildings the network can serve, only five chose not to be connected. The city expects to achieve profitability in seven years (Gumpel, 2005).

Barnesville, Minnesota

Barnesville, Minnesota with a population of just 2,100 created Barnesville Municipal Telephone as a division of Barnesville Municipal Utilities (BMU) which has been, in operation for over 100 years. Broadband Internet service has been offered to residents since 2001. Conduit was installed with every street project in anticipation of future broadband service expansion (Blandin Foundation, 2004).

BMU provides residents with numerous utilities including electricity, telephone, water and wastewater, cable television, and broadband Internet. In the near term, BMU is considering shifting from Asymmetric DSL to VDSL (Very high speed DSL) in an effort to upgrade video services to residents. A fiber-optic network is being considered for the future (Barnesville, 2005).

Detroit Lakes, Minnesota

Detroit Lakes, Minnesota has a population of 7,400 and is located in northwestern Minnesota. Established in 1902 for the purpose of providing electricity to local residents, Detroit Lakes Municipal Utility (DLMU) has grown to include water, wastewater, and broadband Internet services. (Detroit Lakes, 2004)

In 1996 local ISPs rejected the initiative of numerous local institutions to have a fiber-optic network installed. The city installed a nine mile fiber-optic loop in 1998 and LakesNet was formed, offering broadband Internet to over 4,600 households. Five other ISPs have now joined the broadband Internet competition. (Blandin Foundation, 2004)

Subject Group

The following individuals and committees were interviewed: city administrator, broadband Internet department manager, economic development committee members, and broadband Internet committee members. These individuals and committees were selected based on the integral nature of their roles in designing and delivering broadband Internet service.

DATA COLLECTION

One-to-one interviews ranging from 60 minutes to 90 minutes were conducted with leaders from the three communities. Everyone who was contacted agreed to participate in an interview. Three interviews were conducted in Barnesville and Detroit Lakes, and four interviews were completed in Windom. All interviews were conducted in private at the city hall in each community. Roles represented by the interviewees included economic development directors, public utilities directors, operations managers of municipal telecommunications system, director of marketing,

city administrators, members of telecommunications commission, community development directors, and city council members. Participants were chosen based on their involvement and interest in local broadband Internet. All participation was voluntary. An audio recording was made of each in-person interview with a subsequent transcript produced.

The following questions were asked of each participant.

1. What is your present role in local government?
2. What roles and responsibilities did you have at the time the broadband Internet project was initiated and through the time it was first made available to the public?
3. Please describe how broadband Internet is delivered in your community.
4. Please identify local leaders who were instrumental in bringing the broadband Internet project to reality.
5. What traits and characteristics of local leaders did you find to be vital to the project's success?
6. What partnerships with businesses provided resources such as: Feasibility studies, Network design, Project management, Systems infrastructure design, municipality broadband customer care, and billing solutions provider.
7. Please identify government agencies at the county, regional, state and federal level which were helpful in giving assistance, real or otherwise, to the project.

DATA ANALYSIS

Three levels of coding were applied: open coding, axial coding, and selective coding. These three levels run parallel with the three steps of grounded theory identified earlier, namely description, conceptual ordering, and theory. Open coding provided a list of concepts. Within each concept, axial coding was used to produce categories and subcategories. Finally, selective coding generated an explanation of the integration of categories, or theory.

Open Coding

Analysis of the interview data was done through the use of a qualitative research software program titled NVivo. The interviews were first transcribed, and then the text document was imported into the NVivo program where the data was coded and categorized. Next, notes and code words were inserted into the text file to highlight key pieces of information. Finally, the program was used to analyze codes, categories, and notes within the document.

Steps in open coding included examining each sentence in the interview, looking for significant and meaningful information. Each piece of information that was identified was marked or labeled for future reference. An iterative process was used because codes could emerge later in a transcript that were not evident at the beginning or new codes might emerge from one interview. Reexamining an earlier interview could reveal the existence of these codes in this interview as well. These new codes were then inserted into the text the next time the transcript was analyzed.

Axial Coding

Following the coding of meaningful data in the open coding process, codes were grouped into categories and subcategories for the purpose of conceptual ordering. Then these categories were examined in an attempt to discover relationships between the various categories and subcategories. Next, data was reassembled based on the relationships between the categories.

Selective Coding

This final coding step involved the development of concepts which were placed into a logical scheme with the purpose of explaining the phenomena, in this case development of broadband Internet service in rural Minnesota. The output of this final step was the development of a model for use by other rural municipalities who wish to create their own broadband Internet service.

FINDINGS

Coding and Analysis Process

Each transcript was analyzed using NVivo. Transcripts were imported into the software as a data source in a text file format. Next, words, phrases and sections of the text in each file were examined, analyzed, and coded. After open coding was completed on all of the interviews, axial coding was accomplished through the development of coding categories. This was accomplished through the use of constant comparative analysis in order to identify categories (Strauss & Corbin, 1998). These categories then were organized in a conceptual tree. Finally, selective coding was accomplished through the development of a model representing the phenomena that were found as demonstrated in Table 1.

Emerging Themes

The emerging and dominant themes which came out of the coding process of the interviews will be addressed in the following sections. Citations from the interviews are used in an effort to provide study participants with an opportunity to present their views (Creswell, 1998). The selective and axial codes in Table 1 are used as an outline for the content presented. In an effort to protect each interviewee's anonymity, their roles and responsibilities are not identified although each city will be named when it is necessary for a clearer impression of events.

Municipal Motivators

When city leaders were questioned about the reason for installing broadband Internet, each community had a specific purpose, identified in this study as Municipal Motivators. Interestingly, none of the communities created their telecommunications service so that local residents would have access to high-speed Internet. Greater issues and concerns were at play in each municipality.

Save our schools. Barnesville was threatened with the closing of their local elementary and secondary schools so that a consolidated school district could be created. City leaders determined that it was vital to residents and businesses that the schools remain independent. This resulted in an

Table 1. Selective and axial codes

	Selective Codes	
Leadership	Municipal Motivators	Partnerships
	Axial Codes	
Risk Taker Visionary Independently Minded Entrepreneurial Politically Astute	Save Our Schools Support City Services Deliver New Services to Residents	Citizen Support Committees Schools Public Utilities

effort to increase the city's population and thereby increase school enrollment. A major marketing campaign ensued in an attempt to encourage people to move into the city and school district. The campaign included television advertisements on broadcast television out of Fargo, North Dakota promoting city resources including broadband Internet.

Phrases such as "housing development" and "attract residents" were used in response to questions about the motivation for providing broadband Internet. One leader said, "… school has been stabilized in part due to our efforts to attract young families."

In this instance, the reason for installing broadband Internet was for the purpose of attracting more families in order to stabilize school district enrollment. High-speed Internet was not an end unto itself, but a means to accomplish a larger goal.

Support city services. In Detroit Lakes, a city employee realized that telecommunications services the city was purchasing could be delivered at less cost if the city provided the service. In fact the city would break even without ever having to sell broadband Internet service to local businesses and residents.

Alarms at the city's 40 waste water and storm water lift stations were being monitored through a leased line from the ILEC.

[We had] automated meter-reading, SCADA systems, enhancement of SCADA where we would go beyond just wanting to bring some data in but we would want to be able to have two-way communications, to switches, to metering different stuff like that. Here… we had a lot of waste water sewer lift stations, and storm water lift stations. We are fairly flat and back then we had 40 some. We were leasing lines from [ILEC] to run controls or to do alarms for each one of these.

The public utilities department realized that with a city-owned broadband Internet service, the monitoring could be accomplished for the same cost and additional benefits could be gained.

… We had many buildings throughout the community, different work centers, Police Department, Streets Department, Parks Department, the Arena, this [city administration] building. So our telephone system we got from Qwest. I could also see where it would be really nice for us to be able to do a centralized telephone system, so we could tie all this together.

Once the city had decided to install, they determined to broaden their approach to local businesses and residents.

If we're going to do this, let's do it right. Let's put this loop in and let's see if we can encourage maybe private industry to provide Internet service, cable TV to utilize this fiber also. So we'll own this system and we'll lease some fiber to the school, some to the county, we'll utilize it ourselves for our needs and then maybe farm some capacity out here to private industry.

The motivation for installing broadband Internet was to meet the needs of existing city services. Delivering high-speed Internet to local businesses and residents was essentially a by-product, something the city's plans included, but not an integral part of the design.

Deliver new services to residents. A history of annually being promised cable television service for the city of Windom and then being delayed for another year eventually led the municipality to install their own cable system. Fifteen years later frustration over empty promises of providing broadband Internet resulted in Windom passing its own $8.9 million referendum and installing fiber optic throughout the city. Regarding the cable television struggle, one interviewee stated, "Nobody was in service yet with cable TV."

Another person explained that delivering cable television as a public utility was the result of initiative on the part of citizens. Having a long history of providing electricity to citizens also impacted the city's decision making.

Back in the early to mid-80's for some unknown reason the cable providers, nobody inquired on the franchise. That was initiated by local residents who came to a City Council meeting and said, "We would like the city to look at cable." City council threw it right back into this committee, who was just a group of people who got together, and said, "We appoint you to explore that."

So they reported back that "yes, there seems to be sufficient interest in cable TV."

The City Council asked, "Did you explore whether that should be public or privately owned?"

"No, we didn't."

"Well then, here's another assignment." They went out and traveled and discussed. Windom being a local municipal provider of electricity, thereby owning the poles and the ditch witches and the bucket trucks, they reported back that it makes good sense that it would be a municipally owned operation. It would be a pretty good marriage to our existing electrical department.

Successful endeavors with public utility efforts eventually spawned the broadband Internet effort. One public utilities person said, "The successes that we had with our municipal electric system and also the cable system allowed us to think we can go forward here."

Windom's first attempt at a referendum to install broadband Internet failed, which led to another initiative by citizens. One interviewee said,

During the fall of '99 we had some community information meetings. One of the Public Relations [people] of Qwest out of St. Paul showed up and said, "We've been here for 80 years and we are going to be here for the next 80 years." The people of the community bought into that argument. At that referendum it met the majority approval but not the super majority approval. About six months later in the spring of 2000, Qwest came out and there was an article in the Minneapolis Tribune announcing the 13 cities in greater Minnesota in which they were going to update their systems and provide Internet services. Windom was not on that list. Jackson to the south was. Redwood Falls to the North was. That immediately got the local natives worked up, and I think within about six weeks the council was presented with a petition of about 800 signatures requesting that it be placed back on the ballot in the fall elections of 2000. Then it was passed at that time.

Empty promises have repeatedly led the City of Windom to install their own public utilities. First, it was the desire for cable television. When the ILEC refused to provide broadband Internet, the citizens requested a referendum. However, prior to voting on the referendum the ILEC promised to install broadband Internet the following year. The referendum failed and the ILEC subsequently reneged on its promise. This led to the second referendum effort which then succeeded. When the citizens of Windom felt they were not being treated fairly, they chose to take matters into their own hands and commit tax dollars so that broadband Internet could become a reality, a clear parallel to citizen and local government cooperation in getting cable television into the community.

Partnerships

Citizen support. Involving the public in determining which utilities a municipality should provide was a very important success factor. Public support was cited in all cities and by various interviewees

as being critical in efforts to install broadband Internet. Many participants repeated quotes from citizens endorsing public utilities being delivered in their respective communities such as, "strong investment in their community," or "If I'm living here why shouldn't I support local government." Another interviewee commented on citizens' viewpoints and said, "…they are proud you have the telephone company. They're proud you have the electric, you have the cable, you have the broadband …" Another resident was reported to have said, "One of the reasons we moved here is because you guys have the services we wanted."

One of the most poignant, insightful quotes came from a resident of a senior living facility following the city's presentation about the potential for installing broadband Internet.

And this lady raised her hand and she reprimanded me right there and then and said, "You don't understand what people of our age have lived through. We've lived from outhouses, to plumbing, to electricity, to man on the moon. This doesn't scare us." And they all said, "Yeah!"

A strong sense of community pride, the need for community vitality, and a willingness to move forward with technology contributed to broadband Internet installation in these three communities.

Committees. Involvement, research, and active endorsement by local committees drove some of the communities to adoption of broadband Internet.

I went to our Public Utilities Commission first and had fairly good response. Saying, "Yeah, we have to be proactive. We have to look at this kind of stuff." But then it developed into, "So where do you start?"

City councils were also important in the process, especially when those in the minority agreed to move forward in unanimity. One interviewee recollected,

I went to the City Council with this concept there was some concern that we were infringing on private business and maybe we shouldn't be doing this. And I said, "Well. What I'd like to do is work with private because private isn't doing it at this point in time. And what they do have is unaffordable to the school and the county isn't doing anything."

We had a 6-3 vote, but once it was voted on that way we had the type of council at the time that we had 9 people support it. They said, "We were not for this, but now if we are in this business we want to see it work."

In one instance efforts to market the community were brought to the fore, resulting in adoption of high-speed Internet. Interviewees remarked, "Economic Development Authority board has been very active." "We feel that we have to work twice as hard as any city around here because of location." "We had to be more proactive than any city around here."

Committee endorsement, followed by City Council support, was cited in every city as being instrumental in the broadband Internet effort.

Schools. In Windom, the local school district was already being provided high-speed Internet through a consortium of area schools. However, in Barnesville and Detroit Lakes the schools were in need of broadband Internet. Here is how one participant recalled events.

So we went to the school, and the school system says, "You know this would be of interest to us." Because at that time they had a middle school, an elementary at one place, they had a high school at another place, and they had three other elementary schools in the community. They were looking at trying to network them together.

Another responded,

And then the school district was also very instrumental in encouraging the city to do it, almost begging us to do something so that they would have that service available. Maybe begging is a little bit strong. Really wanting the service, and not being able to get the private providers to commit to a date specific when they would have it.

Endorsement by the school district also helped persuade local government officials to support broadband Internet. One person said,

I think it was very important at the time that our local school system was also looking to become better connected. So we had good support from the school. And that was kind of important because that may have swayed our utilities commission and some of the counsel people a little bit. To say we are helping and looking at doing something that will be good for education in the community.

Cooperation between the city and local schools for broadband Internet was also leading to an expansion in other areas of technology. One city administrator said, "We work with the schools; we provide service to the schools. And we are looking at some collaboration on Voice-over-IP phone systems."

School district support and participation contributed to making broadband Internet a reality in two of the three cities.

Public utilities. As long-term providers of various public utilities, beyond the basics of water and sewer, each city had experience with delivery of services, customer service, and billing departments. This background aided in the adoption of broadband Internet as evidenced by the following comment.

As a Public Utility, we had a little advantage. We already owned power lines, we already had some duct in the ground, we provide our own electric utility here in Detroit Lakes. And that made fiber optic even more interesting to me because it's not affected by electric fields and so forth. You've got this glass fiber. So it means you could go right into sub-stations. We can go places with it that we can't probably go safely with copper. So that was another advantage we were looking at. So we were moving from the copper to the fiber. And you can do much more with fiber.

Another administrator said, "Electricity has been delivered for over 100 years through the city public utility."

As a result of the broadband Internet installation, other city services in Detroit Lakes are now interconnected. One person described the system as follows.

We've redone all of our electric sub-stations here in town and we have them all tied fiber now, a SCADA [Supervisory Control and Data Acquisition] system to all these systems and so we can get instantaneous from any of these sub-stations. And we have our phone system. We did do that several years back. I'm not sure if we saved money on that one or not. I have a hard time saying we saved money, but it's a great system. Because we can intercom anyone from this office in any other building every body has their own voice-mail, it all runs over one system. We had great savings as far as our SCADA system. We are probably saving $20,000 a year now over what it would be costing us if weren't going wireless.

Each city has a long history of providing electricity, some more than 100 years. Some departments have also provided telephone service for nearly the same length of time. A strong public utilities department has allowed each

city to more easily adopt and deliver broadband Internet services.

Leadership

Risk taker. Each community in this study had individuals who strongly supported taking risks in a variety of areas including technology, finance, and local politics. One local telecomm director related how the team was inexperienced, but going forward anyway when he shared,

That's when we had the fiber in the ground, and the electronics were ordered, and stuff would show up, and I would go, "What's this for?" "I don't know? Figure it out." So we kind of glued it all together and started the install process.

That same risk taking attitude was evident when he went on to say,

The first fiber shelf me and another guy started putting in at 9:30 one night. And about midnight he left and I turned it on at 1:00. I called him at his house [and said], "Hey, it works!"

Risk takers also were represented by non-technical municipal staff such as public utilities personnel, one of which said,

… and public utilities people looked at, "Does this make sense financially?" "Can we make it work?" They didn't just look at, "Well, it's too scary. We aren't going to try that." They had this attitude that, "We can try this and if it doesn't work it's still be something we can use for ourselves." It had some value. It was risky. We were talking about spending over a million dollars to put this trunk line in, and that's a lot of money. That's a lot of money still. Some people when you hear all these big numbers all the time for everything, a million dollars doesn't have any meaning; but it has meaning here yet.

In one community the threat from existing public utility providers was confronted by the city council and the city attorney with a clear risk taking mentality.

… the cable TV providers and they all showed up in mass and said, "you are in violation of anti-trust and if you go through this we are going to sue you." And I remember the City Attorney who had done his homework turned to them and said, "If you fellas think you have a case, you better file the papers. Cause in my legal opinion the City Council has full authority to do what they are proposing to do." We never heard a word after that.

Another community has a public utilities director who has been taking risks for years, long before taking the position he is in now. His risk taking started when he was first hired part-time by a small municipality and it has continued through four different cities as public utilities director.

…electric utility for them, a municipal. They were previously served by an investor-owned. Basically, what happened was, they couldn't afford to hire anybody with experience. And I had nothing to lose and they asked me if I wanted a job and I said, "Nope. We'll see if we can get this thing going."

One city council member, as evidenced by the following series of quotes, repeatedly emphasized the need to take risks, to work hard to take care of his community. "We need sticking our head out thinking." "We don't have a choice." "We have to do it." "We've got to charge ahead."

He really drove home the point when he said, "Towns and cities don't die. People kill 'em."

Risk taking was a characteristic personified in every community by people holding a variety of responsibilities including public utilities directors, economic development directors, telecommunica-

tions directors, and city council members. Risk taking took many forms including introduction of new technology, knowledge of telecommunications equipment, investment of public dollars, and moving communities forward technologically. Risk taking had a common, cohesive effect on local leaders, resulting in collaboration.

Visionary

Each community was represented by individuals who were able to project into the future in an attempt to determine what municipal services were needed. In some instances the vision included looking a certain number of years into the future. For example, one public utilities director said, "This goes back to probably 1994 timeframe. What I was looking at back then was, I was looking at our utilities and trying to envision the future 10-15 years down the road."

One telecommunication operations manager was concerned not just about getting to the future, but also being viable. He said, "Where do you want to be in 10 years? Well, we still want to be here. I want somebody who knows how to make it go faster and be here 20 years."

The vision and drive of one public utilities director was described as follows.

He was the guy who spearheaded the project. He pushed it…And he went around to all of the businesses and canvassed the businesses…He pretty much pushed it through and got it going. I can't think of anybody else that was more of a leader. It was him. And he wanted it. And he was right. He promoted it from the standpoint of public safety and the means that we used to get there, now we are 13 years later.

In some instances the vision to see the need for the municipality to deliver broadband Internet did not come from a technologically-oriented leader.

[he] was the visionary behind it but he's not a technical person. He's a really good guy, he believes in technology, but he doesn't use it. He doesn't understand it. He doesn't even have a computer in his office. His secretary receives e-mails and she prints them. He hand-writes a reply and she types it back and sends it on his behalf. So it seems kind of odd to have a person who believes so strongly in technology that they would spearhead this program and yet he personally does not use it. It's not a bad thing. At least he had the vision to do it

Another key characteristic of these leaders was that they were not influenced by neighboring communities since no one in the area was delivering broadband Internet as a municipal utility.

[he] started looking around at other communities and other utilities to see if anybody did it, and I don't recall if he found some that did it, but by and large most of them stayed out of that realm. His thinking at the time was, it was something that they needed.

Open-mindedness was also a driving trait in visionary leaders. One participant said,

[he] was open-minded, open to the idea of doing something even though it wasn't necessarily the normal, typical Public Utilities type of service. It wasn't just, "No, we don't do that." And that was the end of it. It was, "Well, it's something that we could do. It's something that we have a need for ourselves." So he took the time to look into it and see how it could be done rather than just being, "I just do sewer and water and electric and that's it. I don't want to try anything like that." There was just a willingness I guess.

Public utilities committees also demonstrated an ability to look toward the future.

I think the copper plant and technology was like $5.5 million and the fiber was about $6 million. The fiber was about a half million higher but the City Council looked at that and ultimately the positives and negatives of both and said, "If we are going to do this, let's spend that extra dollar."

In some instances city administrators saw the need to deliver additional city services, expanding to more than just broadband Internet. One said, "They wanted to add the Internet onto our cable TV system. But we also thought that we needed the telephone so eventually it would cash flow. We needed all three rather than just two or one of them"

In one community leaders with no official role in local government became strong visionaries. One leader said, "these two people in particular and their editorial staff at both facilities could see where this technology was leading. And they were some of our biggest supporters simply by writing supportive editorials and coverage." He went on to say,

I can remember the first time the referendum failed the General Manager of the radio station there has an hour program every morning and he went ballistic! "People, how could you have done this!?" type of comments.

In each community various leaders and committees demonstrated visionary thinking through their decisions to: project where they wanted their city to be in 15 or 20 years, provide services that surrounding communities were not offering, gain funding through an $8 million referendum, and not accept the status quo. A vision for the future was one of the most significant traits in local leaders.

Independently minded. The leadership trait of being independently minded was particularly strong among those in the director of telecommunications position. One IT manager, in citing the first municipal cable television installation in the country, strongly demonstrated this as he spoke of his admiration for those who accomplished this feat.

The first municipal to do any cable TV in the country is in Quincy, California. They started in 1961. Basically how they started was three guys wanted to watch the fight coming off of KTLA out of Los Angeles. So they took snowmobiles and a black and white TV and snuck up the mountain with it. Actually got an antenna built out of bed springs and they pulled the fight good enough to watch it on a black and white TV. Couple weeks later, more people came up and said, "Hey, why don't we run this down the hill.

He then talked of his previous job in municipal public utilities in a small Midwest town and the challenge that came from the incumbent local exchange carrier (ILEC). After surviving the legal challenge, the town proceeded to offer additional utilities, including broadband Internet. He said, "[town] was the battle that TCI picked to fight. Wall Street Journal printed the whole shooting match and how it happened. Then we rolled out video there, then Internet, then telephone."

In two of the three communities strong statements were made about being independent and choosing to install broadband Internet for the community. One person commented, "Why can't we just do it ourselves?" Later, he said, "If they're not going to give it to us, by golly, we'll go get it ourselves."

An independent mindset was clearly demonstrated in all three communities. The dominant feeling was that a municipality should be able to provide any type of utility that it chooses, even in the face of legal threats.

Entrepreneurial. Another leadership trait of local leaders was that of being entrepreneurial. These individuals were willing to start a new

venture for their communities while being accountable and assuming the risk involved. One public utilities director revealed his entrepreneurial bent by sharing how he started his career in public service without any background.

This is actually the fourth utility that I have worked for in my entire life. I started in my hometown. To be honest with you, I do not have a degree. I was going to college. I was running short of money, and the local utility in town hired me part-time and I was going to build up my bank account and go back to school. And I just really got to loving the utility business. And I was able to move up fairly quickly because of the right time in the right place. By the time I was 26 I guess it was.

He went on to reflect on his second job as director of public utilities.

No one with any experience really wanted anything to do with a job like that back then because it was hit and miss. It took them a little bit to convince me to do that because I had a pretty good job in the little town I was with, which was down in northwest Iowa. It was a good municipal utility town and they treated me well…So we got that little utility started.

One telecommunications manager indicated that he considers the broadband Internet department to be more than just a job. It is an enterprise that he directs, that succeeds or fails because of his efforts. He said, "I have a different mentality than most government employees. I consider it a business; and it's my responsibility; and I run it to make money; and it's personal. It's not just a job, it's personal."

His statement, repeatedly using the word "personal," clearly demonstrates his attitude of ownership regarding the telecommunications department. When asked about local tech support, he said that even when he took a vacation to the Middle East, he used his cell phone to take calls from users and in turn direct his technical staff.

The competitive nature of one telecommunications manager was also evident as he described efforts to run an efficient department and maintain market share despite certain advantages of competitors.

[The ILEC] office is on one side of the street and we're on the other side of the street. And they charge us $3,500 a month to go across the street … It makes it real hard for us to be competitive because [another competitor] owns all the fiber up and down the tracks. So they can back haul their own data from the cities up here. [ILEC] owns fiber up and down the track so they back haul their own. But when we need data, we've got to pay $3,500 a month for that piece of fiber to get it across the street. So it makes it a little bit tougher for us to compete. So we have to be a little bit tighter everywhere else.

An entrepreneurial disposition seems to drive municipal telecommunications departments. In some instances the leader has taken an entrepreneurial approach throughout their career in public utilities while in other cases the manager realized that success comes only through great care and concern for the department.

Contribution from County, Region, and State Government

Leaders in all three communities clearly stated that other levels of government did not have a role or contribute to the efforts of bringing broadband Internet into their respective municipalities. These responses were not shared as an area of frustration because in many of the interviews it was obvious that such assistance was not expected. Here are some of the comments of interviewees regarding assistance from other levels of government.

On this particular project, I don't think there was any. I feel a little weird in saying that. We do partner a lot with agencies at all of these levels, but on this particular one there really wasn't any.

I think I would have to say the majority of it is local government. The state and regional you might want to say had a hand of more of the … educational [school component]. They were a driving force behind that requiring certain things by a certain date. Federal? I don't know of any. It could of, but I don't know of any. But mostly it's come from local.

I don't remember any county initiatives. For regional, I don't believe there was much for regional. I know there was a lot of interest from some area communities…There were five communities that were trying to provide wireless Internet between the communities and they were wondering if there was a way they could connect to us. State and federal? Not really.

I would say the city took the project on. The county and the school knew what we were doing. They were anxious to use what we provided for them, but they didn't come forward and say, "We'll pay part of the engineering." Or "We want part of the action."

In each instance the three cities designed, developed, and installed broadband Internet without assistance from other levels of government. No one mentioned attempting to involve other county, regional, or state government agencies. Each municipality secured funding, contracted with design firms, and installed the required telecommunications infrastructure on their own.

SUMMARY

This study, conducted in July 2006 using grounded theory, determined that the collaborative efforts of three rural Minnesota communities in procuring broadband Internet were each aided by the impact a local municipal motivator had on leaders. Each community had an issue which served to unify local leaders and produce a collaborative effort in achieving what individual committees or private firms could not accomplish, namely installing high-speed Internet service to residences and businesses.

Barnesville was confronted by declining enrollment in the local independent school district and faced with a strong prospect of having to consolidate with four or five neighboring districts, the result of which would have been a regional secondary school. Local leaders, united in their zeal to preserve their community, determined the best method of preventing school district consolidation would be to increase the population. Marketing efforts focused on promoting Barnesville as a bedroom community, rich in amenities attractive to young families including broadband Internet. High-speed Internet service was installed in 2001, the population has grown, and school district consolidation is no longer a threat.

The City of Detroit Lakes' collaborative efforts centered around 40 lift stations for municipal sewer and water lines, all of which require constant monitoring. In the early 1990s the Public Utilities department, unwilling to continue to pay the city's ILEC to provide monitoring, began research on how the city might provide their own monitoring services. The result was the installation of a fiber optic loop around the city. Once the communications were in place residents and businesses started requesting access to the high-speed Internet service.

Windom had a long and consistent history of being bypassed by various communication firms and their services. Their citizens also have shown a willingness to collaborate when faced with obstacles. In 1984 a group of concerned citizens polled residents, determined there was sufficient interest to support cable television, and the city installed cable television service as part of

the public utilities department. In the late 1990s Qwest, the ILEC for Windom, annually promised high-speed Internet service the following year. Again, the citizens became frustrated to the point of passing a referendum in 2002 for over $8 million for the installation of broadband Internet.

Results of this research indicate that local leadership, strongly influenced to collaborate by municipal motivators, plays a major, even dominant, role in a community's ability to secure high-speed Internet. Partnerships crucial to the success of broadband Internet service delivered as a municipal utility were all locally based. All of the participants indicated that no county, regional, state or federal government agencies assisted them in their efforts to install broadband Internet service. It was clear that local government leaders saw the vision, realized the need to work together, and acted without waiting for other levels of government to come to their aid.

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KEY TERMS

Axial Coding: Items identified in the Open Coding phase are grouped into categories and subcategories.

Broadband Internet: Typically defined as speeds ranging from 3 Mbps to 5 Mbps, although the FCC continues to consider 200 Kbps as being high-speed Internet.

CLEC: Competitive Local Exchange Carrier; largely formed following the Telecommunications Act of 1996 which authorized local exchange competition.

Constant Comparative Method: Technique used in Grounded Theory to group data into numerous categories through repeated analysis of the text of recorded observations. Sometimes known as "Grounded Theory."

Grounded Theory: A systematic qualitative research methodology in which theory rises from data being analyzed in the process of conducting research. The resulting theory is said to have been grounded in the data collected in the research.

ILEC: Incumbent Local Exchange Carrier; a local telephone company which has existed since AT&T was broken up into Regional Bell Operating Companies.

Municipal Motivators: Reasons why each of the communities in this study decided to install and deliver broadband Internet as a public utility.

Open Coding: Through repeated reading of sentences and paragraphs of data collected for the study, the researcher performs open coding through identification and categorization of responses found numerous times in the data.

Selective Coding: The choosing of one category as the core concept, around which the other categories from the Axial Coding phase are grouped for the purpose of explaining the phenomena which has been observed.

Chapter XLVI
Understanding the Dialectic Relationship between Intra- and Inter-Organizational Cooperation

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ABSTRACT

Information and Communication Technology (ICT) is often seen as a vehicle for organizational reform. However, the established literature on achieving ICT based reform tends to focus upon the private sector and is unsuitable for analysing the public sector. In the public sector ICT reform is usually delivered through complex partnership arrangements with private sector organizations. This seen the emergence of the Strategic Service Partnership (SSP) in which an interorganizational relationship is established between a public sector organization and a private sector organization. This partnership allows for the private sector organization to become the exclusive provider of ICT systems for the public sector organization. These ICT systems allow for intra-organizational communication and coordination to be achieved. As such reform which seeks to enable intra-organizational collaboration is shown to be dependent upon the establishment of inter-organizational collaboration. These two factors are understood in terms of a dialectic relationship.

INTRODUCTION

Information and Communications Technology (ICT) plays an important role in organizational reform programmes in both public and private sector organizations. However, the existing literature on ICT based reform in the public sector draws largely upon studies of private sector organizations. This has led to the literature on ICT based organizational reform in the public sector ignoring

both the political context and the sheer complexity of ICT reform programmes in the public sector. To address this gap in the literature, an in-depth case study of an ICT based reform programme in a local authority in the United Kingdom (UK) is presented. This study concerns the development of a Strategic Service Partnership (SSP) which is a cooperative interorganizational relationship between the local authority and a private sector organization based upon the provision and management of ICT systems. The study of the way in which this partnership emerged is able to highlight the importance of the political context and shows how the complexity of public sector ICT reform can be unravelled.

LOCAL GOVERNMENT IN THE UK

Local authorities in the UK are most effectively understood as institutions (Peters 2005) which are made up of factionalised organizations (Pettigrew, 1972). A local authority consists of an elected council comprised of politicians divided into different political groups (or parties) and an administrative bureaucracy comprised of professional staff. The professional staff are divided between different departments which perform the specialised tasks necessary for the coordination of the authority, the fulfilment of statutory tasks and the implementation of the polices of the controlling political group. This bureaucracy is coordinated and managed by a Strategic Management Team (SMT) which forms an interface between the elected members and the organizational bureaucracy.

As local authorities are composed of different organizations and factions, operating within a single institution, their operation depends upon a series of inter and intra-organizational relationships. These relationships may be characterised as follows. An interorganizational relationship must be established between the elected members and the administrative bureaucracy via the SMT and between the different political groups. Intra-organizational relationships must be established between the different departments in the administrative bureaucracy. Should these relationships break down, a situation can develop in which a local authority becomes uncoordinated and policy execution becomes haphazard.

In the UK, local government exists within a unique legislative structure, as its position is not guaranteed constitutionally. Instead local government exists within a plethora of laws and agendas imposed by central Government and these determine the powers and responsibilities of local authorities. The UK Government has advanced a number of policy agendas which have affected local government and the most important of these are the New Public Management (NPM) which sought to increase efficiency and performance in the public sector. The agenda of the NPM was enshrined in law by the 1999 Local Government Act (S. 3, p. 1) under a concept known as Best Value (Martin, 2000) which required continuous improvement in the "… economy, efficient and effectiveness …" of public sector organisations. The 1999 Local Government Act also gave an inspectorate—the Audit Commission—the power to inspect local authorities and examine their compliance with the Act under threat of central Government sanction.

The New Public Management Reforms

The NPM has influenced public sector reform since the mid 1980's and still has a significant impact upon the public sector. Pollitt (2003) argues that the NPM is a "nebulous" concept that describes a large number of different agendas and reforms. The NPM is founded on a belief that the public sector is inefficient and overly bureaucratic. The existence of the bureaucracy causes the public sector to value procedure over performance. Furthermore, the public sector was deemed to be unconcerned with financial efficiency as it was unwritten by taxation and this was thought

to encourage wasteful activities. The advocates of the NPM such as Osborne and Gaebler (1993) argued that the private sector was not only less bureaucratic and therefore more financially efficient but was also capable of delivering superior performance because private sector managers were focused on results due to the presence of competition.

This led to an argument that the public sector should be reformed to resemble the private sector and that private sector practices should be adopted by public sector managers and organizations. In pursuit of improved efficiency and performance, public services were variously outsourced to the private sector (Pollitt, 2003) on the assumption that private sector organizations would be more efficient at delivering services (Ranson & Stewart, 1994). The NPM reforms also made extensive use of performance measurement regimes (Hood, 1991) on the grounds that if public sector were extensively measured, then their managers would become focused on results and performance (Cutler & Waine, 2000) like their private sector counterparts.

However, the NPM can be criticised on the grounds that it assumes that the private and public sectors are interchangeable (Du Gay, 2000). Mintzberg (1996) argues that the focus on financial results is incompatible with the notion of public service as equal access must be provided to all. In other words, the private sector can simply focus on profitable areas of operation whilst the public sector can not do this. A second criticism can be made against the concept of performance measurement. Watson (1994, p. 136) argued that measurements tend to become "… ends in themselves …" and that managers will focus only on the things they are measured upon and will engage in gaming in order to score highly. The final criticism of the NPM is that the assumption and continual repetition of the belief that the private sector was superior undermined the very concept of the public sector (Du Day, 2000; Newman, 2001). This contributed to a collapse in morale in the public sector and therefore the NPM created a self-fulfilling prophecy—the public sector was undermined and low morale contributed to poor performance which justified the NPM.

The Agenda of Partnership

The implement of the NPM proved extremely contentious and in an effort to neuter the controversy, policy makers increasing began to promote the concept of Public Private Partnership (PPP) as an extension of the NPM reforms (Ferlie, Ashburner, Fitzgerald, & Pettigrew, 1996). Partnerships were seen as a way of leveraging the skills of the private sector to deliver improvements in efficiency and performance in the public sector whilst avoiding the antagonism associated with previous incarnations of the NPM such as outsourcing (Martin, 2000). However, the term partnership itself is something of a contested concept and is used to refer to a variety of relationships between public and private sector organizations. For example, Linder (2000) notes that outsourcing relationships which are little more than contractually based exchange relationships are often described as "partnerships."

This conceptual confusion can be overcome by considering the work of Sullivan and Skelcher (2002) and Teisman and Klijn (2002) who argued the critical issue in partnerships is the willingness of the parties involved to collaborate. Sullivan and Skelcher (2002) argued that partnerships are cooperative interorganizational relationships in which the different members see their long term interests as inseparable from those of their partners. Teisman and Klijn (2002) expand on the notion of collaboration and suggest that a partnership is characterised by a willingness to take joint decisions, which allows organizations to establish the synergies which will underpin the partnership. As such a PPP can be identified as a cooperative interorganizational relationship in which public and private sector organizations believe that they have and will continue to mu-

tually compatible interests. These compatible interests allow the organizations to take shared decisions and to pursue objectives that can only be realised through cooperation.

In the UK, a particular common form of PPP is the Private Finance Initiative (PFI) which is often used to develop public sector infrastructure (Falconer or McLaughlin, 2000) or even to develop ICT systems for government (Bovaird, 2004). In a PFI scheme, the development and operating costs are shifted to the private sector partner as it is believed that they are able to manage finances more effective than the public sector. This belief is underpinned by the arguments of the NPM. The finished infrastructure is then leased to the public sector over the lifetime of the contract which creates income for the private sector and therefore synergies are created (Ball, Heafey, & King, 2000).

However, the ability of the PFI scheme to create synergies have been called into question by Lonsdale (2005) who argued that PFI schemes actually created a situation in which a public sector organization would become dependent upon its private sector "partner" for expertise or for the supply of resources. This would create contractual "lock in" and the private sector partner could exploit the public sector one as the public sector could not easily find new partners. Furthermore, in ICT based partnerships it is not entirely appropriate to talk about the private sector "operating" the partnership as there is not a physical infrastructure (i.e., a building) to operate. Instead the private sector becomes responsible for procuring, replacing, and providing specialist support for ICT systems. However, the day-to-day maintenance is carried out by the local authorities own ICT specialists. As such the term "operate" is rather misleading as the local authority fundamentally retains control over the professional staff who works with the systems on a daily basis.

The Emergence of Strategic Service Partnerships

In an effort to address the problem of contractual "lock in," the agenda of partnership has been extended into SSPs. In many respects an SSP is very similar to a PFI scheme in that the private sector is responsible for funding development and operating costs (Rubery, Earnshaw, & Marchington, 2005). However, an SSP assumes that the dependency relationship inherent within PFI can be overcome by deepening the interorganizational relationship between public and private sector organizations in an effort to make the parties to the relationship interdependent. This view of the benefits of SSP arrangement was held by the Office of the Deputy Prime Minister (ODPM) which was the Government department charged with overseeing local government in the UK. As such, it can be observed that SSPs had high-level political support (ODPM 2004).

This deepening of the relationship would be achieved by allowing private sector to assume responsibility for operating services or infrastructure that are critical to the operations of a public sector organization. However, because these services or infrastructure are integral to the public sector organization, they are deeply embedded and are inseparable from other operations and infrastructure. As such, the ability of the private sector provider to operate them is dependent upon other services and infrastructure that remains under the control of the public sector. It was believed that this would create an interdependent relationship that would avoid the risk of contractual lock in. In other words, an SSP argues that the solution to problems with partnership is another form of partnership.

SSPs have become increasingly popular in recent years as a means of allowing local authorities to upgrade their ICT systems (Hughes, 2005; Rubery et al., 2005; Watt, 2005) whilst delivering performance improvements as is demanded under

the Local Government Act 1999. ICT lends itself particularly well to SSP programmes as local authorities lack both the expertise to deliver ICT systems (Langford & Harrison, 2001) but also lack the financial resources to fund them and must rely on the private sector to provide finance and know-how. As ICT is integral to the operational processes of a local authority, it is deemed to be capable of producing the deeply integrated partnership that characterises an SSP.

ICT IN THE PUBLIC SECTOR

ICT is believed to be an important part of organizational reform in the public sector as ICT systems are often used to streamline organizational procedures (Heygate, 1994; Markus & Robey, 1988) to deliver efficiency improvements. The importance of ICT in public sector reform is illustrated by a substantial body of work (Brown, O'Toole, & Brundney, 1998; Cats-Baril & Thompson, 1995; Goldfinch, 2007; Heintz & Bretschneider, 2000; Jorna & Wagenaar, 2007; Kraemer & Dedrick, 1997; Moon, 2002; Pratchett, 1999).

However, this literature suffers from two flaws. The first is that the literature has tended to draw its arguments from cases of ICT reform in the private sector. This is well illustrated by considering the work of Jorna and Wagenaar (2007) and it is worth quoting Jorna and Wagenaar directly:

We base this thesis first and foremost on the work of Argyris who points to the significance and gives evidence of what happens when the use of MIS's [ICT] crowds out human interaction (p. 195).

As can be seen, Jorna and Wagenaar (2007 base their examination of ICT in public sector organizations upon the arguments of Argyris (1994). Argyris examined the impact of ICT (Management Information Systems in his terminology) in private sector organizations. However, as Ni and Bretschnieder (2007) point out, public sector organizations exist in a different institutional context to their private sector counterparts and are subject to political pressures rather than commercial ones. As such, basing arguments on literature developed for the private sector runs the risk of repeating the fallacy of the NPM that the public and private sectors are interchangeable (Du Gay, 2000).

A second flaw with the existing literature emerges if consideration is given to the way in which ICT systems are currently procured. Public sector organizations have increasingly come to arrange ICT provision through a myriad of long-term contracts and partnering arrangements (Bovarid, 2004). These partnership arrangements involve a cooperative interaction between two or more organizations. However, the discussion of the way in which ICT based reform is implemented or the way in which ICT system procured has tended to view the public sector in isolation (e.g. Brown et al., 1998; Moon, 2002; Pratchett, 1997) throughout the process. This failure to consider the role of multiple organizations has lead to a situation in which the subject of ICT reform is only partially addressed by the existing literature.

THE CASE OF NORTH TOWN

To illustrate the complexity of ICT reform in the public sector and the importance of understanding the political context, an in-depth case study of the development of an SSP in the English town of North Town is presented. Flyvbjerg (2006) argued that case studies are an effective means of illustrating the effectiveness of a particular theoretical approach to complex phenomena as they serve as examples. North Town is an effective example of ICT based organizational reform the case illustrates the complexity of ICT reform in the public sector and in particular SSP arrangements which are rather under-researched given their recent appearance. The case study is able to highlight the impact of political factors and how

the development and implementation of reform programmes depends upon a series of intra and interorganizational relationships. In other words, the case study is able to uncover the context in which the reforms took place (Yin, 1994).

Data Collection and Analysis

The study of the development of an SSP in North Town has employed qualitative methods. In particular, document collection and in-depth personal interviews were used as these allowed the researcher to uncover the reasoning which underpinned the decisions made by key actors. Qualitative methods also allowed the research to highlight the specific factors and relationships that impacted upon the process of reform in North Town.

The research itself consisted of two iterative stages which took place between January 2005 and January 2006. The first stage consisted of the collection and analysis of publicly available documents and the second stage consisted of the personal interviews with key actors within North Town. The document analysis collected documents relating to the Audit Commission's inspection, North Town's response, its own improvement plan (North Town, 2003) and the minutes of council meetings. The analysis of these documents allowed for the construction of a timeline and the identification of the key themes, issues and policy agendas within North Town as understood, proposed and accepted by those directly involved (Atkinson & Hammersley, 1994). The documents also allowed for the identification of key actors involved in the process of developing and implementing the ICT reforms and in this respect the research followed established qualitative research practices (Connell, Lynch, & Waring, 2001).

The second stage of the research consisted of the personal interviews. However, to gain access to the individuals identified in the first stage, the study followed the advice of Marshall and Rossman (2006) and employed the use of a project sponsor—a senior manager—who happened to be interested in taking part in an academic investigation of an ICT reform project. The interviews themselves followed a semi-structured design and examined the issues and themes identified through the document collection and analysis. The decision to use semi-structured interviews was made because the interviews were generally conducted with senior officials within the local authority or senior members of the trade unions. These individuals constitute organizational elites and are likely to be used to dealing with questioning and enquiries (Marshall, 1984). However, Marshall and Rossman (2006) argued that elites are likely to be forthcoming if they are given the opportunity to discuss the topic of investigation and semi-structured interviews allowed for broad discussions.

In total 25 interviews were conducted, 17 of these were recorded and in the remaining eight interviews, extensive notes were gathered. The interviews were fully transcribed to aid subsequent analysis and each interview was analysed soon after it was conducted. The analysis of the interview data revolved around a thematic sort in which the data was sorted into individual categories, such as the different policy agendas, the aims and objectives of the SSP and the personal reflections and opinions of the individual interviews. These categories were identified through the analysis of the documents but also from examination of the text of the interviews themselves. This method allowed for the underlying issues relating to the development of the SSP, as perceived by the interviewees, to be drawn out. Following the completion of the interview, each interviewee was asked to identify other individuals who were involved in the project and to highlight other relevant documents. Further interviewees and documents were also suggested by the analysis. As such, the interviews were used iteratively with the document collection.

The Problems of North Town

North Town is a small, economically deprived town located in the north of England whose local authority under significant financial pressures. Politically, North Town's population is left-leaning and this has created an attitude in the local authority that was that was described by a Trade Union representative (personal interview, September, 2005) as "… socialist …" This attitude led to hostility to the NPM reforms and to the partnership agenda on ideological grounds as the NPM was associated with the unpopular ring-wing Conservative Government of the 1980s and mid-1990s (Martin, 2000; Newman, 2001).

In 2001 North Town, like a number of cities and towns in England, experienced significant urban unrest. These riots led directly to the departure of the majority of the SMT and contributed to the dominant Labour group losing control of the council to the Liberal group in 2002. The riots also focused national attention on North Town and the local authority extensively criticised by the Audit Commission (2002) which, in an inspection, identified serious performance failings with the local authority as a whole. Although, it must be noted that the Audit Commission accepted that some of the individual departments did perform well but overall performance was poor.

The Audit Commission (2002) report indicated that serious problems existed in the disjointed, uncoordinated internal procedures within North Town that resulted in serious inefficiencies. The Audit Commission also highlighted gaps in the capacity of the SMT (due to resignations) and a political leadership that was hesitant and lacked vision. These problems not only contributed to a lack of direction in North Town but led to poor communication between the different departments and this was reducing the standard of public serviced offered. As Middle Manager 1 (personal interview, October, 2005) reflected:

To pay your tax you had to go to Revenues, but if you also had a parking ticket to pay you'd have to go to Highways … You see Revenues couldn't tell Highways you'd paid up as Highways had a different set-up.

Although the Audit Commission identified operational failures in North Town, it failed to recognise that the inefficient procedures were the result of problems with the ICT system. The ICT system in North Town was based upon mainframes and each individual department operated its own system. This created a situation in which the authority's ICT infra-structure was composed of several quasi-independent and incompatible systems. As such it was very difficult for information to be communicated between different departments within North Town local authority. In effort to overcome these communication difficulties, organizational procedures had developed which bypassed the ICT systems. This had led to a reliance within the local authority upon inefficient methods of physical communication and this was described by the Head of Finance (personal interview, November, 2005):

I sat in this room with the previous administration and explained the process by which someone would get paid. We'd have weekly paid staff and they'd fill in a timesheet, the manager would transcribe it and the whole thing would be driven to Finance … it was a joke.

Although the individual departments could exchange information through physical methods of communication, this was time consuming and inefficient. As a result the level of communication between departments was low. Furthermore because of difficulties in communication, North Town had consciously tried to avoid centralisation and as such many of the corporate functions of the local authority existed at the departmental level. For example, each department had its own

Human Resources (HR) function and disciplinary procedures. As the Head of Human Resources (personal interview, July, 2005) explained:

The problem was that with all the different IT systems each department had its own disciplinary procedures. This was held by departmental [middle] managers and no-one would tell us. You can't manage in a situation like that

This control of informational resources by middle managers had the effect of shifting power away from the SMT as information had become a political resource (Pettigrew, 1972) within the local authority. As such, in order for the SMT to exercise authority it had to engage in political negotiations—the generation of intra-organizational relationships—with individual managers who were capable of resisting central direction. This desire of individual managers to act independently of the SMT can be attributed to a belief that the needs of their own department were paramount and this can be understood as a consequence of the NPM.

The NPM had imposed performance measurement regimes (Pollitt, 2003) in which each department was responsible for its own performance. However, to ensure that performance could be maintained, departments had to secure and maintain resources and these were allocated by the SMT. As such, individual departments were able to extract resources from the SMT in return for the information that the SMT required to manage the authority. In this relationship, power was vested with the departments as the SMT could not withhold funds as this would undermined performance and this would reflect badly on the local authority and in particular on the SMT. Therefore, it can be argued that in North Town, the intra-organizational relationships within the authority were deformed.

This situation was broken from 2001 onwards due to three factors. In 2001, the urban unrest resulted in the resignation of the majority of the existing SMT which was responsible for the gaps in managerial capacity as noted by the Audit Commission (2002). A second factor in the collapse of the established intra-organizational relationships within North Town was the change in political control. In 2002, the Labour group lost their majority and this can be attributed to public dissatisfaction (James and John in press) as a result of the riots and the Liberal group assumed control of the council. The final factor was the Audit Commission's inspection in November 2002 which identified the problems that North Town was required to address. The interaction of these three factors led to North Town producing an ambitious programme of ICT based organizational reform which cumulated in the creation of the SSP.

The Development of ICT Reform in North Town

In May 2002, the Liberal group became the largest political group in North Town, however the Liberal group did not secure an absolute majority and as such their control was tenuous. This was later recognised by the Audit Commission (2002, p. 10) which pointed out that the reforms they required could only be achieved if the Liberal group developed cooperative relationships with the other political groups. In other words, inter-organizational cooperation between the different political groups would be required to address the problems of intra-organizational communication with the local authority.

In response to the criticisms of the Audit Commission, the Liberal group attempted to reform North Town's operational processes. In order to deliver this reform the Liberal group was advised by North Town's ICT department that ICT reform was necessary in order to deliver operational reform. As North Town's Head of ICT (personal interview, November, 2005) explained, "I sat in this room with the [Labour] administration and the previous [Liberal] administration and told them that you can't have operational reform without ICT reform."

The fact that the need for ICT reform was proposed internally can be understood in terms of the internal politics of North Town. In proposing ICT reform, the Head of ICT was seeking to gain influence with the elected members as the process of ICT reform would require the extensive involvement of the ICT department. This was because the ICT department possessed the specialist knowledge to oversee the procurement. Furthermore, the ICT department would also be elevated to a privileged position within the authority as they would form the primary boundary-spanning unit between the local authority and the private sector partner providing the ICT systems. This would be supported by the fact that once North Town began to view the partnership in terms of an SSP, the strongest lobbying against the SSP came from the ICT department as the Deputy Chief Executive commented (personal interview, October 2005) "Well, IT are against it [the SSP], obviously." As such it can be observed that attempts were made to establish an interorganizational relationship within the institution of the local authority in an effort to manipulate the way in which the interorganizational partnership that would be providing the funding and technology would be constructed.

The concept of ICT reform was attractive to the Liberal group for two reasons. The first was that by presenting the ICT system as the key variable allowed North Town's problems to be understood as amendable to rational solutions (Heintz & Bretschneider, 2000). The second reason why ICT based reform was seen as attractive was that the Audit Commission (2002, p. 9) had criticised the Liberal party for hesitancy and that ICT reform provided the Liberal group with a "vision" that it previously had lacked. However, the Liberal group sought to achieve ICT reform though a PFI style partnership arrangement. The decision of the Liberal group to follow a partnership was explained by the Leader of the Liberal group (personal interview, October, 2005) who commented that "… partnerships are just the way things are done now."

In order to implement the partnership agenda, the Liberal group required both the support of the Labour group (due to the lack of a majority) but also the support of the administrative bureaucracy. The Liberal group was able to secure the support of the Labour group because the experience of losing power had caused internal political changes within the Labour group which were described by North Town's Deputy Chief Executive (personal interview, July, 2005) "… they went into a opposition as a very traditional Labour group and came back out of it more aware of the new ways of doing things."

However, this change in attitude within the Labour group owed more to politics than an ideological conversion. The Labour group had lost power because they were perceived by the electorate to have presided over an authority that performed poorly. As such the Labour group adopted the reform agenda so that they would appear to be part of the "solution" to North Town's problems but also the adoption of a partnership agenda allowed them to distance themselves from their previous failures. Although the Labour group subscribed to due to self-interest, their support was obtained and a cooperative interorganizational relationship was established between the political groups in pursuit of a cooperative partnership with the private sector.

Despite the support of the political groups for partnership, the attempts to implement this agenda met with considerable resistance from the administrative bureaucracy and this led North Town's Deputy Chief Executive (personal interview, June, 2005) to comment "The officer response to Liberal Democrat policies to establish a partnership whilst they were in control was disappointing." The failure of the Liberal controlled council to obtain the support of the professional staff can be attributed to two reasons.

Firstly, the ingrained attitudes of many individuals with the local authority regarded partnerships and the NPM with suspicion As a Trade Union representative (personal interview,

October, 2005) explained "I'm not just saying this because it's the Union position. If I didn't reflect my members, they'd vote me out. They don't trust partnership, they know what'll happen. We'll get ripped off." Although, the ICT department was very supportive of the partnership as they would gain substantially. Other departments were less supportive as they suspected that ICT reform would remove their power base in the local authority. In fact, Middle Manager 2 [personal interview, November 2005) commented that asking the departments to support reform was like asking "… turkeys to vote for Christmas."

A second reason for the failure of the Liberal group to gain support in the administrative bureaucracy was due to the fact that key leadership positions in the SMT were occupied by managers who were acting up. As such they had no incentive to implement policy. In fact the SSP Project Manager commented, "You thought you had got something agreed with a management team and then there was a different management team."

Addressing the problem of gaps in the SMT was of critical importance to both the Liberal and Labour groups, as North Town could not effectively operate with an incomplete management team. To address this problem, both political groups cooperated on the process of searching for new managers. Due to the shared commitment to achieve reform through a partnership, the managers they sought to recruit would be wiling to drive the political agenda of partnerships through to implementation. In fact, North City's Deputy Chief Executive (personal interview, July, 2005) made this point explicitly:

The [Strategic Management] Team came together in 2003 when five new members joined us giving us quite different characteristic from the old one and three members joined us from another city where there was experience in strategic partnerships.

The Implementation of Reform in North Town

In April 2003, the Labour group regained majority control of North Town and by July 2003, the vacancies in the SMT had been filled with permanent appointments. As such the managerial leadership of the local authority and the interface between the administrative bureaucracy and the political leadership was restored. This allowed for the agenda of partnership to be advanced as there was commitment amongst the political leadership and amongst the SMT.

In order to realise the proposed partnership, the Labour controlled council attempted to gain the support of the individual departmental managers and the administrative bureaucracy at large. This approach was employed because in North Town individual managers had the ability to resist reform and as such reform could only be achieve if a coalition was assembled amongst the managers (Buchanan & Boddy, 1992). The attempt to assemble this coalition of support was based on an attempt to show that the only way to fund ICT based reform was through a PFI type partnership. To provide evidence of this, North Town hired a consultancy firm to assess the costs of replacing the ICT systems. This tactic is often used in change programmes whereby consultants provide "independent" evidence to support managerial intentions (Kubr, 1998). The consultants reported that North Town required £14 million ($28 million) worth of replacement systems. However, whilst the consultancy report was able to justify why partnership was necessary in financial terms, the report actually undermined attempts to develop support as it simply reinforced existing attitudes by making the proposed changes seem inevitable.

The failure of the PFI scheme to gain support amongst the administrative bureaucracy was interpreted by the SMT as a challenge to their authority and as such they abandoned attempts

to implement partnership by consensus. This was also coupled with an emerging belief amongst the political leadership (and the SMT) that that the size and scope of the proposed partnership (£14 million) would be too small to attract a private sector bidder and the potential efficiency gains of partnership would not be maximised. In reaction to these problems, the SMT and the political leadership opted to expand the PFI style partnership into an SSP.

The proposed SSP would involve the replacement of the ICT systems within the local authority but it would also see the development of a central communications hub, operated and staffed by the private sector. This would centralise the informational resources of the local authority and would allow electronic communication between departments but would also remove the informational resources from departmental control. It was also believed by the senior mangers of North Town that in allowing the private sector to assume complete control over ICT operations, that the private sector would deploy superior management techniques, This would deliver the improved efficiency and improved economy required by the 1999 Local Government Act and allow the objectives of the NPM to be realised. As the Head of Regeneration Services (personal interview, October, 2005) explained "Local Government is doing a lot of things we don't need to do. We can get it done cheaper and better by the private sector." These comments were echoed by the Head of Finance and Accounting (personal interview, November, 2005) who was naturally concerned with the financial aspect of the SSP.

We had a situation where if we did it ourselves we could achieve X efficiency savings, if we did it on a contract [PFI], we'd get Y savings and if we used the strategic partnership we'd get Z savings. It's a no brainer.

Although the SSP was rationalised in terms of performance and financial efficiency, it actually had concealed objectives. The purpose of the SSP was to restore the SMT's control of the administrative bureaucracy. However, as partnerships are based on a notion of cooperation, a private sector organization may be concerned by a hostile administrative bureaucracy. As such, to overcome this significant commercial opportunity had to be offered. This explains the decision to create a large scale SSP with a value in the tens of millions pounds. The SSP also sought to promote intra-organizational communication and cooperation within North Town and it was believed that this could be achieved by centralising informational resources in the hands of the private sector.

IMPLICATIONS FOR THE FUTURE

The North Town case study was chosen for study because it highlighted the complexities involved in achieving ICT based organizational reform and showed reform is actually hostage to a series of intra and inter-organizational relationships. North Town choose to achieve reform through an SSP arrangement which are increasing popular as means of delivering ICT based reform (Hughes, 2005) and this study adds to the literature on SSPs by highlighting the motivations of the key individuals involved in their creation. The study also engages with some of the complexity involved in the creation of SSP. However, as SSPs are rather under-researched, there remains a need to conduct further investigations on this form of partnership arrangement.

The North Town case study suggests that the ultimate choice of partnership arrangement was determined by the somewhat dysfunctional intra and interorganizational relations within the local authority. As such further research is necessary to determine whether other SSP arrangements are the result of similar dysfunctional relationships or are genuinely driven by the need to achieve economy and efficiency. A final issue for future research would be to examine the actual opera-

tion of SSPs (although Rubery et al., 2005 have made some progress in this direction) in order to determine whether SSPs really do produce synergies or whether they simply result in contractual lock-in as predicted by Lonsdale (2005).

CONCLUSION

It has been argued ICT enabled reform in the public sector is extremely complex and this is due to the interaction of various intra and interorganizational relationships which are critical in achieving reform. These relationships interact with each other and the establishment, success or failure of one affects the possibilities for the establishment, success or failure of another relationship. This method of understanding the process of reform was used analyse the development of an ICT enabled reform programme in a UK local authority and it was shown that by investigating these relationships, the way in the project evolved can be understood. In short, the central conclusion is that in the public sector, reform that is designed to achieve increased levels of intra-organizational through ICT systems is likely to involve inter-organizational collaboration and scholars and practitioners need to be aware of this.

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KEY TERMS

Group: In the UK, at the local level, political parties are not formally recognised and the elected members form political groups in place of political parties. The groups are formed along party lines, however.

Information and Communications Technology (ICT): This often is used to refer to entire systems of hardware and software designed to relay information.

Labour Party: The Labour party, to differentiate it from the national New Labour Party is one of the major political parties in North Town. Although the party is part of the national Labour organization and is in theory answerable to it, it is, like all local political parties functionally independent.

Liberal Party: The Liberal party is actually known as the Liberal Democrats party but is referred to as the Liberal party to avoid confusion with the national Liberal Democrats Party to which it is answerable.

New Public Management (NPM): A series of beliefs and reforms that attempted to transform the public sector into an image of the private sector. The NPM was based largely on a belief that the private sector was intrinsically more efficient and superior in delivery to the public sector. This argument was and still is highly contested within the academic literature.

Office of the Deputy Prime Minister (ODPM): A Government department responsible for local government. The ODPM was abolished in 2007 and was superseded by the Department for Communities and Local Government (DCLG).

Public Finance Initiative (PFI): A PFI scheme is where a private sector organization provides upfront capital for a public sector infrastructure project and incurs the development costs. The cost are then recouped through a long term contract in which the public sector leases the infrastructure. When the contract expires the ownership of the infrastructure reverts to the public sector.

Public-Private Partnership (PPP): A form of long term contracting between the public sector and the private sector that is thought to be underpinned by a collaborative relationship and high levels of interorganizational trust.

Strategic Service Partnership (SSP): SSPs are a variant of the Public-Private Partnership which are often based around ICT. They are considerably more complex than 'conventional' partnerships and see the integration of the private sector provider into the actual operations of the public sector organization. However, in financial terms they have a substantial similarity with the PFI scheme.

United Kingdom (UK): This consists of England and Wales, Scotland and Northern Ireland. Scotland and Northern Ireland have their own systems of Local Government. This paper specifically relates to Local Government in England and Wales.

Chapter XLVII
Electronic Collaboration Toward Social Health Outcomes

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ABSTRACT

This is an illustrative process description of a collaborative project utilizing a multidisciplinary approach. The requirement for collaboration originated in an attempt to optimally answer the needs of individual patients and health professionals for information to allow them to achieve better health outcomes. This chapter introduces the problem statement through the auto-ethnographic reflections of three project developers. These reflections illustrate individual experiential agendas that initiated electronic collaboration among diverse stakeholders in the health care network. Each reflection also illustrates the

sequence of events in a collaborative process beginning at the individual level and growing through the interaction of multiple individuals including patients, their relatives, health professionals, and other actors in the care giving network. This chapter describes how collaboration was sustained and further developed into an operational model.

INTRODUCTION

To arrive at a correct diagnosis, a health professional requires an accurate account of the illness history from the patient or her/his relatives. Active collaboration with a patient to determine what the patient values most are necessary for a health professional to select an appropriate therapeutic option. Medicine is thus a collaborative effort in problem solving between individual patients and health professionals. The collaborations also involve others who are directly or indirectly related to the patient and health professional (for example, the patient's relatives and the physicians' institutions) who provide the necessary support to the two primary collaborators.

In the medieval past medicine was a similar problem solving effort between patients and health professionals. With time and globalization there have been major changes. From an approach where clinical decision-making was driven by the expert opinion of a local physician (as a first step to medical problem solving) the collaborative process has evolved to a global evidence-based approach that uses generalized information for the benefit of the individual patient (Biswas, 2007).

As clinical information is, to a large extent, available on the Internet, patients and health professionals have rapidly learned to use Internet services to solve their clinical problems. All these users and their information needs drive health care to a considerable extent. The traditional patient and health professional clinical encounter has tended to become an informational collaborative process persistent in virtual space and time. A persistent clinical encounter has immense potential advantages for the patient as well as the health professional (Haggerty, 2003).

However, in day-to-day practice, both individual patients and health professionals are often in situations where the information available is limited and difficult to apply to a given patient. A gap between the paucity of what is proved to be effective for selected groups of patients versus the infinitely complex clinical decisions required for individual patients has been recently recognized and termed the inferential gap. The breadth of the inferential gap varies according to available knowledge, its relevance to clinical decisions, access to the knowledge (that is, what the physician actually knows at the time of a clinical decision), the variable ways in which knowledge is interpreted and translated into a decision, the patient's needs and preferences, and a host of other factors. Clinicians are required to fill in where their knowledge (or knowledge itself) falls short. (Stewart, Shah, & Selna, 2007).

PROBLEM STATEMENT

Average patient data, which drives most of our present day (knowledge and evidence) information bases, is often unable to satisfy individual patient and health professional needs. In spite of an unprecedented expansion of medical information, at present we still do not have the quality of information to satisfy a given individual patient to an optimal extent (Biswas, 2008a).

Reflections of Practitioners as Data to Support Project AMIN (Answering Multidimensional Information Needs)

To expand on the problem statement, auto ethnographic reflections of individual project developers have been utilized. Auto ethnography is a recognized qualitative research method through which a researcher uses participant observation in order to gain a deeper understanding as well as to theorize about models of human behavior within a group and across different groups. Often, but not always, the researcher is a member of the group in question rather than the traditional outsider ethnographer (Ellis, 2004; Reed-Danahay, 1997). Auto ethnography has been utilized here because social networking for health outcomes begins with an individual and her/his story. It also offers valid information that drives the entire healthcare process for that individual. These stories illustrate the sequence of events in a collaborative process beginning at the individual level and growing at an intersection of multiple individuals that includes patients, their relatives, health professionals and other actors in the care giving collaborative network.

Individual patient autoethnographies housed in personal health records would help to maintain the user-driven nature of the collaborative healthcare network. The development of such a network is an aim of the collaborations illustrated in this chapter.

The following paragraphs incorporate selected reflections among the members of the collaborative team that provide experiential observational data in favor of the necessity of the research project.

Jayanthy Maniam offers the following reflections.

The human need:

As a first time pregnant woman back in 2001, I was excited and wanted to know more on how I should prepare myself and my baby throughout the stages of the pregnancy. Of course, I had a lot of advice from my parents, in laws, friends and colleagues cautioning me about pregnancy.

When I visited the gynecologist, he just told me to not worry about anything and take vitamin tablets as prescribed. I was not satisfied, as I had many questions for which I wanted simple answers without much confusion.

I turned to Internet for pregnancy support. I was amazed to find so much information about pregnancy. Unfortunately, Web sites provided very general information and did not answer most of my questions.

I was left with a feeling that there was perhaps no site specifically designed to provide pregnancy support for Asian women who live in diverse cultures with traditional beliefs and with taboos that are difficult to overcome without optimal informational support.

The grip of dated and yet emotionally captivating information:

It is especially hard for a first time mother to cast away accumulated information which takes form of cultural taboos (no matter how ridiculous some of this information may appear) because the taboos may create fear of losing her child in the womb. Many women are forced to rely on information that is passed down from one generation of mothers to another. There is always a nagging feeling that this information may not be accurate, but many end up following traditional advice for want of a better alternative. I was not an exception to the rule. The questions that I had in my mind were: how much of these traditional beliefs are true? And if I do not follow them, will it affect my pregnancy?

The professional need:

To address this personal need (which I felt was also perhaps universal for women) I decided to build a Web-based pregnancy system model for women in Asia with my student Mr. Chang and Dr. Rachagan, a consultant gynecologist, who provided his valuable inputs for this project. The system included stages of pregnancy with weekly growth of the fetus, diets, and exercise during pregnancy, dos and don'ts based on contemporary medicine.

The cultural taboos were explained to educate women on how these taboos came about, whether they were relevant to their present life styles, and if they were harmless or could have any adverse effect on their unborn babies. The system also included information about common illnesses during pregnancy, postnatal care, and when to seek help.

The Web-based prototype developed with search and medical consulting functions is illustrated in Figure 1.

2D and 3D animations, video clips and other multimedia elements were added to keep the user interested during the visit to the Web site. The Web-based prototype won the Multimedia Super Corridor Asia Pacific ICT Awards (MSC-APICTA) 2003 Merit Award under the tertiary institutions multimedia content category in Malaysia.

Reaching a wider audience:

This is when I realized that there were other researchers around the world who were also looking at personalized content for specific population needs. One concern was the accessibility of this valuable information to a wider population.

While searching for answers, I noticed the growing trend of mobile communication in Malaysia and around the world. Statistics showed that, in 2005, the number of mobile phone users was 2.2 billion as compared to 1 billion Internet users (ITU, 2006). For example, in Malaysia the Internet penetration was about 13 percent only as opposed to mobile phone penetration of 60 percent. Later data suggests that almost everyone in Malaysia has a mobile phone. (MCMC, 2006) This growth

Figure 1. Shows the main menu of the prototype model of Web-based system called "Pregnancy and Baby care e-guiding system"

in mobile phone usage has created the opportunity for localized mobile content development to reach a wider public. With higher speed and affordable rate, mobile phone subscribers are able to get multimedia content such as movie clips and news. With availability of compression technology to reduce the size of the content for mobile display, accurate information about pregnancy can be easily delivered by developers and obtained by expectant mothers at any possible time and place. This service may be easily accessed even from rural areas where transportation and medical services are limited.

It was clear to me that communication technologies using mobile devices had a tremendous potential to improve education, health and economic welfare of people. This is when I shifted my focus from a Web-based system to a mobile phone pregnancy system and presented my ideas at the E health ASIA 2007 conference in Kuala Lumpur (Maniam, 2007). I also believed that this framework could be extended to chronic disease heath care support as well.

At that conference I met Dr. Rakesh Biswas who was the speaker presenting before me. We discussed a possible mobile phone and Web based integrated system that could provide support to diabetic patients through virtual means. This would allow the clinical encounter to persist, even after their personal visits at which time and information availability were limited. I was excited about this idea and wanted to help him technically by extending his work onto a mobile platform. Soon Edwin Wen Huo Lee from Intel, Malaysia also joined us to collaborate in this project. Currently, we are working on the details of this framework, prototype development and testing.

Dr. Rakesh Biswas offers the following reflections.

The human need:

Before becoming a medical student 20 years ago I was like any other human. One part of me still remains so, but, in the following years, it has never ceased to make me wonder how my life was transformed in the eyes of other humans the day I entered this old profession. I have, fortunately, been both a doctor and a patient, and I try to appreciate both sides of this professional relationship. This relationship rests on a perpetual interaction between patients and health professionals in a multidimensional clinical encounter. Stake holders in this process may include government, financial investors, patient's relatives, and others, all of whom try to collaborate to achieve what they believe to be optimal health care.

The professional need:

As a physician, I felt that there was a great unmet need for optimal informational satisfaction. I felt that the lack of satisfactory information was due to the present emphasis on going by average information obtained from collective clinical experimentation on selected samples of the population. I had a hunch that I would have loved to have access to information that reflected the lived experiences of individual patients and their physicians that matched the experiences I encountered with my patients. I gradually became aware of the power of Web 2.0 to provide better access to such information; I hoped to create a Web-based solution that could reach the majority of those who could benefit from it with the help of a technical collaboration.

In my clinical practice that was situated in a tertiary care hospital of a busy Indian city, I came across a large variety of patients from remote areas of India. In my eagerness to keep learning from my patients, I initially asked them to keep in touch through my Mobile phone number. I later felt this had not been a wise decision, as I had to fend off long distance calls from various locations in India often while maneuvering my car through

a busy traffic. I only wished there was some manner of helping them by means of an asynchronous network. I imagined a Web-based solution able to store all patient data generated as a result of the communication such that it became a learning solution.

It was with this background and hope of finding a developer that I presented my ideas on answering multidimensional information needs of individual patients and health professionals through user driven healthcare at first in the IEEEP427 conference in UK and later in the E health Asia conference Feb 2007, Kuala Lumpur (Biswas, 2007). Thankfully, I found Jayanthy Maniam who spoke after me in the conference in Kuala Lumpur. We discussed the possibility of collaborating as soon as the conference was over. We were soon joined by Edwin Wen Huo Lee from Intel who had attended the same conference and recognized the feasibility of developing this idea.

Edwin Wen Huo Lee offers the following reflections.

The professional and human needs:

Compared to other industries like Banking and Retail, health care has been slow to adopt ICT (information communication technologies). Only recently, HIS (health information systems) have become popular in the healthcare industry, but most HIS systems are still independently functioning systems and it is hard to build bridges between each of them for various reasons. A PHR (Personal Health Record) that can be in the hand of individuals (or at least exist in a more individually controllable manner) is still a distant dream in most countries. I was influenced by a few health-related incidents with my daughter; my aging parents and some close relatives that made me realize the importance of personal health records. I decided to get involved actively in healthcare IT. To me, this seemed a practical way I could contribute and support my society and community more meaningfully, especially because the digital divide is wider in Asia.

I met Dr. Rakesh Biswas when I attended E-Health Asia Conference in Kuala Lumpur in March 2007. His ideas on answering multidimensional information needs for chronic patients by leveraging common technology like mobile phone clicked very well with my interest and direction. This collaboration allowed us to extend a holistic approach to support diabetes patients by developing different means and ways for people to get medical support by access to familiar tools.

The framework that I started designing to support it is called Unified Communication Framework. It combines both voice and data networks in order to support different types of users.

Validating the ideas necessitated addition of a proof of concept to the operational prototype and could be best achieved with a randomized controlled trial (RCT). Dr Premalatha Gopal Das joined at this point to contribute her expertise in public health and help develop the RCT. The collaboration expanded with Dr. Shashikiran Umakanth who had contributed valuable ideas to the conceptual model, Dr. Sumit Dahiya who had furthered these ideas by presenting them in an international conference and Dr. Sayeed Ahmed who was keen to work toward making this idea into a reality.

The following sections describe the plan that aims to increase inter individual collaboration among key players in the care giving and care seeking collaborative network in the present health care system in an attempt to produce what has been termed as user driven health care. It has been also described previously in a separate context as an operational model for a post EBM approach to answering multidimensional health information needs (Biswas, 2008b).

INTER-ORGANIZATIONAL COLLABORATION TO ACHIEVE INDIVIDUAL PATIENT AND HEALTH PROFESSIONAL COLLABORATION FOR BETTER COMMUNITY HEALTH OUTCOMES

Every person has the capacity to, and is likely to perform the role of caregiver and the role of care seeker (patient) in their lifetime. A large volume of individual patient or health professional experiential information (that may resemble autoethnographic reflections) exists in difficult-to-search Web logs. However, most of the innumerable day-to-day clinical encounters remain undocumented.

Individual users may make record their unique experiential information on a Web log. These records may reflect their learning of patho-physiologic rationale behind the disease at hand, individual patient values and preferences, health care system features including resource availability and societal and professional values. Once individual care givers or care seekers log such information, other Web users may retrieve it through search engines.

The results of a search could present related individual experiences mashed up with empirical data immediately at the click of a mouse. The illness experience posts may link to related posts depending on the keyword-tags used to represent the posts. This would enable every user posting his/her individual experience to read about similar relevant lived experiences of other individuals. It would be up to the individual to derive meaning from these multiple dimensions of information. Even if one could, in this manner, collate a larger variety of experiential information on the Web, the results would still be available only to personal computer (PC) literate individuals.

To bridge the digital divide, our technical collaboration emerged to develop a mobile SMS (short messaging system) portal for data entry into a Web repository. An individual, at his leisure, or even while waiting in queue to meet his/her physician, may use a SMS to log their thoughts and queries about their disease onto a forum. The information they log may then be read and possibly responded to by anyone on the Web.

Although the SMS portal will be accessed remotely, and often anonymously, it may foster a sense of belonging and intimacy. Any individual user feeding input into the Web repository can receive automatic feedback that can grow as other users contribute their own data. Relying on the power of human collaborative intelligence may prove to be much more efficient than artificial intelligence.

DEFINING ROLE OF THE PRIMARY COLLABORATORS IN THE TRIAL PERIOD

An operational model was created to plan a trial on a sample population of diabetic patients utilizing a randomized control trial (RCT) design. One randomly selected group of diabetics was assigned to receive electronic information intervention while a matched diabetic population would receive only regular medical intervention. The results would be analyzed to see if those with access to the electronic information would improve their health outcomes in comparison to the control group. Diabetes was chosen for this particular trial, as it is a major chronic illness in Malaysia and elsewhere in the world.

Role of Patients Participating in the Project

Patients who have consented to participate in the trial period will be randomly allocated to either receive the mobile phone intervention with current standard therapy or receive current standard therapy alone. All participants in the study trial will have their baseline characteristics entered in a structured manner into a Web database

designated as personal health record (PHR). The patients receiving mobile intervention would receive weekly SMSs enquiring about their present symptom status, self monitored blood pressure, blood glucose values if any, current diet, exercise patterns, and any other complaints they would like to convey. All responses and interaction would be automatically recorded into the non-structured portion of their Web-based record. Patients may communicate either through text or voice messages.

Role of Physicians Involved in the Project

Patient entries to the mobile Web database shall be reviewed by one of the physicians involved in the study and she or he shall make appropriate adjustments to the patient's management according to standardized diabetes management protocol (ADA, 2007; Malaysian clinical practice guidelines, 2004). The physician shall also be instrumental in supervising entry of all the individualized data into a standard format which shall be later entered into a Web-based repository that can serve as the individual patient user's standardized personal health profile. The repository may be accessed by appropriate health care givers and controlled by the patient and his or her health care provider. The physician shall also monitor the non-structured patient generated health profile for day-to-day patient queries, thoughts, and so on. The physician shall respond to patient queries and comments to the best of her or his expertise and refer appropriate information needs to medical information specialists. Information may also be referred to other health professionals who will try to enrich each individual patient profile with addition of appropriate evidence based data at relevant areas in the profile. During each visit of the patient, the physician will access the patient's personal record on her or his computer and provide a print out of the PHR (latest version with changes) if necessary.

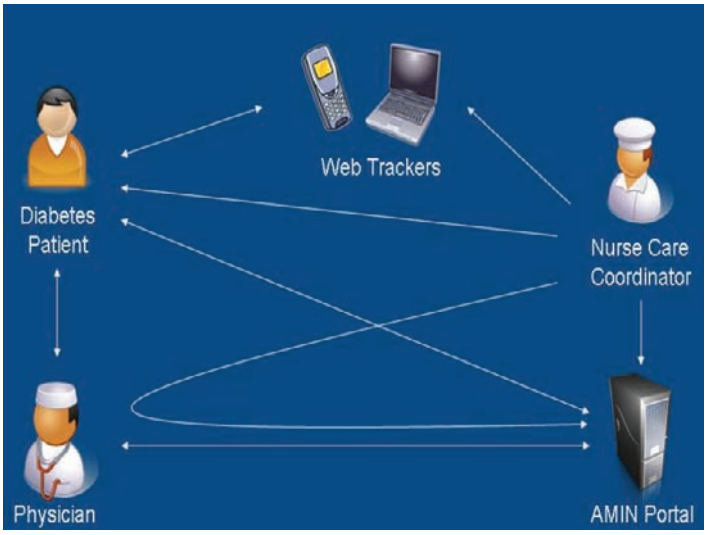
Role of the Research Assistant/Clinical Care Co-coordinator

S/He shall be instrumental in entry of all the individualized data into a standard format supervised/guided by the physician after ensuring a record of proper informed consent. S/He will be an important liaison between patient and health care providers, which includes physicians, diabetic educators, dieticians and even mobile Web support staff. S/He shall arrange for mobile phone based continuity of care by ensuring appropriate weekly and monthly, individualized phone and SMS reminders and discussion. These reminders and discussions with patients are primarily aimed at assessing patient compliance to treatment of which diet, exercise and drugs are equally important components. S/he will ensure this assessment is done weekly in mobile phone users apart from the standard three monthly face-to-face assessments on hospital visits, which would be same as for the matched control group. S/he may help the other health care providers to address patient queries SMSed by patients to the mobile phone support network by collecting their answers and SMSing it back to the patient with the help of the mobile network support staff. S/he shall help the mobile network Web support staff to create and maintain the individual patient's personal health profiles by ensuring appropriate entry of proper and relevant data.

Role of Mobile Phone Based Web Support Staff

The proper functioning of the mobile phone intervention in the selected patient participants will be developed and maintained by the Web support staff who shall regularly monitor and update the individual patient Web profiles based on the data provided by the patient, health care provider and research assistant. S/He shall ensure

Figure 2. Role of various collaborators in answering multidimensional informational needs (AMIN)



that authorized users only with valid personal identification, user name, passwords, and so on use the system.

PROTOTYPE DEVELOPMENT

The structured and non-structured information log for patient centric support to manage and control disease allows patients to overcome limitations in the time spent with physicians. This system provides continuous virtual connection with physicians and support group. This is to allow patients to monitor, manage and control their own health at anytime and place. Support and alert messages are sent to mobile phones to disseminate and collect information from patients as depicted in Figures 3 and 4. The collected information is published in an online Web log anonymously to provide support and help to patients who are suffering from the same disease and have similar disease related problems.

The Organizing of the Structured and Non-structured Information Based on a Patient-centric Model

There are other benefits such as this system allows getting connected with users who share the same common goals and challenges (but would be otherwise difficult to locate) along with care givers who can contribute usefully at their own time. It maintains privacy and confidentiality of patient and empowers them to manage their own health. Search and other utilities will be added to facilitate fast access to information.

Network Architecture

The mobile application is designed to interact with Mobile Internet Platform (MIP) to send and receive short messages.

The initial prototype by JM was further modified by EWHL who introduced the unified communication engine that would support both voice and data inputs especially for structured data. Users could choose to use phone, mobile phone, PC/laptop or the embedded system to work with the portal.

Figure 3. AMIN (answering multidimensional informational needs) solution framework

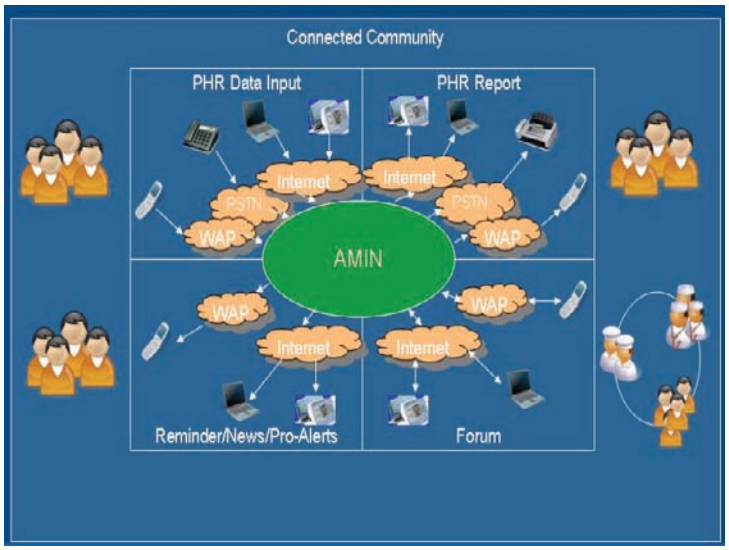
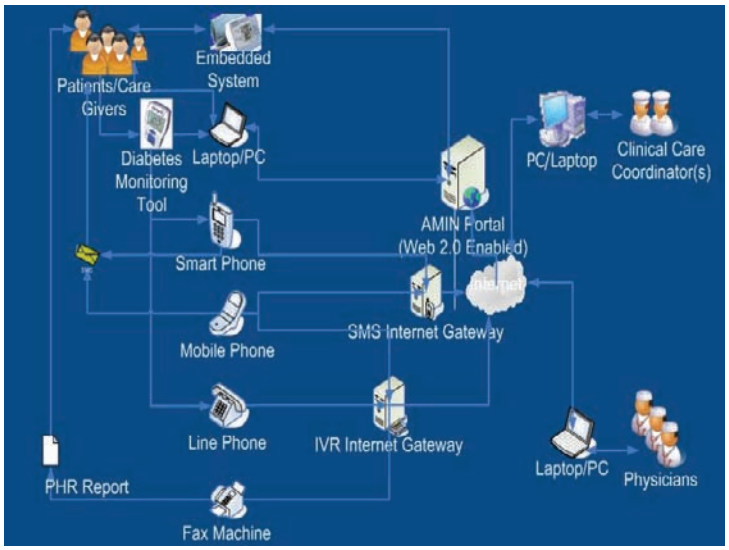


Figure 4. Technical architecture



ANSWERING MULTIDIMENSIONAL INFORMATIONAL NEEDS (AMIN)

Patient needs: To address the problem of multidimensional information needs a novel E-learning solution being perhaps tested for the first time is described.

The following quote may explain the background to the term, multidimensional information needs:

"The need for information is often much more than a question about medical knowledge… caregivers and care seekers are looking for guidance, psy-

chological support, affirmation, commiseration, sympathy, judgment, and feedback. This 'information need' is particularly poorly explored, and yet it may well be the most important need and the biggest stumbling block to a technical solution" (Smith 1996).

This problem may be addressed with maintenance of non-conventionally structured personal disease logs. Regular short messaging services (SMSes/Emails) from individual diabetics conveying their daily thoughts on their disease would be kept in a personalized repository in the Web for those in the intervention group.

Thought partner matching for a learning community creation—thought partnerships in different diabetic patients with similar needs as expressed in their e-logged thoughts could be identified either by manual reading of different patient logs and inferring matches or Web based matching using text tags. This aims to promote shared learning in individual diabetics with similar needs gradually leading to an improved learning community of diabetics.

Informational needs on SMS, conveyed explicitly as health queries, could be manually responded to by health professional monitors. Medical informational specialists (previously designated Medical library scientists) could monitor the discussion between patient to patients and patient to physician with valuable evidence based inputs to the gradually developing structure on the individual health record.

Caregiver needs: All personalized data generated from the patient's regular SMS/Email interaction with the mobile Web support system would be structured into a personalized health record (PHR) with the following components:

1. Structured summary of the patient's health status (Mostly monitored/maintained/modified by health professionals)
    a. Basic information on identification, insurance, allergies, advance directives etc. (Format)
    b. Latest Problem list along with patient's care plan (Investigations and treatment listed serially according to priority of action to be taken).
    c. Hospital admission discharge summaries in the past
    d. Present hospital record (if admitted at present)
2. Non-structured evolving narratives inserted by the patient, thought partners or care givers at various points of time (with date). This structure would simulate the discussion structure of a wiki at present.

PERSONAL HEALTH PROFILES

Personal Health Profiles are a medical knowledge-based characterization of a user of a medical information service. Such a technology facilitates convenient and personalized access to knowledge produced by medical practice—the primary knowledge construction process. Therefore, a personal health profile enables exchange, debate, and reasoning about personal experiences with disease and the health care system, as a secondary knowledge construction process (Sittig, 1999).

At present the health record structures in the Malaysian health system are predominantly paper based with its attendant disadvantages of information of a single patient in multiple paper files that are difficult to trace and maintain. The patient often doesn't carry any substantial information about his past medical history. All this is expected to change soon with implementation of electronic health records (EHRs) in most Malaysian health care set-ups. Complimentary to this, introduction of the proposed mobile phone based PHRs in diabetics (to start with) aims at trying to eliminate the present problem of information

tracing confounding medical decision-making. These PHRs would not only be in the mobile phones of individual users but would also remain safe in a Web-based individual health record bank (IHRB) (Shabo, 2005).

Apart from this particular service, the plan is to form learning communities amongst diabetics that address not just their established physical needs (for which programs like Diabetes Self Management Education DSME is more appropriate but also their psychological/multidimensional information needs that remain unaddressed in traditional learning programs.

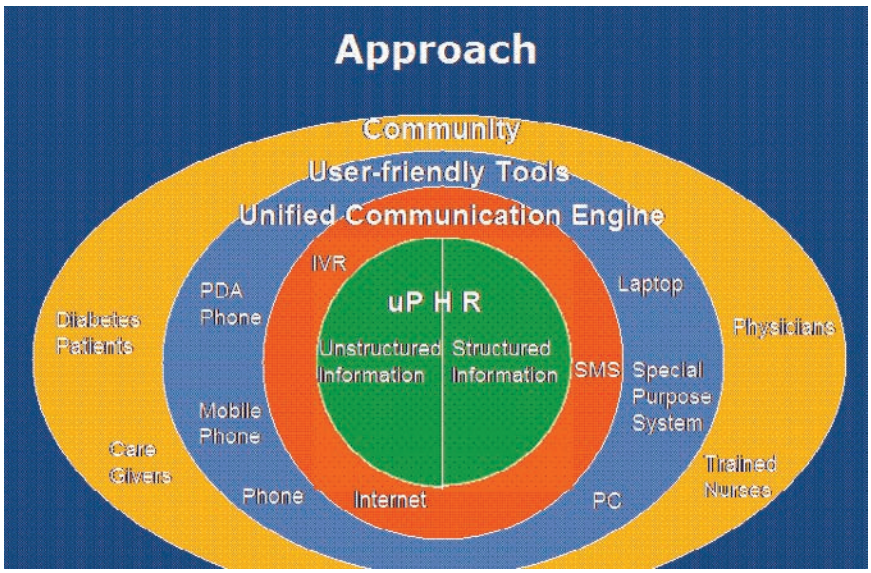
THE PRESENT STATUS OF DIABETES TELE MONITORING

A recent systematic review (Jaana, 2007) identified 17 studies using diverse technologies and transmitting different clinical, medical and behavioral data with respect to telemonitoring of diabetic patients. Significant impacts were observed namely at the behavioral, clinical and structural levels. Minimal technical problems were reported. Close management of diabetic patients through telemonitoring showed significant reduction in HbA1c and complications, good receptiveness by patients and patient empowerment and education. The randomized trial quantitative data generated from this collaborative project planned is likely to replicate these findings. An important difference in this project is the qualitative strategy that hopes to create individual user (patient, health professional and other actor) collaboration utilizing minimally structured user generated free text data to generate experiential learning that otherwise goes undocumented regularly at present. This may be a small step towards promoting user driven health care for various chronic diseases and care of elderly.

FUTURE DIRECTIONS

On completion of the test phase this Web-based solution to integrate healthcare e-learning needs can be opened to the world in a simple forum model already in use at present in various Web sites using what is loosely termed as Web 2.0 technology. In

Figure 5. Overall approach to AMIN



Web sites using this technology user-generated tags allow the site to evolve, enabling individual users to conduct more precise searches, make previously unacknowledged associations between facts, and explore a diverse undercurrent of themes to synthesize learning.

Regular experiential informational input may be posted on to the forum along with a copy to the individual user's password protected Web account that would function as an e-portfolio if s/he were posting as a caregiver and a private personal health record if s/he is posting as a patient. The individual user could even do this through email and every post made by mail could easily open a new post on to the forum. Most PC (Personal computer) users in recent times spend their Internet time predominantly in their mailbox and integrating this solution into the mailbox would target this population.

Finally the digital divide would only be effectively bridged as the basic mobile phone is phased out and the personal digital assistant (PDA) combined with mobile phone and PC functionality takes over boosted with WIMAX (Worldwide Interoperability for Microwave Access) technology for continuous easy online access).

CONCLUSION

This was an illustrative process description of a collaborative project utilizing a multidisciplinary approach. The requirement for this inter organizational collaboration originated in an attempt to optimally answer multidimensional needs in individual patients and health professionals to allow them to achieve better health outcomes through inter individual collaboration between multiple stakeholders in the care giving and care seeking collaborative network.

AMIN, which is an acronym for answering multidimensional informational needs, is a Web 2.0 enabled and moderated forum to support users' unstructured queries, thoughts and journals by returning related thoughts and text with each entry made by users.

It consists of a database with Diabetes Data Set to support both the patient demographic data and medical parameters. This can come from/be integrated with other systems.

The Unified Communication Engine allows AMIN to support both voice (especially for structured data) and data inputs. User can choose to use phone, mobile phone, PC/laptop or the embedded system to work with AMIN.

It is an integrated system to simplify and streamline the diabetes monitoring process and support users unstructured queries, thoughts and journals.

The operational prototype, which still continues to evolve, has been shared with other future stakeholders particularly in the government healthcare system. The described operational model signals the beginning of a future positive collaborative venture in user driven healthcare with multiple stakeholders in public and private sectors.

ACKNOWLEDGMENT

The first author assumes complete responsibility for the views expressed in this. We acknowledge the technical contributions of Waqar Aziz in developing the software interface for the solution discussed and the technical liaison Lim, Chia Ni, Tan, Eng Hoo, Ang, Koon Liang, and Hon Jia Yu. We are thankful to the Ministry of health, Malaysia for having gone through our proposal demonstration and at this point eagerly wait for the next step in this collaborative venture that is executing the operational model into a validation model. This write up has been shared extensively in emails and Web portals and ideas contained within it are being considered for publication in completely different contexts in different journals and book chapters.

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KEY TERMS

Auto Ethnography: Auto ethnography is a recognized qualitative social research method through which the researcher documents a group by recording his or her own individual experience as it relates to social history. Often, but not always, the researcher is a member of the group in question rather than the traditional outsider ethnographer.

Consumer Driven Health Care: A strategy for users/consumers to decide how they may pay for their own health care through multiple stakeholders like employers who provide the money and insurance companies who receive the premiums.

Evidence-Based Medicine: Evidence-based medicine is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research.

Experiential Learning Theory (ELT): Provides a holistic model of the learning process and a multi linear model of adult development, both of which are consistent with what we know about how people learn, grow, and develop. The theory is called "Experiential Learning" to emphasize the central role that experience plays in the learning process, an emphasis that distinguishes ELT from other learning theories. The term "experiential" is used therefore to differentiate ELT both from cognitive learning theories, which tend to emphasize cognition over affect, and behavioral learning theories that deny any role for subjective experience in the learning process.

Qualitative Research: One of the two major approaches to research methodology in social sciences. Qualitative research involves an in depth understanding of human behavior and the reasons that govern human behavior. Unlike quantitative research, qualitative research relies on reasons behind various aspects of behavior. Simply put, it investigates the why and how of decision- making, as compared to what, where, and when of quantitative research. Hence, the need is for smaller but focused samples rather than large random samples, which qualitative research categorizes data into patterns as the primary basis for organizing and reporting results.

Quantitative Research: The systematic scientific investigation of quantitative properties and phenomena and their relationships. The objective of quantitative research is to develop and employ mathematical models, theories and hypotheses pertaining to natural phenomena. The process of measurement is central to quantitative research because it provides the fundamental connection between empirical observation and mathematical expression of quantitative relationships.

User Driven Health Care: Improved health care achieved with concerted collaborative learning between multiple users and stakeholders, primarily patients, health professionals and other actors in the care giving collaborative network across a Web interface.

Chapter XLVIII
Technology Enhanced Collaborative Leadership Development

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ABSTRACT

This chapter presents a case study of the process of employing technology in a project involving the development and presentation of a unique leadership program for the not-for-profit sector in a major Canadian city. The project relied on telephone and Internet technology as a primary means of communication between the three women developing and delivering this program. The chapter provides a background on the development of the program; the ways in which technology was employed; and the problems and benefits of employing technology in doing this. Finally, it identifies the strategies and interpersonal skills found to be most effective in facilitating technology-enhanced collaboration, and makes recommendations for maximizing the benefits of using technology in the process of creating new approaches to leadership development. The chapter can contribute to the literature in the field of leadership development, collaborative program development and diversity management in the field of leadership.

INTRODUCTION

Historically, within Western contexts, the concept of leadership has developed as a particularly individualistic venture. However, the varying changes in the local and global marketplace, and within organizations, has ushered in multiple constructs of leadership that are informed by varying cultural practices, social expectations, and the involvement of organizations that are located within cultures

that are foregrounded within modes of communal leadership. This unsettling of "the leader" position has required a shift in our ideas regarding leadership; the practice of leadership; and also the way in which we manage leadership issues.

Leadership is emerging as quintessentially a collaborative process where decisions are no longer the sole charge of an individual. Rather, there are multiple stake holders who are expected to play an integral role in any decision making process. In addition to the multiple emerging constructs of leadership which are significantly informed by globalization practices, there are attendant changes regarding how leadership is developed and negotiated. Collaborative practices continue to be identified as the hallmark of effective leadership, despite the role that technology plays.

Pearson (2000) for example defines globalization as "the process in which economic, financial, technical and cultural transactions between different countries and communities throughout the world are increasingly interconnected, and embody common elements of experience, practice, and understanding" (p 10). Globalization then, facilitates a sharing of ideas and resources across vast geographical boundaries. Prior to the explosion of various technological developments such as the telephone, and more recently the Internet, the levels of contact between equidistant groups required enormous amounts of cash infusion and time involvement. The evolving technologies that have accompanied global development have resulted in the removal of geographic and time/space boundaries that in the past limited the potential for cross border development projects. Leadership therefore is no longer contained within organizational or geographical boundaries, thereby requiring an increased usage of technological forms of communication.

According to Appadurai (1990) with the advent of "print capitalism, a new power was unleashed on the world, the power of mass literacy and its attendant large-scale production of projects of ethnic affinity that were remarkably free of the need for face-to-face communication … between persons and groups" (p. 325). Therefore in this chapter we will examine the manner in which leadership program development has unfolded in a process that relied heavily on technological advancements and limited the usage of face-to-face communication between the parties. This leadership program was developed and designed for the executive directors, senior managers and board chairs of not-for-profit organizations in a major Canadian city. Technology was a central means of communications between the program developers; the primary forms being the telephone and Internet. The chapter will discuss the problems and possibilities of using technology; highlight the ways in which tasks and roles were delegated, discuss the strategies that we used to facilitate this process; explore the cross-cultural dynamics that emerged and the processes that were employed to address the conflicts that ensued. Finally, we will identify the strategies and interpersonal skills that we believe were most effective in facilitating technology-enhanced collaborative leadership development.

Drawing from the work of a range of theorists in the field of leadership development, we will discuss the historical development of the field of leadership and also provide a summary of the contemporary issues that are emergent in the field. We will also discuss the way in which globalization practices, and technology most specifically, impacts on collaborative development processes. Additionally we discuss the ways in which our personal locations and professional backgrounds, particularly in light of racially marked sites of social difference and educational trajectories were implicated in the development process and the role that technology played in unraveling these conflicts. The issue of social difference and understandings is a unique and important aspect for analysis in this paper given the changing demography of Canadian society. In addition, although conversations happen across a technological divide such as email which includes

only verbal communication, this may appear to limit the impact of non-verbal missteps. However, one may argue that words on a screen are being interpreted and those interpretations are heavily culturally and socially determined. Therefore, it is important to examine the manner in which these factors may have been implicated in our work, thereby contributing to a seldom examined aspect of collaborative or leadership development processes. We will address the skills and strategies that we employed in addressing the challenges that emerged in this process. Finally the paper will provide suggestions for working across the divide, identifying the limits and challenges that emerged through our work and the sites of engagement that were developed and enhanced. This chapter can contribute to the literature in the field of leadership development, collaborative program development and diversity management in the field of leadership.

BACKGROUND: THE UNIQUE ASPECTS OF THIS PROJECT

The decision to develop this leadership development program arose from a recognition of the need for such an initiative by a foundation committed to improving various problems associated with life in large cities, including homelessness, literacy, mental health, and substance abuse. Traditionally, services addressing these areas had been primarily provided by government agencies and more recently by government funding of third party non-profit organizations supplemented by charitable grants. However, as the population of the city grew, the need for these services had expanded and become more challenging, while the funding had shriveled and changed in character, so that core funding was reduced and increased funding tended to be temporary and project based. The result was that non-profits were struggling for their very existence, attempting to cope with ongoing funding deficits and increasingly stringent funding and grants application procedures.

These aforementioned issues present an increasing concern for most non-profits. One federal study noted that:

Forty-eight percent of organizations that reported receiving funding from governments, foundations or corporations between 2000 and 2003 report substantial difficulties with respect to this funding. More than 60 percent report problems due to reductions in government funding, unwillingness of funders to fund core operations (e.g., long-term programs, administrative expenses) and over reliance on project funding. More than 25 percent indicate that these problems are serious. Most of these problems appear to be associated with government funding, which comprises the bulk of the funding they receive from these sources (Statistics Canada, 2005).

The non-profit sector has been negatively affected by poor morale caused by the years of cutbacks and the constant energy required to simply keep agency doors open. At the same time, the needs of the sector were becoming increasing complex with an overall increase in the demand for services coupled with specialized needs arising as a result of increased immigration. All of this was occurring against a backdrop of growing racial tension within the city as the demographics of the population gradually shifted.

While the programs offered by these agencies were creative and responsive to community needs, there existed a need to upgrade the existing organizational structures and approaches to modern management—such as performance management systems or strategic planning. Typically the leaders of these organizations were white Canadians, primarily women, although there was a growing group of non-white immigrants leading agencies providing services specifically targeted at various ethno-cultural groups. Many of the mangers and directors of these organizations held bachelor and masters' degrees, and often had professional training in areas such as teaching or social work. However, participants

generally had risen through the ranks to become the ED's of their organizations in recognition of their expertise in service delivery. The time and financial constraints associated with working within the noon-profit sector however, limited the manager's and directors' exposure to professional training in management or leadership.

The intent of the leadership program focused on in this paper was to offer to this group of managers and directors formal skills training that addressed their organizational management and leadership needs. The program was heavily subsidized by the sponsoring agency, thereby limiting the financial cost to the participating organizations. There was also an identified need to help develop leadership in the sector which was less reactive and better able to plan strategically, including undertaking organizational change initiatives that would ensure ongoing organizational viability.

The foundation planned to offer the first program to agency executive directors in the sector who could attend either by themselves or with the chair of their board or one of their agency's senior managers—the rationale being that if two attended from each agency, the learning would be even more supported. Once the program had been piloted and tested, the foundation intended to offer it on an ongoing basis to the sector, so that a cadre of strong leadership was established over time.

The project was therefore quite complex. The leadership program needed to include traditional content that would address skills around basic management as well as build capacities tailored to the requirements of non-profits. Researchers such as Barbeito (1997) and Middleberg (1993) indicate that these include a range of skills related to traditional management and leadership approaches such as marketing and financial management, as well as knowledge and skills required to meet the specific environmental pressures facing non-profits. The latter involve such areas as advocacy, fund raising and resource development. More recent research in Canada (Association of Canadian Community Colleges & the Coalition of National Voluntary Organizations, 2003) indicate that the management capacities required by non-profits are becoming increasingly sophisticated and include development of competencies as diverse as those related to public policy, global issues, creating a culture of learning, and promoting creative, innovative, and healthy workplace environments.

In addition, the program was intended to build capacities around increased critical thinking and reflection—so that leaders would be less reactive and more strategic in their ability to respond to the ongoing social, political and financial turbulence in which they operated. Research by Wall (2003), building on the work of Kegan and colleagues (1982, 1994, 2001 a and b) and Rooke and Torbert (1998, 2005) suggests that these types of capacities could be developed through a range of reflective and artistic practices including meditation, journaling, reflective discussions, artwork, ritual, and storytelling, as well as individual support and challenge of participants through individual coaching.

There was limited time and opportunity to deal with all of these goals during the program itself since participants were so stressed in terms of understaffing and time commitments that they felt unable to leave their agencies for more than a total of a day and an evening per month, and were not able to commit to completing any reading prior to attending the course or between sessions.

It was clear that this program could not simply be another traditional leadership development program being offered at colleges, universities or in corporate training programs—it had to be quite different in a number of ways. Moreover, those developing the program had to find ways to meet all these program objectives within very limited classroom time, and without additional time outside the classroom for participants to read and become familiar with basic content. The basics had to be "taught" within six sessions lasting a day and one evening (with one additional off-site session over two days). Reflective practices had

to be incorporated within that period while conducting some real-life planning for organizational change initiatives. Moreover, this had to be done in such a way that it recognized and honored the diverse cultural and racial backgrounds of both the participants and the clientele they served.

Those developing the program had to create an overall design for the program which addressed each of these issues, as well as create detailed designs for each session and a participant work book so that the program could be repeated for subsequent participants in future offerings. The course developers also shared responsibility for facilitating sessions and coaching of participants, each of whom received one hour of telephone coaching after every workshop session. Initially there was a total of 21 participants. Each developer had seven individuals to whom they provided coaching. These individuals were assigned randomly a coach if participants' preferences were not stated. By the fifth session of the program, numerous participants had dropped out due to work pressures or family or health crises. Only 14 remained through the entire program and the responsibility for these coaching sessions continued to be distributed among the three facilitators.

The original intent was that the program would be completely developed prior to conducting the workshops. However, the workload involved in doing so, as well as the other commitments of each developer, only allowed for the overall design and the development of one workshop to be completed before the program began. Subsequent workshops were designed and material developed prior to each workshop. These time constraints underscored the importance of employing technology and a viable option.

LITERATURE INFORMING THE DEVELOPMENT OF THE PROGRAM

Bearing in mind the challenges of the target audience and the types of services they provided, it was essential that the approach to leadership espoused by the program incorporate yet also move beyond the traditional western management approaches. Historically, these approaches were developed for private sector or governmental organizations serving a white clientele that was dominated by white males. The following section outlines the scope of literature used to ground the program design. This literature served as a foundation and resource for the design team as they attempted to work collaboratively to develop and deliver the program.

Most approaches to leadership have arisen as result of organizational transitions of organizations towards a bureaucratic hierarchical structure, the description of which has typically been attributed to Weber (Wiesbord, 1987). As capitalism grew, production moved from cottage industries to an environment of closely supervised workers, with management shifting from the owner of the production facility or enterprise to a more professional approach involving hired management who were skilled in such areas as planning, organizing directing and controlling (Zuboff, 1988). Gradually the literature on leadership has becoming increasingly sophisticated, recognizing that leadership and management are not necessarily identical (see for example, Anderson, 2006b; Arthur, Day, Jaworski, Jung, Nonaka, Scharmer, & Senge, 1999-2000; Blanchard, 1982, Collins, 2001; Covey, 1989; Heifitz, 1997). Moving from seeing leadership as a trait that could be inherited, the literature increasingly regards leadership as an approach that includes strong management and interpersonal skills as well as the ability to create a vision and enroll others in achieving that vision. The following description of leadership is an approach that the course developers believed reflected some of the best thinking of these traditional approaches to leadership:

[Leadership] is the life-stance of continuously focusing one's attention and commitment on a desired future, and in the midst of the current situation, working cooperatively with others to

take action that brings that shared vision into being over time.

Leadership is a life-stance. It is a different way of going at life. It is vision oriented and driven by passion and commitment. It is … a higher level of character development. We notice in great leaders the highest of human qualities and values. What distinguishes them as a leader goes far beyond their technical skill, market knowledge, and managerial competency. They are creators. They are creating themselves into soulful renditions of their true nature, doing the work they most love, and creating futures worthy of their own commitment and the full commitment of others.

Leaders, especially leaders of the future, are partners. They are creating shared vision and working cooperatively with others to bring that vision into being. More than that, they are primary contributors to the development of others and the system. Their goal is to help others learn the creating game and to encourage the ongoing redesign of the organizational system so that it better supports creating and collaboration (Anderson, 2005, p. 4).

However, ongoing critiques of modern organizations and hierarchical leadership approaches have been made by feminists, ecologists, and post modernist writers for some time. These critiques assert that the marketing/capitalistic ethic underlying much of modern leadership creates unnecessary, unsustainable and addictive product demand (Greer, 1999; Shaef, 1987), is dominated by gender bias around ethics and values (Belenky, Clinchy, Goldberger, & Tarule, 1986, 1997; Benjamin, 1988; Gilligan,1993), and uses accounting principles which ignore and undermine the value of female labour and important environmental considerations (Steinem, 1994; Waring, 1988). Many radical feminist organizational writers suggest that no significant change can occur in organizations unless hierarchical and patriarchal leadership practices are challenged (Ferguson, 1984; Greer, 1999; Iannello, 1992; Steinem, 1994).

Health practitioners have also criticized modern organizational behaviour and leadership on a number of fronts. Charges include profiting from the promotion of harmful habits and denying the scientific facts that demonstrate their effects on the environment and individual health. These practitioners also maintain that modern organizational behaviour promotes products, food, invasive procedures and patented remedies that encourage dependencies and addictions and thus ensure continually expanding markets and consumption. Despite mounting evidence of the efficacy of non-invasive, less expensive approaches derived from other cultural traditions, non-allopathic approaches to health and well-being have typically been opposed by the dominant medical establishment, or have been appropriated for their profit-making potential.

Feminist scholarship as well as literature from the fields of postmodernism, sustainability and business ethics has explored and espoused the value of incorporating the role of dialogue and polyvocality in leadership. These studies emphasize the importance of challenging assumptions and dominant narratives, and recommends using f social construction, narrative, re-storying and ethics for management and leadership (e.g., Adams, 2000; Boje, Gephart, & Thatchenkery, 1996; Chappell, 1993, Dalla Costa, 1998; Ferguson, 1984; Fox, 1994; Frost, 2003; Hazen, 1999; Robinson, 2002; Roddick, 2000; Summers, Boje, Dennehy, & Rosile, 1997, Van Buren, 2005). These approaches were part of the basis for the program.

Mainstream leadership literature also includes encouragement for specific approaches to leadership such as Servant Leadership, Contemplative Leadership, Transformative Leadership, Lateral Leadership, Facilitative Leadership, Compassionate Leadership, Primal Leadership (using emotional intelligence to lead and manage), and more (Block, 1993; Goleman, Boyatzis, & McKee, 2002; Greenleaf, 1977; Roberts, 2004). While strong

challenges to traditional western approaches are not offered, these authors focus on the need to develop particular interpersonal or ethical skills to serve the needs of the organization, employees and other stakeholders. Increasingly leadership, particularly in the non-profit area, has been influenced by literature that originates from areas outside of traditional business or government settings. These include education (e.g., Freire, 1970; Palmer, 1993), therapy and counseling (e.g., Schaef & Fassel, 1988), and systems theory (e.g. Emery, 1993; Wheatley, 1993). This literature points to the need for modern leadership to see the "big picture" in terms of understanding power and authority, avoiding dysfunctional management practices, and recognizing the interconnection of all aspects of the organization—both within the organization itself and as the organization interacts within the broader environment. In addition to these literatures, the approach to leadership in the course was informed by material derived from traditions which are older and different from those of modern western society. Examples of older traditions include those in which leaders may be seen as warriors and healers and specific cultural approaches to leadership such as those offered in African and Aboriginal traditions (e.g., Bartunek & Moch, 1994; Frost & Egri, 1994; Mandela, 1995).

The content and tone of these various literatures was incorporated into program materials, lecturettes, and exercises. Including these perspectives was intended to shape the program development process itself and the facilitation of the workshop sessions. The entire program was inclusive and reflective of best practices in modern management as well as the wisest and highest order of leadership on a global basis. The inclusion and combination of these multiple strains indicate that the program was designed to be collaborative in its development and in its overall mission.

EMERGING THINKING AROUND TECHNOLOGY AND LEADERSHIP

Increasingly technology has become a fact of life for both leaders and organizations. Bauman (1998) argues that the expansion of technology has reduced or removed the need for face to face interactions. The telephone, the Internet and constantly evolving forms of video conferencing, though limiting the need for direct contact amongst collaborators, has also created a scenario in which various conflicts, missteps, verbal and non-verbal miscues, continue to be transmitted, albeit technologically. People are more aware of the stereotypes that are associated with various social groups, information regarding conflicts is readily available and the interpretations that we apply to those electronically gained knowledge, still frame interactions across the technological divide. As the world becomes increasing affected by globalizing forces, of which technology is a central aspect, organizations of varying sizes are forced to contend with technology. However, the idea that technology inclusion can in some way limit the need for effective leadership, or at the very least mitigate the impact of ineffective leadership, remains a fallacy.

According to an article cited in the December 2000 edition of *Computerworld*, "IT leaders must be smart, confident flexible, creative and persuasive. They must have integrity, initiative, empathy for others and courage of conviction. They also need technical expertise. Experience handling difficult situations and great communication skills…communication has to be part of the entire IT investment process" (Anonymous, 2006, p. 24-25). May (2000) and Sumner, Brock & Giamartino (2006) for example, indicate that good leadership skills are lacking in many fields and the technology field is significantly affected by that factor. Quilling (1999) argues that that there continues to be a gender differential in the acquisition and application of those skill sets

with men adopting technological competence and women adopting leadership skills. However, effective contributions to organizations or society at large, requires a combination of technological competence and leadership skills.

Sumner, Brock and Giamartino (2006) cite various research studies that indicate that the direct relationship between the possession of "soft skills" and technology program success. Soft skills include the ability to manage people, the ability to be empathetic and the ability to motivate others. The results of the study indicate that the perception of leadership skill and capacity amongst team members are strong predictors of program success. They further indicate that participatory leadership involving cooperation and collaboration is important. The authors also state that it is important to identify the differences between a project manager and a leader, given that the expectation of leadership is vastly different for the expectation that someone will supervise the completion of a project.

TECHNOLOGY USED IN DEVELOPING AND DELIVERING THE LEADERSHIP PROGRAM

The two primary forms of technology used in this project were the telephone (for conference calls), and the Internet (for facilitating the exchange of information). The latter included detailed designs for each workshop, group exercises, role plays, scenarios, worksheets, and other written material used in participant workbooks. These were often reviewed and revised numerous times as the developers moved through iterations from draft to final product.

The course developers met face to face on a regular basis, until it became clear that the time involved was not cost effective. The developers agreed to meet virtually by conference call using email communication to share documents discussed in those meetings. Multiple benefits came from employing technology in this context. Each of the program developers were located at various parts of the city and the ability to meet on a regular basis was limited by time and travel constraints. For example, a one hour face to face meeting would have required a minimum travel time input of five or six hours and was considered an ineffective use of time. Using technology reduced the travel time and reduced what Bauman referred to as the time/space continuum, that is, the reduction in time that it takes for information to travel across vast distances (Bauman, 1988).

Another benefit of employing this technology was the way in which it allowed for the sharing of information. Program leaders could literally "be on the same page" a process that historically would have required either a face to face meeting or waiting for what is now affectionately called "snail mail". Being able to work on documents at the same time, to discuss information, identify gaps and repetitions etc. meant less time was required for work to be completed efficiently. However, there were drawbacks to employing technology in this way. The drawbacks included: underestimating how the issues of power and difference were potentially complex intervening factors in the program; minimizing the significant role played by emotional issues; limiting the ability to read non-verbal cues which may have provided indications regarding course developers' reactions to various items under discussion. These are issues that the course developers would have probably been forced to address on some level earlier and more effectively in the development process, had they been working together in person.

In the context of the current leadership program, the use of technology was important on several levels. Most significantly, it was a cost-cutting and time saving device. The program was designed to be a collaborative venture that modeled participatory leadership. However, there were external factors such as cost over-runs and the demands of upper management which may have negatively impacted on the ability to engage in

effective leadership within the program. Although technology use continued, the results of this program reinforce the earlier studies which contend that while any program or organization may employ the use of technology, its effective application continues to be grounded in the human touch. A report from the Government Technology Leadership Institute, developed by Kari Moe (1998), indicates that the need for leadership was the primary refrain cited by conference participants. Therefore the assumption that human skills can be separated from technology and technological capacities should be challenged. Kolenda (2000) indicates that: "To achieve excellence we must combine efficiency with things and effectiveness with people…If we focus solely on achieving efficiency as a means to achieve excellence, but neglect human effectiveness, we will soon find that we have arrived at the wrong address" (p. 87). The results of the patterns of interactions that emerged from the study of this program also unearthed another important site for investigation and research, that is, the impact of cultures and histories on programmatic success.

WORKING ACROSS CULTURES, HISTORIES AND TECHNOLOGIES

The course developers contributed multiple histories, cultures and backgrounds, which were not initially revealed as strong differences. Each of the three was a Canadian, a woman, heterosexual and a mother of two or more children. Each was a strong facilitator and trainer; each was a feminist with a stated commitment to feminism, anti-racism and anti oppression. Each had at least one advanced degree, and had moved into her current position as course developer and facilitator from an earlier career in another area. These areas included counseling, family therapy, local politics and union activism. Two were currently involved in teaching at the post secondary level. All of the leaders strongly supported the goals of the foundation sponsoring the development of this leadership program. Although apparently different, these histories appeared to reflect similar values of justice, compassion and inclusiveness.

As the development process unfolded their differences became more marked. Two of the group members were white and born in Canada while the third was of Afro-Caribbean heritage and had arrived in Canada as a teenager after attending high school in the West Indies. Their ages varied considerably. With approximately ten years between each developer of them, this meant a difference of up to twenty years in work and life experience. The eldest was a grandmother while the youngest was pregnant.

Each had experience in "training", but from different perspectives. One had extensive experience as a consultant with formal training in instructional design. She had developed long commercial training programs for government and the private sector including detailed leaders guides. Another's training experience was primarily in academic settings, which was often part of diversity or anti-racism programs consisting of shorter one-day workshops with flexible designs. The third woman had conducted training as part of organizational development initiatives, almost exclusively with non-profits. Moreover, the approach to training and training design varied greatly between the course developers. One was oriented to skill-based training while another was more oriented to using group exercises and individual assessment tools to provide the opportunity for participants to receive feedback and develop insight into personal behaviors and organizational practices. The third course developer was more experienced with using flexible designs to promote awareness and facilitate candid group discussions.

No clarification was made at the outset around specific roles and how each area of expertise would be used on the team. This became an ongoing source of conflict–both overt and covert, as the group attempted to design and deliver each

program. One woman's background included knowledge of most of the theory underpinning the program. She had a strong commitment to the extensive program evaluation component of the program. The official project leader accountable for program costs and outcomes was a full-time employee of the foundation sponsoring the leadership program, and was She had the authority to hire and fire the other two, as well as approve or not approve the invoices they submitted in payment for their work. The third had delivered a number of workshops for the foundation previously but felt new to the area of formal leadership development programs. She was aware that her presence as part of the development team had been initiated at the insistence of the foundation's CEO rather than the project leader.

It also became apparent that the group was operating from differing discursive contexts around training and training design, that there were differences in power that were never openly addressed, and that there were competing narratives backgrounding the attempt to collaborate in developing and delivering the program. These differences emerged in the particular communication styles.

SKILLS AND COMMUNICATION STYLES

Although many skills were brought to the program, there was some level of difficulty coalescing these skills. A number of assumptions were made at the onset which affected the functioning of the team. One primary assumption was that this was a group of women who embodied a feminist dynamic and work ethic and therefore believed in the importance of voice and providing a supportive environment. Another assumption was based on the proposed design of the program, (as earlier discussed), was that this would be a collaborative project. These assumptions along the emerging power dynamics and the pressures to complete the program within an externally imposed time frame resulted in a significant degree of conflict that unfortunately also played itself out during the leadership program itself.

The course developers also employed different communication styles that ranged from over-involvement to silence. These differences impacted on the quality of the relationship between the team members and affected the process of program development. The use of technology in this instance served to limit the level of contact between the course developers. For example, although emails were sent in an attempt to address emerging issues, the recipient of the email had the power to determine whether they would respond at all and could decide how much time they took before responding. In this case technology afforded people a sense of control over their willingness to engage in situations that were uncomfortable or that could be regarded as having potential for conflict, whereas face-to-face interactions force people to engage. In some cases such delays and non-responsiveness added to the growing tensions in the team. The benefits therefore of employing technology were offset by the fact that it essentially limited the instantaneous, emotion-based reaction that people often employ when there is conflict.

Awareness of the power imbalances emerged relatively early in the development of the program, but using technology did not serve to mitigate these imbalances. These imbalances emerged from several sources. The employment status of the program developers, in which one person had the ability to terminate the employment of the other if they did not adhere to the expectations, was one source of difficulty. Another issue was the almost dogmatic adherence by each of the course developers to their particular domain and knowledge expertise thereby resulting in a degree of entrenchment. As a result team members minimized the importance of the contributions of the others on the team, thereby intensifying resistance. This situation was evidenced in the

comments that were made regarding the viability of including particular issues or strategies into the final product, and these comments were sent via e-mail. Again, the use of technology did not minimize the effect of conflicts or the emotional issues that emerged. Instead they tended to exacerbate the problems.

Although each course developer believed she was aware power issues; thought she understood the way in which it impacts on collaborative processes; and recognized its impact on the nature of peoples' reactions and the quality of the work relationships, it appeared that the developers' notions of collaboration were different. The use of technology in this instance also contributed to the failure to effectively analyze the impact of power imbalances and differing understandings of basic approaches to work and conflict resolution.

An additional conflict ensued when using technology limited the use of reflective practice amongst the course developers. Initially it was decided that there would be ongoing reflection regarding the process and practices used in program development meetings and during delivery of the program itself. This was a commitment based on the intent to develop "second loop learning" (Argyris,1978; Bateson, 2000; Senge, 1990) as well as to "practice what we preach" – since such reflective practices were being heavily emphasized with participants during the leadership program. Post-meeting reflections were followed somewhat during the initial stages when the developers met in person. However as the program moved increasingly to the use of technology as the primary site of communication, the reflective piece was marginalized, resulting in limited opportunities to engage in reflection as group.

Several attempts to address the conflicts that emerged. Attempts were made to initiate face to face meetings to discuss the issues and deal with the cost over-runs of the project; attempts to engage in reflective practices; attempts were made to openly air disagreements and assumptions and to address the power imbalances. At one point a meeting was set up with foundation's CEO to clarify the limits and options for the program. However, these various efforts experienced limited success. As the project unfolded and eventually concluded, communication between the team as a group became increasingly terse and instrumental. It became clear that the structure and working relationships in this program reflected a traditional hierarchal approach rather than a collaborative approach.

In spite of these challenges however, there were various aspects of the program that worked quite well. While some program participants clearly indicated their discomfort with the manner in which the obvious power imbalances played out in the delivery of the workshop session, generally participant feedback indicated that both the training sessions and coaching sessions were well received. Both the summative and formative evaluations showed that the program met its stated objectives. It would seem that each team member performed their assigned duties as course developers, coaches and facilitators in a professional manner regardless of the tensions within the team itself.

CONCLUSION

The experience in this case study is supported by the current literature and research that was discussed earlier -- namely, the use of technology does not limit the problems inherent in human interactions. In fact it tended to make these problems even more intractable, particularly when a team attempts to use collaborative methods to develop new approaches to leadership.

In this study, it appeared that the impersonal nature of technology use, the differential employment status of the leaders and the obvious power imbalances in effect foregrounded peoples' willingness and/or sense of agency around resolving the conflicts. Technology provided an impersonal and formal divide across time and space that

essentially made human contact disposable and relationship maintenance an issue of limited importance that was primarily based on supply and demand for skill rather than building long-term enduring connections.

The dynamics discussed above provide several indicators for working within technologically enhanced spaces. The basics of good project management simply cannot be ignored. In fact they must be particularly strong in order to mitigate against some of the challenges of using technology. The experience highlights the importance of clarifying the nature of the project including budget, timelines and deliverables, clarifying assumptions, and acknowledging the potential impacts of different and multiple centres of knowledge.

This case study highlights several possibilities and pitfalls of employing technology in the context of leadership program development. It is of central importance that the overarching goals be clarified along with the potential limitations, including time and financial constraints, of the program. Secondly, the objectives and approaches that would be employed must at the initial stages of the program, together with participants' strengths and limitations. Clarifying roles and functions of each member of the group, thereby limits the potential for conflict over the division of responsibilities. Along with the idea of clarifying roles, making a clear distinction between project management and leadership skill sets and enumerating options for achieving the project goal helps to ensure success. Strategies for addressing potential conflicts should be agreed upon and reviewed at various stages in the development of the project. One final but equally important factor is identifying and making special accommodations for the reduction of face-to-face communication, recognizing that technology does not mitigate the importance of respectful and informed human contact and interaction.

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KEY TERMS

Detailed Design: Often termed "teaching guide", or "lesson plan", and is an approach used by instructional designers to identify the goals, learning objectives, exercises, activities, materials, and set-up required for each segment of a workshop or training program. Detailed designs also facilitate easy replication of the program, since they form the basis for leaders guides, which provide detailed instructions for leading the training session or workshop.

Collaborative Leadership: Involves a style of leadership that provides opportunities for leaders to practice inclusion by openly soliciting and acknowledging the input and involvement of all members in a manner that empowers all members of the team. This form of leadership fosters open communication and on-going learning.

Globalization: Refers to the processes that result in the growing interconnection amongst various regions of the globe and is characterized by increasing economic, cultural, political and technological transactions. Leadership in the context of a dynamic global world must recognize the shifting and multifaceted constructs of leadership and knowledges that are brought to bear in workplaces and organizations. Leaders must engage in inclusive and collaborative practices designed to harness these multiple sites of knowledge and recognize the various benefits that can ensue.

Inclusion: Refers to the process of ensuring that diverse perspectives are represented and included on an equitable basis. These sites of diversity can include gender, ethnicity, race, sexual orientation, ability etc., and are recognized as important sources of knowledge that can contribute to the dynamism of emerging projects and processes.

Leadership: The life-stance of continuously focusing one's attention and commitment on a desired future, working with others to take action that brings that shared vision into being over time. Effective leaders exercise compassion and bring many "soft skills", that is, people management skills to the table, in addition to their technical skill set. Effective leadership also recognizes the role that power plays in structuring relationships and identifies strategies for leveling out power imbalances.

Project Management: Involves a range of knowledge, skills, tools and techniques to manage resources and ensure that the objectives and deliverables of a project are achieved in a timely and cost effective manner.

Technology Enhanced Leadership: Refers to the inclusion of varying forms of technology and technological equipment to enhance the process of leadership, and requires less face-to-face interaction. This form of leadership however requires a clearly defined structure, clearly identified goals and objectives and the provision of multiple opportunities for team members to identify and address conflicts and difficulties that may emerge.

Chapter XLIX
Lessons Learned from the NASA Astrobiology Institute

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ABSTRACT

Complex social, economic, political and environmental challenges as well as new research areas that cut across disciplinary, institutional and national boundaries are catalyzing a rapid increase in geographically distributed work groups. At the same time, advanced information technologies designed to facilitate effective communication and collaboration among remote colleagues are having a dramatic impact on social and professional relationships and organizational structures and forms. The practice of science is one of the domains that are undergoing significant change as a result of this trend toward increased collaboration. In this chapter we describe our efforts to promote collaboration among geographically dispersed multidisciplinary science teams in the NASA Astrobiology Institute. The lessons learned regarding the importance of recognizing and addressing the complex and inter-related dimensions of collaboration have implications not only for science but also for many other contemporary domains of activity.

INTRODUCTION

Today, around the globe, there are growing numbers of people connected by shared purposes, common goals or strategic interests working in virtual teams and organizations whose effective operations are dependent upon collaboration across distance and other barriers. In theory, these virtual groups, made possible by advanced information technologies, are well suited to address complex issues and problems by having the capability of drawing on needed expertise and

other resources wherever they may be located. In practice, however, the establishment and maintenance of thriving virtual groups and organizations remains challenging.

Over the last 20 years or so, a significant amount of research has been undertaken with the aim of better understanding the technical and social requirements for, and the best practices associated with productive virtual collaboration (See Duarte & Snyder, 2006; Gignac, 2005; Haywood, 1998; Hinds & Kiesler, 2002; Jones, Oyung, & Pace, 2005; Langhoff, 2006; Lipnack & Stamps, 1997, 2000; York, 2000). The successful implementation of collaboration tools and technologies requires attention to the specific domains and existing organizational cultures into which these new methods of communication and collaboration are being introduced. While some issues are pertinent to a wide range of domains, others are unique to a specific context, for example, business, education, social policy, or science. Our concern here is with the challenges associated with the implementation of electronic collaboration to further scientific research.

This chapter focuses on a recent NASA effort to establish a virtual scientific organization, the NASA Astrobiology Institute, made up of geographically dispersed multidisciplinary teams of scientists supported by electronic communication and collaboration tools and technologies. Our discussion is based on work carried out by Lisa Faithorn and her team during her tenure as Manager of Collaborative Research at NAI from 2000 through mid-2004, with the guidance of NAI Director Baruch Blumberg, and during the year following Blumberg's retirement from NAI. We discuss our findings from these several years of research focused on attempts to catalyze and facilitate electronically supported collaboration within and between 15 multidisciplinary teams involving more than 500 participants from over 100 institutions. Our efforts included not only the implementation of a variety of electronic collaboration tools, but also the promotion of an organizational culture in which collaboration across distance, across disciplines, across institutions, and even across generations was emphasized, valued, and sought out. We believe the lessons learned from this endeavor are not only important for science but are also relevant to geographically distributed work groups in education, business, social policy and other activities.

BACKGROUND: SCIENTIFIC RESEARCH AND THE CHALLENGES OF REMOTE COLLABORATION

Collaboration among researchers has always been part of the scientific endeavor. Students undergoing their training together, senior and junior scientists in mentoring relationships, or colleagues at the same institutions who then relocate, develop close working relationships maintained across distance and time. Collaborations based on shared research interests also develop through professional societies, conferences, and other meetings. However, most of these formal and informal interconnections among scientists have historically occurred within the same or similar disciplines. What is more recent within the scientific realm is the increasing occurrence of collaboration across a wider array of diverse specialties and disciplines, institutions, and national boundaries.

New information and knowledge is accumulating so quickly and is available so readily that it is necessary for researchers to limit the breadth of their expertise in order to develop necessary depth of understanding. Individual institutions and laboratories can no longer encompass the study of all possible subjects within a discipline, let alone all the disciplines relevant to a complex project. To address many current science and engineering problems, knowledge must be integrated from a variety of different disciplines. This collaboration among scientists of diverse backgrounds,

and of institutions and laboratories with different research emphases and/or expensive, specialized scientific instruments, is being facilitated by advanced information technologies.

Broad recognition of this important trend in scientific practice was evidenced by the publication of the seminal National Science Foundation report entitled "Revolutionizing Science and Engineering through Cyberinfrastructure" (Atkins, Droegemeier, Feldman, Carcia-Molina, Klein, Messerschmitt, Messina, Ostriker, & Wright, 2003). The NSF Blue Ribbon Panel charged to produce this report recognized that

Advanced networking enables people, tools and institutions to be linked in ways that reduce barriers of location, time, institution, and discipline. In numerous fields new distributed-knowledge environments are becoming essential, not optional, for moving to the next frontier of research. Science and engineering researchers are again at the forefront in both creating and exploiting what many are now seeing as a nascent revolution and a forerunner of new capabilities for broad adoption in our knowledge-driven society (p. 4).

Traditional funding and organizational structures have been impacted by these changes in the way science is being done and new organizational forms are being created to further scientific research. This has certainly been the case with the field of Astrobiology and the formation of the NASA Astrobiology Institute.

ASTROBIOLOGY AND THE CREATION OF THE NASA ASTROBIOLOGY INSTITUTE

Astrobiology is the study of the origin, evolution, distribution, and future of life on Earth and in the Universe. Fundamental questions include: How did life originate? Are we alone in the universe? What is the future of humans in space? At a more basic level there are additional questions: What is life? How is it defined and characterized? How does biology affect its environment and leave measurable relics after the death or disappearance of the living material itself? (Blumberg, 2000). Although the term "astrobiology" had appeared in scientific literature by the early 1940s, it fully emerged as an important and growing field of study in the mid 1990s, in part through increased funding opportunities provided by NASA. NASA's interest in astrobiological questions, however, had been growing over the previous two decades.

Water is considered a fundamental element for life's existence, hence initial indications of the possibility of water on other planetary bodies within our solar system increased scientific interest in biologically oriented space missions. NASA's support for astrobiological research was in part stimulated by the return of images and data from its Viking and Mariner Mars fly-by and Lander missions in the 1970s and 1980s, indicating the possibility of previous vast quantities of liquid water on Mars. The Pioneer 10 mission, launched in 1972, and many subsequent missions, undertook observations of Jupiter and its moons, particularly Europa. By the mid 1990s, it was inferred from images and observations that the surface of Europa was covered with ice overlaying a briny liquid ocean. This research raised the possibility that life could exist elsewhere within our solar system.

In 1995 scientists at the Geneva Observatory in Switzerland reported finding the first planet orbiting a sun other than our own. (Mayor & Queloz, 1995) Since then many more extra-solar planets have been observed. These findings again raised the possibility that extra-terrestrial life may exist or previously existed, not only within our solar system but elsewhere in the Universe.

NASA's support for Astrobiology was further catalyzed by a report in 1996 on the possibility that a Mars meteorite found in the Antarctic contained microscopic fossils of small bacteria-like organisms. (McKay, Gibson, Thomas-Keprta,

Vali, Romanek, Clemett, Chillier, Maechling, & Zare, 1996). The report was front page news and resulted in a "space conference" called by the White House and led by Vice President Al Gore, with a distinguished group of scientists. Although most scientists over time have come to believe that these meteorite markings are not signatures of ancient microorganisms, this discovery also influenced NASA's commitment to increase its support for astrobiological research and to form the NASA Astrobiology Institute (NAI).

NAI was conceived as a multidisciplinary, multi-institution science-directed program, executed collaboratively by universities, research institutes, NASA Centers and other governmental laboratories. Recognizing the importance of both remote and multidisciplinary scientific collaboration in the emergent field of Astrobiology, NAI was designed to provide not only funding but also a cyberinfrastructure for a virtual organization that would support collaboration among a large number of geographically dispersed scientists and institutions (Blumberg, 2003).

NASA issued a Cooperative Agreement Notice, inviting multidisciplinary teams to competitively apply for five-year funding grants and membership in the virtual institute. In 1998 the NASA Astrobiology Roadmap Workshop was convened, attended by a broad diversity of scientists from the national and international scientific communities, to set the dimensions of, and define the guidelines for the field of Astrobiology. NAI's organizational structure was established which included a central management group—NAI Central—located at NASA Ames Research Center in Mountain View, California. Dr. Blumberg joined NAI as its first director in May 1999. His initial staff included a Deputy Director, a Manager of Public Outreach, an Information Technology Manager, and support staff.

Eleven teams were selected for membership in the NAI, out of the 50 that initially applied. Four new teams were added in 2001 through a second Cooperative Agreement Notice with a third competition scheduled for the conclusion of the first five-year grants. The members of these first 15 teams were drawn from over 100 institutions and varied in size (8-86) and in the number of academic disciplines they included (2-6). All teams were made up of a Principal Investigator (PI), varying numbers of Co-Investigators (Co-I) and Collaborators, numerous postdoctoral fellows and graduate students and a small number of undergraduates. Each team had an Administrative Assistant and NASA also requested that each team appoint an Education and Public Outreach person, and a Technical Support person. NAI membership numbers fluctuated from year to year during our research, due to new projects, the addition of Focus Groups and the inclusion of international participation. When the 15 teams were surveyed in 2001 there were close to 600 members. The count in the NAI Directory in March of 2004 at the close of the research period on which this paper is based showed 962 members.

INITIAL TECHNOLOGY IMPLEMENTATION

NAI's initial technology infrastructure included NASA's deployment of electronic collaboration and communication tools for use by institute members. State-of-the-art videoconferencing and data sharing equipment was installed at the lead institutions where each team's PI and several key Co-Is were located, at NAI Central and at NASA Headquarters in Washington, DC. Equipment included a Polycom camera/viewstation, microphones, and a television monitor for the videoconferencing; and a computer, projector and a SmartBoard or large interactive electronic screen for data sharing and collaboration during virtual meetings. Each system could be used to conference with groups or individuals at one other site, or could link with multiple sites through a bridging unit housed at Ames Research Center and operated by NASA technicians. These tools

were selected to enable synchronous (real-time) communication and collaboration among some members of the NAI community and were primarily intended to facilitate exchange within NAI's Executive Council. The Council, scheduled to meet virtually eight to nine times annually and three to four times during the year in person, was composed of the team PIs, the senior management group at NAI Central and several NASA Headquarters personnel.

An additional collaboration tool was also deployed during this initial phase of NAI's technology implementation plan. This was a system in development by NASA called Postdoc that provided password protected collaborative workspaces, data and document sharing capabilities and an information storage area. All members of NAI were given access to Postdoc at no cost to them or their institutions. The assumption was that Postdoc could be used by distributed team members as virtual team spaces for asynchronous collaboration, thus bridging physical distance and time zones.

From its inception, NAI leadership recognized the importance of researching and evaluating this experiment in promoting scientific collaboration through a virtual institute. The IT Manager at NAI Central and his staff undertook an assessment of the effectiveness of NAI's electronic collaboration support during NAI's second year. They surveyed a number of institute members and found that despite the deployment of the sophisticated and expensive videoconferencing and data sharing equipment, the access to Postdoc and the training on these tools available from NAI Central technical staff, a very small number of NAI members were actually using these tools and/or engaging in electronic collaboration.

The PIs were indeed attending Executive Council videoconferences and an initial series of virtual seminars had been organized by the Arizona State University team. However these meetings and seminars were frequently disrupted by technical problems that interrupted the flow of the presentations and greatly frustrated participants. Also, access to the synchronous collaboration equipment was limited to all but those physically located near the room where it was installed. Team members in another building or at a different institution felt they were left out of NAI's primary electronic communication structures. Additionally, the asynchronous tool, Postdoc, was rejected by most within the NAI community who perceived the system as difficult to access, navigate, and utilize. Given their frustration with meeting disruptions, busy schedules, and unfamiliar technologies most NAI members surveyed were unwilling to put much time in to learning how to use these tools efficiently.

This initial NAI self-study revealed that not only was it challenging to promote the use of electronic communication technologies in and of themselves, there also existed a number of non-technical inhibitors to collaboration. Greater focus was needed on the human participants and the human/technology interface in the virtual institute experiment. It was determined by NAI Central staff that a social scientist could bring needed expertise. Thus in September 2000, Lisa Faithorn, a cultural anthropologist and organizational culture specialist, joined NAI Central as the Manager of Collaborative Research.

ADOPTING A HUMAN-CENTERED APPROACH

NAI Central leadership was learning about the challenges inherent in the development and management of virtual teams and organizations and agreed that a deeper understanding was needed of how people in the NAI community were going about their work and what they wanted to achieve.

We continued exploring the literature on virtual work groups and global organizations within the business sector. We also reviewed research that had been done within the educational arena,

on distance learning programs, on on-line degree, certification and other training programs, and on effective collaboration efforts within and among geographically distributed learning groups (Jones, 2001, also see recent work by Buzzetto-More, 2006; Ferris & Godar, 2005).

We found much less published material on virtual science organizations and on successful collaborative endeavors among remote scientists supported by electronic technologies (Koslow & Huerta, 2000; Kraut, Egido, & Galegher, 1990; Olson & Teasley, 1996; Sonnenwald, Bergquist, Maglaughlin, Kupstats-Soo, & Whitton, 2001). However, through an article published in Science on-line entitled "Scientific Collaborations at a Distance" (Teasley & Wolinsky, 2001), we were led to a very significant resource in University of Michigan's School of Information called the Collaboratory for Research on Electronic Work (CREW). Their work and that of others focusing on the development of collaboratories was particularly relevant to our project at NAI.

We recognized that collaborating across distance involved a learning curve that is difficult for many, with unfamiliar work practices and the challenge of learning how to use new tools and technologies. We increasingly saw our work as an effort to influence NAI member attitudes and behaviors, orienting them toward the idea of being a virtual (Reingold, 1994) or Web-based community (Kim, 2000) that valued collaborative work and the development of "communities of practice" (Hildreth & Kimble, 2004; Wenger 1998; Wenger, McDermott, & Snyder, 2002).

DEVELOPING A "CULTURE OF COLLABORATION"

Any organizational culture is based on a set of underlying shared assumptions that manifest themselves through the behavior and espoused values of its members (Schein, Edgar 1992). Over time these assumptions become so deeply embedded and taken for granted that they resist challenge or change. Most of the scientists funded by NAI were situated within a larger academic culture that still recognized and rewarded individual over collective accomplishment despite the increase in collaborative and multidisciplinary scientific work. They were also extremely busy and many of the senior scientists in particular had little time for learning new ways of interacting via electronic tools and technologies with unproven benefit. We knew we needed to be sensitive to the deeply held assumptions still very alive within the larger organizational culture of academia as we worked to promote an inclusive style of leadership and what we began calling a "culture of collaboration" within NAI.

Working closely with NAI Director Blumberg throughout, Faithorn's initial steps were to form and take on the management of two new working groups. The first, the Collaborative Research Support Group (CRSG) was made up of staff from NAI Central, technical support people for the NAI cyberinfrastructure from Ames Research Center and occasionally research and development information technologists from Ames. The group met weekly to review and refine NAI's Technology Implementation Plan, update requirements for the virtual institute based on what we were learning and troubleshoot issues as they arose.

Up until that time the technical support staff for the operation and maintenance of NAI-deployed equipment had little regular exchange with NAI Central management other than the IT Manager. Their experience with the members of the scientific teams was limited to initial training sessions given to a handful of team members at each lead institutional site when equipment was installed and/or to calls for help from frustrated team members when equipment failed or they didn't know how to use it. We recognized the need to build stronger and more positive collaborative working relationships between the Ames technical support staff and the science teams as well as with NAI Central staff to resolve the recurrent technical problems that disrupted virtual meetings.

A second support team, the NAI Information Technology Working Group was also formed. This consisted of members of the CRSG along with IT Points of Contact from the NAI-funded science teams. Also participating was collaboration research specialist Claude Whitmyer from FutureU, a San Francisco-based consulting firm. Whitmyer and his partner Gail Terry Grimes continued to work with us on a number of the tasks and projects we undertook to develop the virtual institute throughout the time we are reporting on here.

The Information Technology Working Group (ITWG) began to meet monthly by videoconference. The purpose was to develop a team of experts on effective electronic collaboration using the tools NAI had made available and impart this expertise to their local science teams through training and hands-on support. The group served as a venue for increased information exchange between the science teams and NAI Central and was encouraged to solve problems together, pilot and evaluate new tools, and build relationships across team boundaries.

It quickly became evident that those serving as the team IT Points of Contact differed widely in their expertise. In some cases the person designated was an IT specialist at the PI's institution, in other cases he or she had little IT experience, assigned to serve dual team roles along with being the team Administrative Assistant or Education and Public Outreach person. A few teams had no one designated for the IT support role. To address these gaps we provided special funding to teams where needed to strengthen team IT support and bring new people into the ITWG.

As technical problems were resolved and the ITWG members became more proficient with their own use of NAI's existing collaboration tools, they were better able to support local team members and satisfaction with the monthly Executive Council meetings improved. We also added two virtual seminar series. The first, called the Director's Seminar, was a monthly presentation by a senior researcher from one of the NAI teams. The second, the Forum on Astrobiology Research, which came to be known as FAR, also was scheduled to meet monthly. The presentations in these seminars were by graduate students and postdoctoral fellows. These seminars were regarded very positively by participants who experienced them as events that furthered learning about other disciplines, and broadened understanding of the field of Astrobiology as a whole. For graduate students and postdoctoral fellows in particular, the seminars provided a venue for them to present their work, get useful feedback, and expand their professional network. Because of the frequent in-person NAI events (meetings, annual science conferences, field trips), in time, virtual acquaintances and friends became actual.

Initially these virtual seminars could only be accessed as live events by those at the lead institutional sites where NAI videoconferencing equipment had been installed. We worked to find other tools that would increase NAI member access at outlying institutions as well as to the general public. One solution we were able to quickly provide to several distant key Co-Is who were PC users was a standards-based desktop system called Via Video. However, both the lack of cross-platform compatibility and the cost prohibited wider distribution. Electronic solutions that greatly increased participation in the virtual seminars came later and are discussed in the "Design and Development" section of this chapter.

In our work to foster shared values and behavior consistent with a culture of collaboration and to support this electronically in our virtual institute we recognized the importance of periodic face-to-face interaction. We knew this was of value not only when a virtual team or organization is in its formative stage, but also throughout its development. We already had in-person meetings of the Executive Council several times a year, and annual science meetings where all team members could interact. An in-person graduate student science conference was also later funded by NAI and organized by the students themselves. We also secured funds to bring IT Working Group

together at the annual science meetings. This helped strengthen the group and in some instances deepened the working relationships between the IT specialists and the astrobiological researchers who were members of the distributed teams they technically supported.

Another means to encourage scientific collaboration came through NAI's support of topical Focus Groups that were formed for limited periods to accomplish specific scientific goals. These groups included participants from different disciplines both from within the teams and from the larger scientific community. Initial Focus Groups included Astromaterials, Europa, EvoGenomics, Mars, Mission to Early Earth, and Mixed Microbial EcoGenomics. Others were added as the institute evolved. These Focus Groups met virtually and also held periodic in-person science conferences. Additionally, a number of the Focus Groups sponsored field trips to significant astrobiological research sites, enabling face-to-face contact among group members. To date several Focus Groups have been successful in providing input to future NASA space missions and impacting Earth-based research projects.

During this "discovery phase" of our project, from October 2000 through 2001, our focus was on the resolution of technical problems with the collaboration equipment already deployed, and improvements to the existing cyberinfrastructure. A major focus was also on the collection of more detailed information from the NAI community through site visits and electronic surveys regarding their current research work and work practices, their hopes and expectations as institute members, their needs and desires for collaboration support and their perspectives on the evolution of the virtual institute.

SOLICITING MEMBER INPUT

An important and explicit value in our culture of collaboration was proactive solicitation of member input about various aspects of NAI as a virtual organization and its evolution. Given the wide geographical spread of NAI members, collecting this data meant going to them in person or soliciting information electronically. The Collaborative Research Support Group took both approaches. Throughout 2001 Faithorn made visits to the lead institutions of the first eleven teams and three of the four teams added subsequently. She also visited several other institutional sites where team Co-Is were situated. Interviewing the PI of each team and as many other team members as possible, including administrative and technical support staff, she sought information on their perspectives regarding the virtual institute, what they hoped for as members, what they needed to support their collaborative work, what concerned or frustrated them. One outcome of these meetings, mentioned especially by those who hadn't had direct contact with other NAI Central management, was that these in-person conversations helped them feel more a part of an organization which up until then had seemed distant and unreal.

These site visits were closely followed by a comprehensive institute-wide Needs Assessment developed, administered and analyzed by Faithorn in collaboration with FutureU's Whitmyer and Grimes. The survey was conducted electronically and sent to everyone listed as affiliated with an NAI team. One hundred and sixty-four (29 percent) of the 572 NAI members listed in the database at that time responded to the survey. Analysis of respondent category by team, role and discipline were undertaken. Respondents included people from every team with representation in most instances in similar proportion to the size of the team. Responses came from every team member category except one, that being undergraduate students. One hundred percent of the team PIs participated, approximately 50 percent of the Co-Is, just under half of the Postdoctoral Fellows, a quarter of the graduate students, just over half the administrative, education and public outreach and information technology staff and a quarter

of those team members identified as "collaborators." All of the key astrobiology disciplines were represented as well, and as with team affiliation, survey respondents reflected a similar discipline distribution to that of the total number of scientists in each discipline.

FINDINGS FROM THE DISCOVERY PHASE

The NAI Communications and Collaboration Needs Assessment Report (Faithorn, Grimes, & Whitmyer, 2002) was submitted as an NAI white paper to Director Blumberg and then shared widely within and beyond the Institute community. It presented a wealth of detailed information about the composition of NAI membership and the diversity of its multidisciplinary teams, as well as member views and opinions on NAI's organizational culture and its current and future cyberinfrastucture.

We also now had a member-defined set of social and technical requirements (listed below) to inform our work.

Social Requirements for the Virtual Institute

- Recognition of the importance of virtual collaboration in order to further the field of Astrobiology
- Common goals and objectives
- Shared intellectual interests
- Willingness to work together and share resources
- Team cohesion and regular team meetings
- Communication across teams
- Exchange of students, postdoctoral fellows and senior researchers
- Frequent use of technology by many
- Minimum bureaucracy
- High productivity with lots of research reported to the Astrobiology community and to the public

Survey respondents confirmed our view that it takes more than technology to foster a culture of collaboration bridging disciplinary and geographical boundaries. They agreed that specific social and cultural attitudes, values and behaviors are essential to an effective virtual institute. Some reported that the historically competitive culture of academic research with its emphasis on individual achievement would hinder the full actualization of NAI's vision. Others suggested that academic culture is changing in response to the need for multidisciplinary approaches to the urgent issues in our contemporary world. The survey results underscored for us that the tensions between the traditional focus on individual reward and the increasing emphasis on collaborative scientific research informs the larger context in which NAI is evolving.

It was also confirmed that NAI members already have much experience collaborating with their colleagues on specific projects past and present. However, in working at a distance most had primarily or exclusively utilized e-mail and teleconferencing to communicate and exchange information and were inexperienced with more advanced collaboration tools. What also was new for some was NAI's multidisciplinary emphasis. Co-located and remote colleagues alike reported that collaboration across disciplines presented a particular set of challenges, notably differences in perspective on the research questions at hand, in professional language, in research methodology, and in the kinds of technology utilized.

Technical Requirements for the Virtual Institute

- Desktop tools (to include ALL members)
- Cross platform compatibility
- Web-based access
- Easy to use
- High speed
- Reliable
- Secure and private
- Reasonable cost

We learned that for daily office work as well as for scientific research purposes, the NAI respondents to our survey used Apple computers and PC compatibles in roughly equal numbers. This variance was true within teams and even when located at the same institutions. These scientists were under extreme time pressures and wanted any tools they used to be easy to access and operate without involving a steep learning curve or the need for troubleshooting. They also wanted tools they could use both at their desk and in the field. Finally, we were asked for tools that were both cutting edge and reasonably priced. Even while asking for proven, dependable solutions, NAI members expected a high-profile NASA endeavor like NAI to support advanced technology. Yet they also clearly wanted costs kept down, which we did as well.

The research we undertook in the discovery phase served as foundational for the design, development and deployment phases of our work, which we began in early 2002.

DESIGN PHASE

Our overall goal became continual improvement and increased support for "easy collaboration from anywhere at anytime." One approach we took was to identify different categories of potential collaborators and the kinds of tools and technologies required to support them. Our categories are shown in Table 1.

With now a good understanding of the needs of NAI members, we refined our requirements for potential collaboration tools to add to NAI's information technology infrastructure. Together with our consultants from FutureU we produced a Collaboration Tools Comparison Study (Faithorn et al., 2002), which explored feature by feature all the existing synchronous and asynchronous collaboration tools we could identify as relevant to NAI at that time. During this development phase in 2002 and into 2003 we also ran vendor demonstrations of several promising tools. Invited to the demos were members of NAI Central, the Collaborative Research Support Group, the IT Working Group and in some instances the Execu-

Table 1.

PIs at the lead institutions	Polycom videoconferencing, SmartBoard data sharing, desktop collaborative tools
Team members at lead institutions	Polycom videoconferencing, SmartBoard data sharing, desktop collaborative tools
Team members not at lead institutions	Desktop collaborative tools
Project work groups within or across teams, Focus Groups	Desktop collaboration tools, specialized research support technologies, e.g. 3-D visualization tools, high-speed computing, computational modeling tools
Team members in the field	Wireless technologies including satellite
Larger Astrobiology community	Desktop collaboration tools
General public	Webcasting

tive Council PIs and/or other members of the NAI community. Based on feedback from these demos we implemented specific pilot projects.

DEVELOPMENT PHASE

With the beginning of our collaboration tool pilots we shifted into the development phase of the virtual institute project. The first pilot was with WebEx, the real-time desktop-accessible meeting tool which was being widely adopted within the business sector. It had the functions we were seeking and also met our cross-platform requirements better than any other meeting software available then, although it could still not support every computer used by NAI members.

This browser-accessed meeting space enabled data, application and desktop sharing, which could augment presentations or provide a virtual meeting place for researchers to engage in real time collaborative work, such as preparing slide presentations, creating models and diagrams or reviewing documents together. A small video window could show one participant or participating site at a time, if users installed small cameras. A meeting participant list and a hand-raising button allowed the facilitator to control meeting flow by calling on people in order. A polling function was also available as well as a chat function. Participants could send text messages to the group as a whole or privately to any individual. We used a NASA teleconferencing number for the audio component, and also experimented with voice-over-IP, which worked well for participants who did not have handy access to a telephone.

We initially trained NAI Central staff and our IT Working Group members in the use of WebEx, utilizing it for various administrative meetings as well as the monthly ITWG meetings. We incorporated mini-trainings as we went about the business of these meetings, rather than having the whole meeting time focus on training. The strategy of using WebEx for meetings with other content focus, and with local support for novice users, proved an effective training approach as we expanded our pilot.

We next introduced NAI team PIs to WebEx by using it along with the Polycom videoconferencing system for the monthly Executive Council meetings. The TV monitor displayed participating sites in small windows on the screen while the SmartBoard screen/computer/projector combination displayed the WebEx meeting space. Thus all participants in each conference room could see the agenda and other shared documents or slides on their big screens as the meetings progressed. We used the hand-raising button to facilitate dialogue. This cut down on the latency problem and accompanying awkwardness when two non co-located people spoke up at once and then waited for one another to continue or spoke again at the same time. The team PIs became accustomed to WebEx in this way, in most cases supported by their already trained IT supports.

We also incorporated WebEx successfully into our two NAI Seminar Series. This not only improved the quality of seminar participation for those located in the team videoconference room in the same way as for the Executive Council, it also opened the seminars to those who previously had no access. WebEx meeting information was posted on the NAI Web site prior to each seminar. Anyone, including those outside NAI in the wider Astrobiology community or interested members of the public could join the WebEx meeting and dial in to a teleconference from their desktop, thus simultaneously seeing images and hearing the presenter speak.

Postdoc, the system originally made available to NAI members for asynchronous collaboration needs, had been removed from our suite of tools in response to NAI member feedback. One frustration with Postdoc was that it had no email interface. Because NAI researchers were accustomed to doing much of their collaborative work using email we understood the importance of finding a tool that did not require users to go to a special site in

order to post files or other data for storing or sharing. This requirement considerably narrowed our search to only a few tools as potential pilots. With input from the community we selected Livelink, which provided a secure browser-accessed collaboration space for asynchronous collaborative work that met several member-identified needs: easy upload and sharing of large files, effective version control for the co-authoring of research papers and other documents, and the capability for development of a searchable shared information repository by researchers with common interests. We ran a seven-month Livelink pilot with NAI Central, the ITWG members and small scientific project groups from three of the NAI teams.

DEPLOYMENT PHASE

Feedback collected from participants in both the WebEx and Livelink pilots indicated that these tools were regarded by most respondents as valuable and that they favored their adoption by NAI. In the deployment phase of our virtual institute project, we implemented WebEx for full on-going use by the NAI community.

However, as we neared the end of the pilot period for Livelink we were introduced to a new tool jointly developed by researchers from NASA Ames Research Center and from Xerox, called NX. It had all the features we required and was planned for deployment across Ames as well as other NASA Centers. We found that NX could be extended to NAI members at an extremely reasonable cost. We did a short pilot and made the decision to adopt NX as our main asynchronous collaboration tool.

At this stage of the project Blumberg had recently retired from his position as NAI Director. Faithorn was soon to leave NAI for another assignment. We were at a point where we had completed one full discovery, design, development and deployment cycle. We believed we had made some real progress in furthering NAI as a virtual science organization and we certainly had learned some key lessons about what it takes to foster electronically supported collaborative work. We also identified a number of topics that we believe would benefit from future research.

LESSONS LEARNED

Some organizations, especially in the business sector, are in a position to mandate electronically supported collaboration among their workforces, as well as dictate what software and hardware participants will use to do their work. NAI members' collaborative activities with scientific colleagues at a distance, however, were voluntary and motivated by their science agendas. NAI Central's aim was to encourage, not mandate, new ways of working in the interests of advancing scientific research, using the electronic tools and technologies that NAI members had a voice in selecting.

Although scientific collaboration is on the increase, competition between individual researchers and between institutions is still reinforced, both through the traditional system of recognition and reward for individual accomplishments in the academic world and through resource limitations. Cross-institutional and international collaborations are hampered by restricted access to information and policies designed to protect institutional or national security. The key obstacles to scientific collaboration identified by NAI members closely reflected our own observations. These included disciplinary differences in theoretical and methodological approaches and in language, heavy work loads under extreme time pressure, uneven access to collaborative opportunities, skill and generational differences resulting in varying levels of motivation to learn new technologies and work practices, and intellectual property and attribution issues. A comment by one of the PIs during an interview was telling: "NAI makes it almost socially acceptable to collaborate with your competitors!"

We found that our efforts to overcome these barriers necessarily took time and involved incremental learning, consistent and on-going advocacy by organizational leaders, strong motivation on the part of participants, proactive training and facilitative support and much positive reinforcement.

We tried to foster a sense of belonging to a virtual institute that was inclusive and that actively sought member input regarding its operation. The site visits, Needs Assessment and other forms of exchange and information gathering we undertook were intended to send a message to NAI members that their perspectives and opinions were valued by NAI Central and that they were regarded as key players in decisions regarding the development of NAI's technology infrastructure.

In introducing new tools to our members we learned to initially focus on those people most likely to be early adopters and advocates. By and large these turned out to be the younger scientists, as well as our IT Working Group members. We also looked for where collaborative work was already happening or for projects that scientists were clearly eager to take on and then searched for ways to support those efforts, rather than trying to encourage collaboration where there was no existing investment. We also learned our initial focus on collaboration across the teams had obscured the need for us to simultaneously encourage internal team development and cohesion. Scientists had come together from different institutions and different disciplines to propose projects to NAI. Their selection as a team did not mean they in fact already functioned as one.

Theoretical Implications and Future Work

One of the most important lessons from our work at NAI that we believe has implications for many other domains of activity in addition to science was about collaboration itself. We realized that it was not possible for us to focus on promoting collaboration across distance using electronic means without also regarding other, interrelated aspects of collaboration. We came to explicitly recognize that our aim as a virtual organization was not only to support remote collaboration but at the same time, given the aims of NAI, necessarily required us to address several other forms of collaboration as well. This included collaboration across disciplines, across institutions, across national boundaries, and across generations. From work in subsequent NASA projects we are now also studying collaboration between humans and robots or humans and other "intelligent" technologies. Each of these collaborative dimensions has their own challenges and potential solutions.

A conclusion from our work at NAI is that if virtual science organizations, collaboratories, and other organizational forms of scientific collaboration are going to flourish in this new era of advanced cyberinfrastructure, multiple and interrelated forms of collaboration will need to be explored and addressed.

From a theoretical perspective we are thus proposing that to understand collaboration fully and be effective in supporting it in groups and organizations, whether virtual or not, collaboration must be approached as a multi-dimensional reality. The dimensions relevant to any given domain of activity must be distinguished, as each has specific features requiring analysis. Clearly, more research is needed regarding all of these collaborative dimensions as well as the interrelationships among them.

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KEY TERMS

Astrobiology: The study of the origin, evolution, distribution, and future of life on Earth and in the Universe.

Collaborative Science: Scientific research carried our collectively by two or more scientists.

Collaboratory: A laboratory without walls where scientists can access instruments, data and one another across distance.

Communities of Practice: Groups of individuals with a shared intent who intentionally come together to exchange knowledge and learn from one another, often within the context of a larger organization.

Culture of Collaboration: Assumptions, values, and behaviors shared by an organization or group that promotes and supports knowledge exchange and collective work.

Cyberinfrastructure: Infrastructure based upon distributed computer, information, and communication technology.

Electronic Collaboration: Performing work with a colleague or work group using communication and collaboration tools and technologies.

Virtual Organizations/Virtual Teams: Organizations or teams with a shared mission, task, or agenda whose members are geographically dispersed.

Chapter L
Online Collaborative Integration and Recommendations for Future Research

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ABSTRACT

The concluding chapter offers the editors' insights into the book chapters' combined contribution. Using the editors' Collaborative Integration Paradigm, they examine types of collaborations described, the electronic technologies used, and the kinds of research and theories discussed by contributing authors. They consider commonalities in electronic collaboration across sectors and the significance of inter-organizational or intra-organizational structure. The editors recommend future research as well as theory-building needed to advance the field.

INTRODUCTION

This *Handbook of Research on Electronic Collaboration and Organizational Synergy* examines electronic collaboration in three sectors: business, education, and the public sector. In each sector, contributors consider collaboration within organizations and across organizational boundaries.

Electronic collaboration requires new ways of thinking that may challenge previous ways of working and motivate change. Contributors to this book, who represent a broad range of fields,

note a shift away from the old methods of one-way knowledge transfer toward collaborative models where experts become active participants and facilitators in knowledge creation.

The topic of collaboration in a connected world is complex and means different things to different chapters' authors. The research examines new approaches to problem solving and new ways to meaningfully engage participants who collaborate in various settings. The chapters in this book examine a wide range of subject matter. Contributions range from fresh voices of new researchers to evolved perspectives of experienced scholars. They used a wide range of research methods. Taken together, their work provides a snapshot of emerging interdisciplinary practice and scholarship.

To better convey the significance of these contributions, the editors systematically analyzed chapters of this book. The editors looked at the kinds of collaborations described, the electronic technologies used, and the kinds of research and theories discussed by contributing authors. They considered commonalities in electronic collaboration across sectors and the significance of inter-organizational or intra-organizational structure. Lenses used for this analysis included the editors' *Collaborative Integration Paradigm* (Salmons & Wilson, 2008).

RESEARCH METHODOLOGIES, METHODS AND THEORIES

This Handbook of Research draws on diverse methodologies and theories. Here is a brief summary of general theoretical and methodological traditions represented in this book. Many of the studies fall into more than one of the categories listed below, particularly when the studies were interdisciplinary.

Theories

Theories inform both the choice and implementation of methods. Sometimes they are explicitly stated in the studies, and other times implied by the strategies and outcomes of the research. Some theories that guide this book's authors are briefly described here.

Constructivist theories guide most of the chapters in the Education section and many Social Sector entries. Constructivism is regarded as both an epistomological view and an instructional method. A core notion of constructivism is that individuals live in the world of their subjective experiences—a world where they construct their own meanings. Constructivism is usually presented in contrast to positivism: the belief that reality exists independent of our own perceptions and that it follows objective natural laws.

According to constructivist theory in education, learners take responsibility for constructing meanings and the instructor takes an active role as guide. Constructivist researchers explore the different ways that subjects construct their own meanings, even in relation to the same phenomenon (Gray, 2004; Patton, 2002; Schutt, 2006; Stake, 1995). Some authors refer to constructionist rather than constructivist theories, emphasizing particular constructions of the subject which are external to an individual; rather these constructions are shared creating new, tangible knowledge (Papert, 1990).

Social constructivist theories point to the value of interaction and negotiation among learners who construct new meanings together (Bruner, 1966; Dillenbourg, Baker, Blaye, & O'Malley, 1999; Hennessy & Murphy, 1999). Social constructivists look at ways collaborative interactions catalyze cognitive development (Vygotsky, 1978, 1987). ***Social learning theories*** focus on ways people learn in a social context by observing others, imitating others, and modeling behaviors for others. According to this theory, environmental

factors can either reinforce or obstruct learning (Bandura, 1977, 1986).

Originally developed for qualitative data analysis in the field of sociology, ***grounded theory*** is also used more generally as a research design strategy for both qualitative and mixed methods studies. When researchers use grounded theory, they intend to move beyond description and generate or discover new theory (Charmaz, 2006; Creswell, 2007). In this constructivist world view, knowledge is not drawn from preconceived theory; rather, it is constructed based on patterns in the data. In grounded theory, researchers summarize observations into conceptual categories, which are tested in the research setting. New theory evolves as conceptual categories are refined and linked (Schutt, 2006). ***Situational analysis***, as described by Clarke and as used by contributing authors, builds on basic grounded theory. While grounded theory focuses on actions and social processes, situational analysis focuses on the situation of the inquiry. Researchers map the major elements in the research situation of inquiry, the social worlds and positions taken (Clarke, 2005), and use these maps as the basis for analysis. Two chapters used grounded theory and two used situational analysis.

Discourse theories directly or indirectly guide those chapters in all sectors that concentrate on issues related to the communicative process. Discourse theories focus on social relations, knowledge, identity, and power, affecting not only the form of discourse, but what is counted as knowledge. Two related approaches to discourse are referred to in these theories; one dealing with the structure of language and one with the social aspects of discourse. Words and symbols structure participants' contributions to a discussion; discourse refers to the patterns in discussions and deliberations and their social implications. Careful analysis of language can shed light on the creation and maintenance of social norms and the construction of personal and group identities, practices central to the collaborative process (Hardy, Lawrence, & Grant, 2005; Starks & Trinidad, 2007).

The degrees and types of rules that govern discourse are keys to the social aspects of these theories. Rules-based hierarchical discussion, debate and communication (Habermas, 1984, 1987) which has functioned as a cornerstone of contemporary democracy and social theory has been questioned by those interested in equality of power and meaningful participation by all actors within a collaborative venture. One outcome of inquiry about the nature of these rules has been a disposition towards information-derived consensus as a tool for collaboration (Dryzek, 1987).

Examples of the widespread use of discourse theories is found in chapters in the education and social sectors that focused on cultural and organizational power differentials. It also plays a significant role in social network development referred to in chapters that focused on collaborative learning, whether in intra-organizational or inter-organizational contexts.

Network theories broadly relate to complex interrelated actors and relationships from many domains. Here, the term is restricted to social theories, ***actor network theories*** and ***policy network theories***. Actor network theories combine the technical and non-technical aspects of these relationships between humans and non-humans (Law, 1992), generally explaining how rather than why these linkages occur (Latour, 2005). Policy network theories expand actor networks to link actors interests and resources. ***Social capital theory*** focuses on social networks, particularly aspects relating to trust-building, that significantly affect the impact of this type of network. Over half of the chapters refer to establishing and maintaining trust as a major theme.

Two chapters explicitly state that the researchers employ actor network theories, although most of the subject of the research, in both cases involved interaction between humans and machines (electronic collaboration). Business sector chapters on technical tools for commerce and information

delivery as well as system support and multi-national requirements in education and emergency response technology in the social sector are examples that reflect the influence of these theories.

Methodologies & Methods

The collection of works presented in this book is heavily weighted in favor of qualitative case study, action and literature review styles of research. It is not surprising that exploration and reflection would characterize research in an emerging, rapidly changing field. Studies presented in this book may provide a foundation for subsequent inquiries using other methodologies.

Action research is used when researchers want to solve, as well as study, specific problems within a class, project or organization. Researchers are actively involved with the point of action, allowing for collection of rich data. Action research may be loosely or highly structured, and can serve either qualitative or quantitative studies (Gray, 2004). Participants are often engaged with the researchers, serving as co-researchers who help to shape the inquiry (Patton, 2002; Schutt, 2006).

Action research methods were used qualitatively in five chapters. Contributing authors looked at projects, classes or teams with dispersed participants, or work that involved significant online activity. Researchers primarily used data drawn from participant observations and project-related documents or correspondence, including e-mail.

Case study research is used in a variety of contexts primarily for addressing *how* or *why* questions. It allows the researcher to explore the complexity of a single case by looking at it holistically (Stake, 1995). Case studies are empirical inquiries that explore contemporary events within real-life contexts, particularly when context/event boundaries are difficult to establish (Yin, 2002). The researcher conducts detailed, in-depth data collection using multiple sources of information. For some researchers, case study research "is a qualitative approach in which the investigator explores a bounded system (a *case*)" (Creswell, 2007). Others see case study as a research strategy that encompasses qualitative and quantitative methods.

Qualitative case study was the most common method used by contributing authors; twenty chapters described this approach. Authors used data collected through interviews, observations and participant observation, and documents. Some observed research participants' online activity in class discussions or work projects. Some authors, immersed in the *case,* blended action and case study approaches.

Ethnographic research is a qualitative design in which the researcher describes and interprets the shared and learned patterns of values, beliefs or behaviors of a group that shares a particular culture (Creswell, 2007, p. 68). Ethnographers immerse themselves in the lives of the subjects of their inquiries (Lewis, 1985). Ethnographic research was once primarily associated with anthropologic studies of culture. Today researchers also use it to look at organizational culture. The ethnographic researcher uses methods such as observation, participant-observation, or interviews.

Two chapters drew on ethnographic research. One chapter used ***autoethnography***, which entails a researcher's study of his or her own culture through personal narratives (Patton, 2002). Researchers used mobile and web-based communications and e-mail exchanges to share and develop narratives.

Studies based on ***literature review*** aim to draw new conclusions from others' empirical research and published studies. A variety of types of coding are frequently used analyze literature. Twelve chapters in this text drew data from review of literature, documents, or technologies. Again, the nature of online exchanges involves traceable and archived communications, events, and documents available for scholarly consideration. Other authors looked at the literature using online databases and electronically published articles.

ANOVA, or analysis of variance is a collection of statistical models used to determine whether a significant relationship exists between variables. Researchers select among different types of analysis, including one-way, factoral, mixed design and multivariate (MANOVA), depending upon the nature and number of variables in the application. ANOVA is frequently used to analyze differences in data sets through revealing areas of statistical significance. Three authors used ANOVA to investigate topics from student mentorship and e-business.

Two chapters drew on ***path analysis***. Path analysis is a straightforward extension of regression modeling. It explores hypothesized relationships of variables using structural equation modeling for causal analysis. Specifically, path analysis normally tests the fit of the correlation matrix against two or more causal models which are being compared by the researcher.

Q method is a type of factor analysis designed to investigate subjectivity in a systematic way by correlating persons instead of tests (Brown, 1980; 1993). The purpose of this approach is to uncover relationships among significant clusters of data that reveal ideal types generated by the participants rather than as a function of the researcher's design. As such, they use relatively small samples, probing in depth to reveal characteristics of those ideal types. The types are statistically analyzed, using correlation as an interim step, before placing the results in the study's context. Q results are designed to be tested with wider samples of the population through surveys or other quantitative methods. Another important aspect of Q method is the gathering of a very large sampling of statements about the questions under investigation that guide a Q study; these statements are derived from literature, observation, and interview data, making a Q study a truly mixed-methods approach to studying questions such as those relating to values, standards, or beliefs that are highly subjective, and therefore difficult to address with statistics alone. One study in this book used Q method to investigate values and their roles the the attitudes and behavior of experts in policy questions.

Eight chapters used the ***survey research method,*** a descriptive research method used to discover things that cannot be directly observed. The survey research method is most often used to quantitatively describe specific aspects of a specific population, sometimes including examining the relationships among variables. Using the survey itself as the tool, this method is predicated on a model of expected relationships among variables. Often, results are generalized to a larger population. Survey research method in the context of electronic collaboration could be used to explore whether the results of a specific case study were valid over a larger specific population.

COLLABORATIVE INTEGRATION PARADIGM

The Collaborative Integration Paradigm offers a conceptual framework for exploring fundamental questions about the collaborative process: who collaborates, why do they collaborate, and to what degree do they collaborate? How do they interact to accomplish collective outcomes? Most of the collaboration practices apply whether the collaboration occurs online, face-to-face, or in a blended arrangement. However, when collaborative partners work across geographic and other divides, the need for clear goals and agreed-upon parameters are heightened. As a result, it is more important to ensure that all involved understand the kinds of distinctions highlighted in this paradigm, and plan, organize, and manage the collaboration accordingly.

Who?

Collaborative partners may include people who operate at *individual*, *organizational* or *societal* levels. Individuals may collaborate autonomously, and represent their own self-interest, or they may

represent an organization. They negotiate shared purposes and agree to processes. At the *organizational* level, more people or departments may be involved. Individuals involved may be responsible for representing the interests of an organization, a state, or a segment of society. Policies, cultures or constraints may need to be attended to in order for the collaboration to proceed—or for outcomes to be implemented. At the *societal* level, multiple organizations, disciplines and/or stakeholders may be involved, requiring a more global look at the procedures and management involved with the collaborative process.

Collaborative processes can occur within an organization (*intra-organizational*), or between organizations (*inter-organizational*). In *intra-organizational* collaboration, partners are more likely to enter the process with a foundation of shared rules, norms, language, worldview and structures for decision-making and communication. In *inter-organizational* collaboration, they may enter the collaboration with very different epistemological viewpoints, backgrounds in different disciplinary backgrounds, different knowledge bases, and different organizational cultures. In such cases partners more often need to allocate time and attention to making agreements about roles, expectations (including definitions of positive outcomes) and timelines before substantive work can occur.

Why?

People work collaboratively, instead of independently, for a variety of reasons. In the Collaborative Integration Paradigm, these reasons are categorized as *emergent, strategic* or *sponsored*. *Emergent* collaborations arise when parties with a common interest bring their varied expertise together to frame an issue or explore a new direction. Typically, participants in an *emergent* collaboration are responsible for determining the collaborative process and articulating desired outcomes. *Strategic* collaborations take place when the solution to a specific issue requires particular disciplines, perspectives or representation. When a regulator, funder, or other stakeholder desires or requires the involvement of multiple perspectives and participants, the collaboration can be categorized as *sponsored*. Similarly, when an instructor requires learners to participate in a group project, it could be categorized as *sponsored*. The goals, processes, and desired outcomes may be either generated by collaborative partners or may be defined by an external stakeholder or sponsor.

These categories may apply to collaborations that are *inter-* or *intra-organizational*, with collaborative partners who operate at the individual, organizational, or societal levels.

How, and to What Degree?

This model uses the terms *interchange, interweave,* and *innovate* to describe distinctions related to process, degree of integration, and outcomes of a collaborative process. Collaborative partners *interchange* information or ideas to better comprehend or explore issues from different perspectives. After experiencing an *interchange* collaboration, participants may benefit from an enlarged view based on the understandings gained from the exchange.

At the *interweave* level, partners need more than a simple exchange; they need to draw knowledge from multiple perspectives and use methodologies from diverse disciplines. At this level, participants combine information, knowledge and methods. After experiencing an *interweave* collaboration, participants may continue to view problems from different angles and use multi-disciplinary approaches when they return to work outside the collaboration.

At the *innovate* level, collaborative partners co-create knowledge that transcends the contributions from respective partners. Implementing the outcomes of collaboration at this level may require radical re-thinking of the status quo. These participants are often fundamentally changed by the experience.

The factors involved in who, why, how, and to what degree participants collaborate are interrelated. Taken together they offer a non-linear basis for describing and analyzing collaborative processes. For example: an *emergent* collaboration may occur at an *individual* level. These creative and flexible individuals may find that a high degree of integration of their respective ideas and approaches is possible. During the process, they may begin to see ways that their successful outcomes could be applied to a particular *strategic* problem and expand involvement to include others at an *organizational* level. This may involve moving beyond the existing organizational culture, requiring more formal agreements and accountability in the collaborative process. Involving others may mean they have to start with *interchange* to establish a foundation and shared commitment before they can grow towards an *interweave* level.

Another example could entail finding a solution to a large-scale problem. Foundations, corporate and governmental entities allocate funds to create a new answer or even design a new set of questions, recruiting people from diverse national and organizational cultures and disciplines. This *sponsored* collaboration may generate *innovative* solutions, and stimulate new fields of study to prepare those who will implement them. Individuals involved in more complex, *societal* collaborations may discover some new area to explore together in a new *emergent* collaboration.

The Collaborative Integration Paradigm offers readers a framework for considering the examples presented in this book as well as their own work with electronic collaboration. Readers who are instructors may construct assignments that ask learners to compare and contrast chapters based on the ways they represent dimensions of collaboration described by the paradigm. Readers who are planning collaborative projects may find the vocabulary of the paradigm useful as they determine roles, goals and desired outcomes. Readers who are researchers may find it useful as they craft interview or survey questions, or design studies to evaluate collaborative projects. Creative readers are encouraged to build upon, improve and apply the Collaborative Integration Paradigm.

COLLABORATIVE INTEGRATION PARADIGM AND THE HANDBOOK OF RESEARCH FOR ELECTRONIC COLLABORATION AND ORGANIZATIONAL SYNERGY

The Collaborative Integration Paradigm is offered as a basis for understanding and comparing the collaborative processes and projects described in the book's chapters. Chapters reporting on classes or projects through case studies or action research mentioned a variety of ways that people collaborate in a virtual world. Since interaction between partners is intrinsic to the collaborative process, most authors described how and why they communicated. Information generated by the authors' examples provides some insight into electronic collaboration in education, business and the social sectors.

Roughly half of the projects reported could be described as either *emergent* or *strategic*. *Emergent* electronic collaborations often evolved in an organic way to further work or relationships started in face-to-face meetings. Strategic collaborations were more carefully planned to address a particular need on a campus, in a business or community. *Sponsored* examples included assignments in courses or projects with an external funding source, but there were no examples where an external stakeholder mandated that partners must work collaboratively.

Why and How do Collaborative Partners Communicate?

For electronic collaborations to succeed, ongoing, purposeful communication is essential. Collaborative partners used a variety of approaches in

cases or projects profiled in chapters throughout the book. Authors discussed ways diverse participants created productive connections. The authors generally did not analyze communication styles or content, technology selection or effectiveness of particular tools; instead they general focused on electronic tools as means for connection and exchange. Dialogic processes reported by authors are summarized in these eight steps:

1. Planning and organizing the process the partners will use to work collaboratively;
2. Establishing trust, group cohesion, and collective identity;
3. Exchanging ideas or telling stories about the content of the collaborative work;
4. Making decisions;
5. Solving problems or resolving conflicts;
6. Reviewing each other's contributions to the project;
7. Meshing individual contributions into a collective outcome; and
8. Reflecting on the collaborative process or project.

Any collaboration might involve communication for these purposes. However, in online collaborations with geographically dispersed participants, clear expectations, and systematic communication is a critical success factor. Authors' examples provide some insight into electronic communications tools and approaches favored in education, business, and the social sectors.

Given the number of international collaborations described, it is not surprising that asynchronous methods were mentioned more frequently than synchronous communications. Since asynchronous communications can occur at any time, they allow the most flexibility for dispersed participants. Almost every chapter that reported on communications mentioned e-mail, with its ubiquitous access by computer, handheld PDA, or mobile telephone.

Company and institutional intranets or portals were the second most popular approach. These centralized spaces allow collaborative partners to share and archive materials of common need and interest. In education, threaded discussion forums, electronic portfolios, wikis, blogs, and podcasts were reported. In public and private sector organizations, shared calendars and handheld/mobile technologies were discussed. A few cases mentioned Really Simple Syndication (RSS) feeds, and specialized research support technologies, such as 3-D visualization tools.

In synchronous communications, real-time online meetings were most commonly reported across sectors. These might entail using a multimedia meeting platform, videoconferencing, or a messaging/chat function. Interactions in immersive 3-D virtual worlds were described in the education sector.

These communication activities fulfill important steps associated with collaboration at the levels of *interchange, interweave,* and *innovate*. Chapters in this book offer examples of ways people communicate to exchange ideas, mesh ideas, and develop new solutions. In some cases, the perspectives and insights of multiple collaborative partners led to improvement of individual outcomes. In other cases, the perspectives and insights of collaborative partners led to the creation of collectively-generated outcomes of benefit to the group or organization.

IMPLICATIONS FOR FUTURE RESEARCH AND PRACTICE

Gaps in contemporary research on electronic collaboration were highlighted in this Handbook's preface. Three needs were articulated:

- New models that focus on organizational practices and processes necessary for successful online collaboration,

- Opportunities and mechanisms for interdisciplinary exchange of findings, and
- Study of potential impacts of electronic communications on research methods and outcomes.

It seems clear that, in order to advance research on electronic collaboration it is necessary to explicitly consider research theories and methodologies as well as the subjects under investigation. Given progress made in these areas with publication of this volume, where should future researchers direct their attention in order to move this field forward?

New models relevant to practice in education, business and the social sector were introduced in this Handbook. Chapters about education offered models for multi-institutional e-research and content access, classroom team projects and assessment, mentoring, and professional development of teachers and administrators. Chapters about business examined new software solutions and strategies for e-business and e-commerce. E-collaborative solutions to international and community social problems were considered by authors in the Government/Social Sector chapters.

Many of these models were developed by the authors and studied on an exploratory basis. Several of the authors made a point of inviting other researchers to build on their initial efforts. Next steps might include broader, more systematic studies that can test these models in different settings. Such studies could generate findings researchers can use to refine and improve the models, and educators and managers can use to improve practice.

Models for successful leadership in dispersed organizations were not explored in depth in this volume. Next steps might include studies of effective leadership roles, styles, and practices in support of electronic collaborative partnerships and alliances, or studies of leaders' use of collaborative advantage in comparison with use of competitive strategies.

A related gap that became apparent in this book is the need for new and revised theories to guide study in this emerging field. In some cases, authors charting new territory were dependent upon theories that failed to take into account the force of new issues associated with electronic communication.

The second need identified in the preface pointed to the scarcity of opportunities for interdisciplinary exchange of findings on topics related to collaboration. This need is implicitly addressed by the interdisciplinary nature of this book. One purpose for the Handbook was to encourage readers to transfer applicable ideas and practices across sectors.

The contemporary shift toward organizing journals in electronic databases means that those with access to online libraries can access journals from diverse, multi-disciplinary sources. However, those not based in academic institutions lack the entrée into these costly publications. Publication in journals with open access to people across disciplines will broaden exposure to emerging ideas and findings.

Most scholarly exchange occurs within professional societies and associations, which are by their nature primarily discipline-based. Next steps might include development of ways to encourage cross-sector, cross-disciplinary peer review and scholarship. New or updated theoretical frameworks that encompass multiple epistemological stances will open the door to new kinds of inquiries.

The same obstacle exists for practitioners. In many cases associations serve very specialized sub-sets of professional fields, so educators in higher education rarely interact with grammar school teachers; small business entrepreneurs do not cross paths with corporate employees. The exchange between sectors, or between scholars and practitioners, is rarer still.

Next steps might start with attention to mechanisms that encourage and reward participation in cross-sector, interdisciplinary collaboration.

These efforts could encompass a progression from *interchange* across sectors and disciplines, through the *interweave* level to co-creation of knowledge at *innovate* level. Based on the examples presented in this book, it is possible to imagine important discoveries with the potential to illuminate contemporary dilemmas that have remained unsolved using current approaches to scholarly inquiry and practical problem-solving.

The third need identified in the preface points to the lack of scrutiny into potential impacts of electronic communications on research outcomes. Contributions to this book were made by researchers using ICTs to collaborate with co-researchers at the same time that they investigate electronic collaboration and related processes and outcomes. In this circumstance the researchers and the researched both offer insights into dimensions of electronic collaboration. Still, meta-analysis is needed to improve understanding of choices made, of tools and processes used by Internet researchers and of those who use electronic communications in practice.

Full consideration of these questions and strategies goes beyond the scope of this book. They are briefly outlined here as a springboard for new research and practice. It is hoped that readers will be motivated to step outside disciplinary boundaries to learn and work e-collaboratively with others—and to study processes and outcomes.

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KEY TERMS

Collaborative Integration Paradigm: The Collaborative Integration Paradigm describes the relationships among purposes for collaboration, types of partners, and degrees of integration from diverse individual, organizational or disciplinary partners into the processes and outcomes of the collaboration.

Cross-Disciplinary: Coordinated effort involving two or more disciplines.

Emergent Collaborations: Arise when parties with a common interest bring their varied expertise together to frame an issue or explore a new direction.

Interchange: A level of collaboration that involves interaction of disciplines, using different lenses to view a problem where each offers that discipline's knowledge and processes. Interchange often occurs at the personal level—building relationships.

Interdisciplinary: Process of combining two or more disciplines, fields of study or professions.

Interweave: At this level collaboration the problem involves integrating parts of disciplines or elements to create a new solution to the problem. This could be described as "intellectual pluralism;" borrowing tools, methods, concepts, models or paradigms from other fields.

Innovate: Co-creation of new knowledge, new approaches or disciplines. This level of collaboration results in new thinking that typically means radical change and new frames of reference.

Multi-Disciplinary: Relating to, or making use of several disciplines at once.

Sponsored Collaborations: Take place when a regulator, funder, or other stakeholder desires or requires the involvement of multiple perspectives and participants.

Strategic Collaborations: Take place when the solution to a specific issue requires particular disciplines, perspectives or representation.

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