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Donald G. Perrin
Executive Editor

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Editorial

The Golden Age of Television

Donald G. Perrin

Since World War II, television has made its debut in education on broadcast channels, airborne television (MPATI), closed circuit television, Instructional Television Fixed Service (ITFS), cable television, satellite on C and Ku bands, Interactive Video via telephone lines and later using Internet Protocol (IP), and most recently on a host of handheld devices such as Personal Digital Assistants (PDAs) and cell phones. Analog radio and analog television are being replaced by digital radio and digital television from satellite and terrestrial sources.

All telecommunications are going digital.

We have seen the rise of special programming for preschool, K-12, higher education, and home consumption. We have seen educational programming of exceptional quality from the Public Broadcasting System and the Adult Learning Services. These programs that once upon a time were supplied as expensive 16mm films are now available at low cost on videocassette and DVD.

We have seen new technologies replace old, and production companies come and go. The success of new technologies such as cable television, World Wide Web, and Digital Video Disk have adversely affected the market for commercial television and television networks. The Public Broadcasting Service and Adult Learning Service (ALS) are increasingly dependent on Foundations, sponsors and fund raising. It is projected that ALS will close in September 2005.

As distance learning in colleges, universities, and school systems went online, funding for educational television production diminished. With cuts in federal and state funding, the future of educational television is uncertain at best. And the move to make television fully digital hastens the demise of existing television production and broadcast equipment.

The internet has been widely adopted for distance learning. It can be accessed anywhere, anytime, by almost anybody. It is highly interactive, ubiquitous and inexpensive. The inventory of educational resources is enormous and many resources come free of charge. Does the internet replace television? Not exactly. But it does so much more...

Is it possible that we are coming into the golden age of the Internet? Or is it already in decline as an agent of learning?

The possibilities are enormous, but so are the threats. Commercialization, spam, and spyware occupy an increasing percentage of bandwidth. The Digital Millennium Copyright Act and privatization of knowledge are propelling valuable free resources into "for sale" products and services. Government regulation and taxes loom like a dark cloud on the horizon. It would be easy to conclude that the Internet also has seen its *Golden Age*.

But wait!

Innovation and creativity - a powerful force for growth and change - are flourishing. Educators have adopted the Internet as important to facilitate learning at a level unprecedented for earlier technologies. Distance learning on the web is exploding as a world wide force for education and training. It is serving the underserved and provides access to education where it was previously inaccessible - in hospitals, prisons, home schools, and geographically remote areas. The Internet crosses local, state, geographic, international and cultural boundaries to form new kinds of learning communities; It supports mobile learners and flexible schedules. It supports many learning styles, languages, and levels of education and training.

The Internet is still at the beginning of its golden age. The best is yet to come!

Editor's Note: This paper presents preliminary findings of a study to determine how computer technology impacts teaching of Gaelic language. It defines new roles for students and teachers as a result of "technology-based practices", "changes in curriculum and pedagogy", and "an instructional shift toward project-based constructivist approaches to teaching and learning". The use of technology is embraced by students while raising some concerns from teachers.

New Teacher and Student Roles in the Technology-Supported, Language Classroom

Daithí Ó Murchú

Abstract:

The focus of this paper is a challenging analysis of how the roles of teachers and students in different classroom settings are altered as a result of computer-based technologies. I am particularly interested in how the capabilities of computer-based technologies, and technology-enhanced learning environments can enable and/or constrain innovative pedagogical practices in and elementary school, Gaelic language settings, in Ireland¹. Powerful new capabilities of computers make it possible to access, represent, process, and communicate information in new ways (Kozma, 1991, 1994). These capabilities make it possible to search and organize information, analyze data, represent and transform ideas, simulate complex systems, and communicate with others in ways that were previously not practical or even possible. They also enable new ways of teaching and learning – new activities, new products, and new types of learning and teaching (Kozma & Schank, 1998), but, do all teachers, students and educators feel and agree with the general, positive, societal perception of technology in education?

Introduction

School's hierarchical organization is intimately tied to its view of education and in particular to its commitment to hierarchical ways of thinking about knowledge itself. What one will consider to be the proper place for School on the heterarchy-hierarchy scale of organizational forms depends on the location of one's theory of knowledge on the heterarchy-hierarchy scale of epistemologies. (Papert, 1993 :pp. 61-62)

The research literature (Means & Olson, 1997) documents a strong association between new technology-based practices, and changes in curriculum and pedagogy. For example in many countries, the use of educational technology is part of an instructional shift toward project-based, constructivist approaches to teaching and learning within a context of school improvement or reform. Instead of focusing solely on increasing the acquisition of facts related to specific subject areas, teams of students are collaboratively engaged in solving complex, authentic problems that cross disciplinary boundaries. Instead of dispensing knowledge, teachers set up projects, arrange for access to appropriate resources, and create the organizational structure and support that can help students succeed. This approach moves conceptions of learning beyond rote memorization of facts, instructionist and behaviourist methodologies, and procedures to learning as a process of

¹ The schools and teachers involved were from 'ordinary' elementary schools where Irish Gaelic was taught daily as a subject only as defined and outlined by the National Curriculum in Ireland.

knowledge creation. It moves education beyond the notion of a place where knowledge is imparted, to one of classrooms, organisations, communities of practice (COPs), and societies as knowledge building communities (Wenger, 1998; Bereiter, 1999; Scardamalia & Bereiter, 1994; Brown & Campione, 1994). These are more appropriate constructs for the information society and knowledge economy of the future. Technology plays a role in this approach of providing students with tools and information that support their problem solving, communication, collaboration, and knowledge creation. It also provides teachers with new tools and challenges that can transform instructional roles, curricula, and practices.

Plomp, Brummelhuis, and Rapmund (1996) define learning as a process in which four components interact: (1) the teacher, (2) the student, (3) curriculum content and goals, and (4) instructional materials and infrastructure – more specifically in this paper, the role of multimedia and information and communications technology (ICT). This paper, will discuss findings about changing teachers' and students' roles and classroom practices in technology-enhanced, Gaelic language classrooms across the Republic of Ireland. This paper will also allow for a more open debate on the effects of TELLE (Technology-Enhanced Language Learning Environments) be they positive or negative, advantageous or dis-advantageous, creative or destructive, on the roles of both teachers and students (perceived and emergent), in their daily lives, with technology, at school.

To Roll the Role?

What implications do these new instructional approaches have for the roles of teachers and students? What new teacher roles complement those of students and visa-versa? How does technology support these roles? In the following sections, these questions will be addressed based on video, peer-mentoring and observational data, and qualitative and quantitative interviews from 500 in-service teachers in the republic of Ireland (a randomly selected sample of a much larger body of research undertaken by the author and presently being scrutinised).

Student Roles

New student roles:

Looking across the participant students of this study, three new roles were perceived for students, which were often associated with project-based or inquiry learning:

1. self-learner,
2. team member/collaborator, and
3. knowledge manager/leader.

Each of these roles are, in turn, associated with typical activities.

The “self-learner” role:

In all schools chosen (100%), students selected their own real-world, real-time, multimedia projects in the Gaelic language classroom and identified possible solutions to improving lessons by making them more interactive, more enjoyable, more relevant, more authentic and more meaningful. In this way, students helped determine the content of the Gaelic language curriculum. Students went further by organising their multimedia projects into ‘Thematic Portfolios’ as suggested by the Revised Curriculum in Ireland (NCCA, 1999), for future usage by themselves and other classes. They also managed progress made on the various ‘portfolios’ as various collaborative groups came up with new multimedia ideas and possibilities to enhance learning. “If children really want to learn something, and have the opportunity to learn it in use, they do so even if the teaching is poor. For example many learn difficult video games with no professional teaching at all!” (Papert, 1993:pp. 139-140)

This management task extended to managing student time where they often sacrificed other activities to complete design tasks. The role of self-learner extended to that of helping others learn also and a definite mentor/mentee role relationship was also prevalent. As one teacher put it, and this was echoed widely in schools (78%), “They definitely depend on each other more than on me/us. The work is all about them and not just about me/us as their teacher(s).”

The ‘Team member/collaborator’ role:

While students have almost always been divided into groups, even in some traditional, ‘instructionist’ environments, the role of collaborator or “team member” is a relatively new one for students and no more so than outlined in The Revised Curriculum in Ireland (NCCA, 1999). The difference here is that the social interaction of the teams in some way gave them ownership the multimedia projects or ‘portfolios’, and the team members were actively involved in advancing the project. There was both shared and individual responsibility for the success of the project. Students worked collaboratively to move it forward.

For example in the multimedia, hypermedia “Cúchulainn” project, students rotated between different tasks given to a design committee, a research committee, and a language committee. For the 5th class “Pop -Ghrúpa” project observed at one particular school, students performed specialized tasks such as collecting survey data on the preferences of their friends, their neighbours, developing and implementing an advertising campaign for a ‘top of the pops’ show in Gaelic where the multimedia presentations were used to encourage other students to make preferences concerning various pop-groups and design their own presentations using the PowerPoint templates which had already created by their fellow-students.

The role of “knowledge manager/leader”:

The third role that we observed was that of “knowledge manager/leader”. This was, perhaps, the most prevalent role and the one most often associated with the use of technology to support project-based learning. The focus of the role was on the development of knowledge products. These are often reports, newspapers, or multimedia presentations that solve a real world problem, address a social question, or express personal feelings. Activities demanded of this role include formulating questions, searching for information, collecting and analyzing data, and designing reports and presentations. The schools that took this role most seriously had as their mission “to prepare students to experience the Gaelic language as a living language in an information-based, technologically-advanced society”. Students were viewed as knowledge-workers.

Technology supports for new student roles:

A range of hardware and software applications supported these new student roles. The most supported role was that of “knowledge manager”. In this role, students had access to vast stores of information, either on the Internet or in a limited way, on Gaelic CD-ROMs. In addition, they had a variety of tools that they could use to transform this information into knowledge, tools such as search engines, word processors, graphics packages, multimedia, presentation and web-development software.

The role of “team member” was supported through the use of communications hardware and software. Student groupings were generally based on what made the most sense for learning rather than on hardware constraints (which were few in all schools).

The least-supported role was that of “self-learner”. This role was marked by the need for students to see their own goals, organize their own work, and manage their own time.

Teacher roles

New teacher roles:

Generally teachers retained many of their traditional roles (e.g. class leader or director, lecturer, information giver, discussion leader). They also negotiated multiple new roles in Gaelic language classrooms that utilised innovative technology-supported practices. The new teacher roles identified were: instructional designer; trainer; collaborator; student; silent partner; team coordinator; advisor; and monitoring and assessment specialist. Each role was associated with specific activities and was made possible by the use of technology in support of project-based learning in inquiry-based instructional methods.

“Instructional designer” is one of the more common new roles taken on by teachers. Much like the “self-learner” role adopted by students, teachers in this role found themselves designing, planning and organising their classrooms in order to effectively use and integrate technology into their Gaelic language lessons. “The instruction designer takes into account all of the resources available to meet the variety of needs his/her students have and implements well-designed activities to address those needs.” (Kozma, 1994)

The role of **“trainer”** was also reflected in the study. “Trainers” give individual instruction to enable skilled development. This training or mentoring was accomplished through modelling the use of multimedia and technology, and helping the students see how they might use software tools to accomplish unique language learning tasks.

The **“collaborator”** role was also evident. “Collaborator refers to a variety of activities teachers undertake to work with their colleagues to improve their instruction.” (Kozma & Schank, 1998). These activities included informal sharing with colleagues and team teaching. They also included collaborating, sharing and learning with the students as equals. “I am convinced that the best learning takes place when the learner takes charge..”(Papert, 1993:p. 25).

“Team co-ordinator” was another teacher role supported by the data collected. The focus of this role was on the active assignment of individual students to project or portfolio teams. In addition to opening up opportunities for collaborative and social learning activities, teachers who assumed the “team co-ordinator” role created opportunities for peer tutoring, apprenticeship modelling, and support between students with mixed ability levels.

The role of **“enabling advisor”** refers to those teachers who gave assistance, advice, suggestions or posed questions in a way that enabled students to find the information they needed to complete particular multimedia or language-learning tasks. “Teachers who give so much autonomy to their students are thereby declaring their belief in a radically different theory of knowledge, one that entails far more work for them as well as their students (Papert, 1993:p. 63). A common term used sometimes to describe this role is the term **‘facilitator’**.”

The **“mentoring and assessment specialist”** refers to the new role where teachers and students alike mentored and monitored performance and attempted to assess and improve that performance.

These various teacher roles align with, and exist in tandem with the new student roles previously outlined. Additionally the new teacher roles appear to overlap the different student roles observed in the schools. The student role of “self-learner” is complemented and supported by the roles the teachers play as “trainer”, “instructional designer”, and “monitoring and assessment specialist”, and visa versa. The student role of “knowledge manager”, a creator of Gaelic language knowledge portfolios, is related to and supported by the advisor, instructional designer, team co-ordinator, and collaborator roles that teachers adopted. Indeed many roles were inter-changeable throughout the observations.

Conclusions:

Findings from this randomly chosen sample of a five hundred in-service teachers in a variety of elementary schools, reveal that technology is being used in a variety of ways to improve classroom instruction in the Gaelic language. Moreover, teacher and student roles are being altered in ways that are reflective not only of the presence of technology, but also the efforts at spontaneous and systematic school and curriculum reform. The findings highlight ‘some’ of the different and emergent roles that students and teachers adopted in the course of their interaction with technology-enhanced, technology-supported pedagogical practices in the Gaelic language classroom, in elementary schools in Ireland. These practices:

- Promote active, autonomous and transformative learning in the students.
- Provide students and teachers with competencies and technological skills that allow them to search for, organise, and analyse information and communicate and express their Gaelic language ideas in a variety of multimedia projects.
- Enable teachers, students and the general school population to communicate and share information.
- Engage students and teachers in collaborative, project-based learning in which they work together on real-time, real-world like, language projects.
- Provide students with individualised or differentiated instruction at all levels of ability, interest and/or learning styles.
- Allow teachers and students to assess performance (a total interactive, interpersonal human process).

The Flip-Side of the coin

Thirty-eight percent (38%) of the teachers involved displayed a certain resentment to the presence of what they perceived to be the policy-makers’, non-consultative imposition of technology into their classrooms. They viewed technology as annoying tools, implemented with a top-down philosophy, which in some cases (20%) challenged their professionalism and *‘raison d’être’*. Twenty-four percent (24%) looked upon technology as a possible de-humanising influence in their relationships with students. To this group, time given to technology-enhanced language projects, detracted from what they believed to be what Gaelic, language teaching and learning was all about – instruction and communication, reading and writing. Another group of teachers (14%) also indicated that their students, being surrounded in society with the gadgets of the digital-age, were being de-sensitised to, and deprived of what they perceived to be the basic human needs for face-to-face communication and inter- and intra-personal social skills.

I would have to state at this point that there was very little negativity, either observed or pronounced by the students. They seemed to be totally engrossed in the technology-enhanced tasks already outlined, and the majority of them (94%) said that they preferred the combination of Gaelic language instruction and project-based learning to traditional face-to-face only instruction. It challenged them to think and work in a variety of interesting and fun ways and it was rarely boring! When the students were asked what their ‘utopia’ would be in the Gaelic language classroom, their answers were unequivocal – Playstation and PC interactive games that would be voice-activated in Gaelic and available on the world-wide web to all Gaelic speakers and learners. They wanted their Gaelic language classrooms to become communities of practice around the world, based on the ‘technology toys’ which they found most motivating in life.

Video games teach children what computers are beginning to teach adults—that some forms of learning are fast-paced, immensely compelling, and rewarding. The fact that they are enormously demanding of one's time and require new ways of thinking remains a small price to pay (and is perhaps even an advantage) to be vaulted into the future. Not surprisingly, by comparison School strikes many young people as slow, boring, and frankly out of touch. (Papert, 1993:p. 5)

In conclusion, this paper intends to ask more questions than provide answers. The larger study will undoubtedly throw up many more interesting and challenging realities for all teachers, students, educational bodies and policy makers, as we progress into the 21st Century. Issues surrounding transformative learning, reflectivity, technology and emergent roles in TELLE also suggest very interesting possibilities in the larger study. It is important that we do not ignore any of the experiences being explored in technology-enhanced learning environments, as a Gaelic language saying also tells us ‘bionn dhá insint ar gach scéal’ - ‘there are two sides to every story’.

Finally the word ‘enhanced’ as indicated in TELLE must not be viewed solely as implying ‘advantage, positive, wonderful’. The results were overwhelmingly positive and in favor of the TELLE in the Gaelic language classroom but serious doubts were also conveyed by teachers who felt alienated, afraid and undervalued by the organizations and policy makers who deliberately introduced technology into their professional lives without consultation.

One moral of the story is that we might all do better if we dared classify ourselves as "developing." (Papert, 1993:p. 75)

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About the Author



Daithí Ó Murchú Ph.D.

Daithí Ó Murchú is an all-gaelic, Irish medium, elementary school principal teacher in Gaelscoil Ó Doghair, Newcastle West, Ireland since its foundation in 1985. In 1993 he founded the first co-educational, second level ‘all-Gaelic Gaelcholáiste’ in the Mid-West and in 1996, was awarded his Masters in Management and Curriculum studies in Trinity College, Dublin. Following his first PhD in Technology and linguistics and subsequently in Elementary education and Learning, he was elected executive vice-president of human language and technology with SITE (USA).

As a cultural and technology expert with the European Union’s MyEurope schools, Daithí also collaborated with Waikato University, New Zealand on their distance-education, teacher training programme and began collaborating with Trinity College, Carmarthen, Wales and the University of San Diego in their technology and Multiple Intelligences programmes. Having been seconded to Mary Immaculate College of Education, University of Limerick as a lecturer in Methodology of teaching Gaelic, Daithí continued to work with the Master programmes in MSc, MEd and MA in Education and ICT programmes in the various universities. As a research fellow in ICT and Education at Trinity College, Dublin, he lectured and designed the first MSc programme modules in Gaelic in Knowledge management and ICT.

Presently Daithí is working with Aalborg University, Denmark in their VirtDan project which designs innovative, e-Learning, blended environments for linguistics, and is contracted to the position of National co-director of Gaelic in blended, e-Learning environments with Hibernia College, Ireland. He continues to teach in Gaelscoil Ó Doghair, which is his first ‘mathetical’ love and his books, presentations and keynote speeches have been enthusiastically received worldwide.

Contact Dr. Daithí Ó Murchú by email:
omurchu.ias@eircom.net

Editor's Note: This case study details one teacher's efforts to implement a problem-based unit online. It uses Activity Theory and systems analysis to identify issues and turning points that affected her teaching-learning experience. Activity Theory provides a visual model of contextual relationships, issues, and turning points as the teacher progresses from initial goals to final outcomes.

Transformation in an Urban School: Using Systemic Analysis to Understand an Innovative Urban Teacher's Implementation of an Online Problem-Based Unit

Donna L. Russell

Keywords: systems analysis, innovation in education, Activity Theory, constructivist-based learning theories, problem-based learning, instructional design, online learning and development, higher-order thinking abilities

Abstract

This paper describes a case study analysis of an urban 5th grade teacher's efforts to implement an online problem-based learning environment. The research study used a systems analysis process to holistically identify and evaluate aspects of the learning environment that impacted the effectiveness of the implementation of the constructivist-based unit. The researchers used Activity Theory (Engestrom, 1987) to define *apriori* issues in the teacher's work activity and identify those professional development processes and collaborations that impacted this teacher's reform efforts. Additionally, *invivo* analysis identified three progressive issues that developed during the unit including 1) changes in the teacher's beliefs about her urban students' learning abilities and potential, 2) issues that emerged in the teacher's local context that impacted her unit and 3) issues that arose in relation to the technology integration process itself. Finally the researchers evaluated the teacher's responses to *apriori* and *invivo* issues in relation to her original goals for implementing the innovative technology-based unit. As a result of this systemic structuring of data response and analysis, the researchers define the theoretical and practical implications of the study for research of innovative classrooms and the design of professional development programs for innovative educators.

Introduction

This paper describes an ethnographic analysis of an urban 5th grade teacher's attempt to implement an authentic problem-based unit using an online workspace. The teacher volunteered to work with the two researchers who designed the study and the unit design template she used to develop the unit. The unit was implemented online collaboratively with three other teachers in different schools throughout the state of Missouri, U.S.A. This paper describes the interactions of the teacher in her local context, her collaborative professional development processes and the integration of the innovation cluster, defined as the two interrelated innovative tools (the online workspace and an instructional design template) that were used by the teacher to develop her innovative classroom.

Systems Analysis

This study used an analytical qualitative research design to study this innovation educational setting due to its inductive descriptive and exploratory nature. Bogdan and Biklen (1992) described qualitative methods as:

...an umbrella term to refer to several research strategies that share certain characteristics. The data collected have been termed, soft, that is, rich in description of people, places and conversations, and not easily handled by statistical procedures. Research questions are not framed by operationalizing variables; rather, they are formulated to investigate topics in all their complexity, in context (p. 2).

McClure and Lopata (1996) also emphasize a strong link between exploratory research and qualitative methods because "qualitative techniques are especially appropriate for use in situations where the research problem and the research setting are not well understood...When it is not clear what questions should be asked or what should be measured, a qualitative approach will be more useful" (p. 11) Schoenfeld (1999) asserts "It should be stressed that [systemic analysis of points of leverage] does not represent a weak alternative to conducting controlled experiments, but a different option altogether. Sometimes the only way you can understand complexity is to study complex things. Part of the job, in that case, is figuring out what to look at and how to talk about it "(p. 13).

The researchers employed Activity Theory for data structuring to develop an understanding of a complex social system responding to change. The compelling purpose of systems-based research is to recognize the organizing relationships between entities in the system from which emerge the unique properties of the systems (Banathy, 1991). Activity systems are historically conditioned systems of interrelated contacts among individuals. Activity systems are complicated models of interactions within which equilibrium is the exception and the "tension, disturbances, and local innovations" are the norm and the catalyst for change over time (Salomon, 1993, p. 8). If an activity system is defined then patterns of responses can be identified and evaluated based on the agent's reason for implementing innovation into his work activity.

This contextual emphasis, reflected in the use of Activity Theory (AT) as a framework for analysis, is a response to the social nature of human learning (Wertsch, 1985) and incorporates an emphasis on ecological validity and practical relevance (Anderson J., Reder, L. & Simon, H., 1997). This is a process that requires the consideration of the mediated nature of the participant-object relationship and the identification of responses to contradictions as essential in order to understand human development without dualism and subjectivism (Roth & Tobin, 2002).

Therefore, a systemic analysis has two potential benefits, it can aid the researcher in developing an understanding of the activity from the perspective of the agent, and it can potentially create a conceptual base of knowledge that will correlate to similar contexts.

The Activity Theory Model (shown as Figure 1 below) visually represents the potential of analyzing a multitude of contextual relations within a triangular structure of activity. The subject, located on the left of the model, represents the participant in the study. The object, located on the right side, represents the problem space, or the intention of the activity. The subject constructs the object, and the object gains motivating force that gives shape and direction to activity. The object includes anticipated and actual results of the activity. The subject interacts with the environment to realize the object. The top of the triangle defines the mediational aspects of the activity that can include actual and conceptual tools that change the nature of the interaction between subject and object. This mediational effect, especially important to define with the integration of advanced technologies, is defined as the insertion of a new tool that the subject is using to develop the object. In this case, the researchers clustered two innovative tools, the online workspace and the problem-based unit design template, as mediational tools. The bottom of the triangle includes

local aspects of the action: rules, community, and division of labor. The rules are those situational conventions that impact the development of the object. The community includes those people or organizations that are impacting the progression of the object as seen from the perspective of the subjects. Division of labor refers to the horizontal division of tasks among members of the community that are necessary to realize the object. On the far right of the model is the outcome. This is the overarching intended consequence of the development of the object.

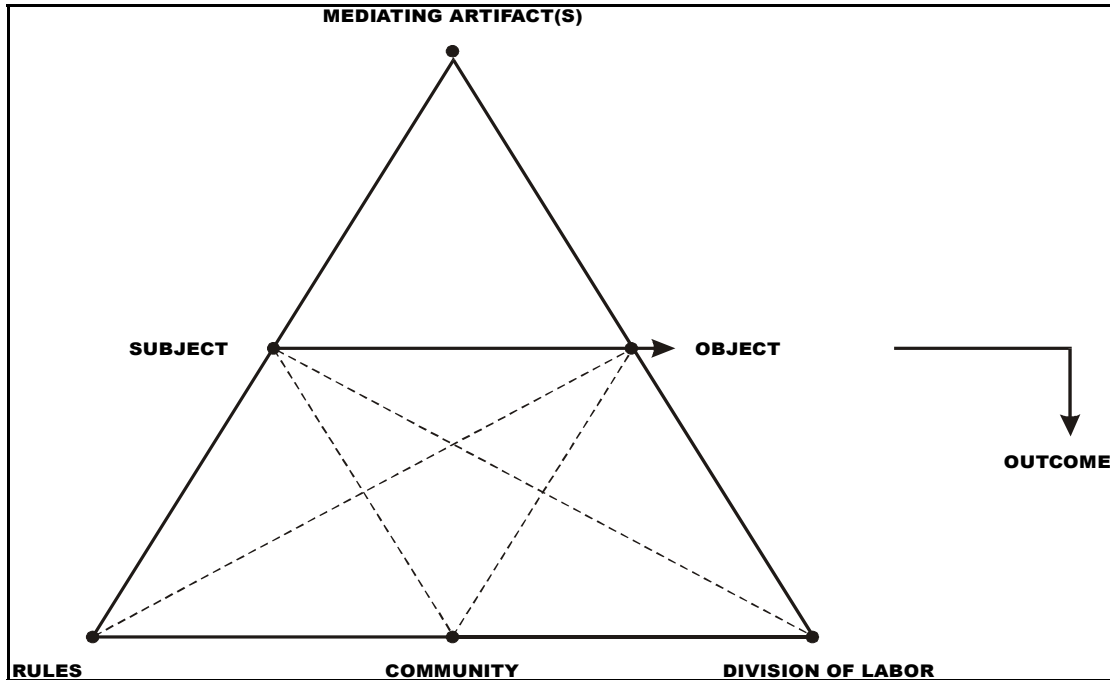


Figure 1: Activity Theory Model

The researchers identified these AT aspects in the teacher's work activity through structured and unstructured interviews occurring pre, during and post unit, online chats, video of the classroom, the teacher's online journaling and the collection of the teacher's finished unit including student work. Motive was identified as her goals for her students' learning and the purpose for implementing the unit. The outcome of this activity was the types and qualities of learning that resulted from a unit designed around constructivist-based learning principles. The object of this activity was defined as the implementation of the problem-based unit. The mediational tools were studied as an innovation cluster and included the online workspace and the unit design template the teacher used to implement the unit.

A premise for Activity Theory is that the insertion of tools in the work activity of the teacher in order to develop a new object will result in contradictions, problems that affect her ability to develop her object (Engestrom, 1987). Contradictions were identified as problems that the teacher stated as pre-existing (primary contradictions), developed in response to her collaborations with the other teachers implementing the unit collaboratively online (tertiary contradictions) or arising as result of some aspect of her local situation (secondary contradictions). The researchers then identified the teacher's response to the contradictions as a turning point. Next, the researchers evaluated the turning point behavior as resolving or not resolving the contradiction based on her original goals. Finally the researchers evaluated the teacher's development of the object (her ability to realize her outcome through the object) as either widening (increasing the object potential), narrowing (decreasing the ability of the teacher to reach her goal), or disintegrating the

object (such as stopping the unit). As a result of this systemic data structuring and analysis the researchers are able to identify those interactions that were productive or less productive for this innovative educator. This allowed the researchers to develop implications for the professional development of innovative educators.

Constructivist-Based Learning

This study describes an effort to implement a constructivist-based learning environment. Constructivist learning theory serves as an epistemology of learning and understanding and suggests that knowledge and meaning are not fixed but instead constructed by the individual within the context of meaningful learning. The work of Dewey, Piaget, Bruner, and Vygotsky provide a historical framework for understanding the theoretical assumptions of constructivism and placing this theory of learning within a human action framework of sociocultural theory. These four assumptions include:

1. knowledge and meaning are constructed, not dispensed, when students are engaged in meaningful activity;
2. knowledge is anchored and indexed by the context in which the learning activity occurs and requires articulation, expression, or representation;
3. meaning making, which is prompted by a problem, is an attempt to resolve questions, confusion, disagreement, or dissonance, in the mind of the knower
4. meaning making and thinking are distributed throughout our tools, culture, and community and may also be socially constructed with others through activities such as conversation (Vygotsky, 1978; Honebein, P., Duffy, T. & Fishman, B. 1993;Jonassen, Peck, & Wilson, 1999).

Research in constructivist learning environments suggests that instructional design grounded in constructivist principles engage students in purposeful activity as the students attempt to tackle a complex problem, overcome an obstacle, or negotiate a contradiction in their thinking (von Glasersfeld, 1998). In addition, instructional units designed based on constructivist learning principles allow students to apply their knowledge more effectively under appropriate conditions (Collins, 1991). Instances of constructivist-based learning theories include situated theories of learning (Brown, Collins, & Druguid, 1989; Greeno, 1997; Lave & Wenger, 1991; Roschelle & Clancey, 1992; Roth & Bowen, 1995) and distributed cognition theory (Pea, 1993; Resnick, Levine, & Teasley, 1991; Salomon, 1993), which emphasize how the responses of the learner and the design of the learning environment affect the development of higher-order thinking abilities, such as problem-solving abilities in this study, in students.

In this problem-based unit, titled Improving I-70, there were four teachers located in four different cities across the state of Missouri. They presented their students with a complex problem—how to improve Interstate 70 which runs across the state of Missouri. Through the process of responding to this design problem, the students acquired knowledge and skills that enabled them to revise their theories, develop new theories, and compare their theories with other students through online discussions. The four schools represented an urban setting, a rural setting, a suburban setting and a small city setting. The problem-based unit design template was created by the two researchers who implemented the study and worked with the teachers as they implemented it. The template was designed in three phases. In Phase 1 the students define the problem space using the online workspace to design their responses within their local groups. In Phase 2 the students worked in online work groups with members from each of the four classrooms creating and revising their projects in the online workspace. In Phase 3 the students worked in their local context to create a strategy for solving the problem.

The innovation cluster used by the teacher in this study included two aspects: the problem-based unit design template described briefly above and an online workspace. The online workspace, Shadow Net Workspace, was used by students in the four classrooms to collaboratively study the problem making it possible for the students to respond to a state-wide problem from multiple perspectives. Shadow Net Workspace (SNS) is a set of middleware Linux-based internet tools which includes workgroup storage and dissemination capabilities, a chat room function, discussion boards, email, and review panel workgroups. The unit was designed to utilize these functions as the four classrooms developed their projects collaboratively online. The teachers also used SNS to communicate and share information with each other during the unit. The research study characterized these two innovations as an interrelated set of tools, an innovation cluster, mediating the work activity of the teachers.

Setting

The urban teacher, Janice (a pseudonym) who is the focus of this paper volunteered to participate in an innovative program called ePioneers. The four classrooms participating in this project were all part of the eMINTS program. eMINTS stands for enhancing Missouri's Instructional Networked Teaching Strategies. eMINTS is administered by MOREnet under contract from Missouri's Department of Elementary and Secondary Education (DESE). MOREnet, Missouri's state education network, is part of the University of Missouri System. School districts, selected by Missouri's Department of Elementary and Secondary Education (DESE) to participate in the program, choose classrooms in the district that are transformed into models of inquiry-based instruction. eMINTS teachers have a lab classroom consisting of 15 computers, a SmartBoard and identical software. These four teachers, one teaching 4th grade in a suburban school, one teaching 4th grade in a rural school, one teaching 4th grade in a small city, and Janice, who was teaching 5th grade in an urban school, all volunteered to implement the I-70 unit collaboratively using SNS during the last quarter of the 2001-2002 school year. Their only professional development with each other during the unit was done online in SNS. All the teachers had the same eMINTS equipment, software and past training experiences.

Case Study Analysis

Background

Janice taught 5th grade in one of three elementary schools in an urban community (population 19,188 in 2000). She has taught for 34 years, the last 10 years at this school. Last year, the school decided to adopt the eMINTS model by purchasing and placing additional computers in several other classrooms in the school. Janice, who had taught 5th grade for three years, worked with 17 students, all of African-American ethnicity. There were 7 boys and 10 girls in the class. As a part of her participation in the eMINTS program for the previous two years, Janice had 14 Pentium3 LCD computers, one teacher workstation, a Smartboard, a scanner, a color printer, and a digital camera. She has received two years of eMINTS training in inquiry learning methods and the use of the technology. When she volunteered to participate in the ePioneer's Project she received additional training on the tools in Shadow NetWorkspace (SNS).

Pre-Unit

Before the unit began she met with the two researchers and discussed her goals for this pilot project. She was asked to participate in ePioneers by the technology support person in her district. She felt that "she could not say no" to this request. She felt pressure to participate in this pilot project because she was an eMINTS teacher and had received a lot of technology for her classroom. Janice did not discuss the ePioneers unit with her principal or the other teachers. She did ask permission to not departmentalize at the end of the school year in order to implement the unit and her principal agreed to the revised schedule.

In the pre-unit interview Janice was very concerned about state testing. She gives the Terra Nova Math test. Her district places an extreme interest in the testing including counting down the days until the test over the intercom each morning throughout the school year. She also believes that the district felt that eMINTS classrooms should have higher test scores which placed additional pressure on her departmentalized instruction of math. She wanted to complete all standardized testing before initiating the unit which in her district ended in mid-April. She stated in her pre-unit interview that she did not have a lot of experience teaching inquiry or working collaboratively with the other teachers in her building.

researcher: So, do the other teachers in your building ever talk to you about the professional development that you receive from eMINTS?

Janice: Well, no, not really. I don't bring it up that much because I don't want them to feel... you know.. that I'm bragging or anything like that. Sometimes the other teachers might say something like, "Oh, you can't do this or you can do that because you're an eMINTS teacher". They are just teasing, but sometimes there's some truth in teasing. I really wouldn't want them to feel funny about anything like that.

researcher: Do you think there is something that would impede you from implementing the unit?

Janice: I don't think there will be anything that would impede me.

researcher: You mentioned departmentalization before. That might have impeded you?

Janice: Yeah, that might have, but I've taken care of that. And I spoke with the principal, and she's all for it. She would probably do anything to make it a success. I've already spoken to the kids about it, and they are all for it. They look forward to it. As far as my colleagues, I don't see that there would be any problems.

Also during this interview the researchers, who created the unit design template, gave Janice the unit design template for I-70 and explained the purpose of the problem-based unit. After the unit template was explained to her in detail, Janice expressed concerns about her students' abilities to work with the information and the other classes. She described her students' communication skills as "very low." She was unsure that her students could make themselves understood by the other students in their online workspace. She was, however, interested in her students being able to work collaboratively with other students. She felt that her students needed exposure to different cultures and ideas. She was very unsure about her capabilities to implement the unit successfully and her students' capabilities to respond at the anticipated level. However, despite these concerns, she was very open to discussing the ideas about constructivist-based learning theories that the researchers discussed in the pre-unit interview and ideas concerning the design and the implementation of the unit and the use of the online workspace. The researchers used the pre-unit interview to design an AT Model for Janice (see figure 2 on page 24). All the *apriori* aspects (nodes) of the AT model were identified through the structured pre-unit interview.

Janice was able to participate in only two of the four 1-hour chats scheduled for the teachers prior to the initiation of the unit. There was a discussion board available to the teachers. The chat and discussion board were the only collaborative forums available to all four teachers as they implemented the unit. The chat tool never worked well at her school. It ran slowly or not on all the machines. When she participated in the chats with the other teachers, she was usually on the Internet at home.

Prior to the initiation of the unit she was encouraged to call or email the researchers if she had difficulties anytime during the process of implementing the unit. She requested and got a schedule from the local researcher for visits to her classroom in order to "make sure I am doing it right." This researcher visited Janice's classroom six times during the implementation of the unit.

She was very open to this form of contact. Janice also called the researcher four times during the implementation of the unit. She was especially concerned during Phase 2 and called several times during that phase, at one point calling this researcher at 9 o'clock at night to talk. Janice developed a very positive relationship with both of the change agents, the two researchers/designers over the course of the study (Rogers, 1995). She asked our opinions repeatedly for advice on scheduling, instruction, assessment and technology. She worked very collaboratively with the teachers online as well.

Implementation

Janice implemented all three phases of the unit. However, she was unable to use the chat tool reliably with her students. She was only able to get the chat running simultaneously on a few machines. The online groups in Phase 2 included 2 students from each class. This limited her students' ability to develop Phase 2 of the unit when they would discuss their strategies with the other students in their groups throughout the state. Her students would have been able to dialog with the other classrooms through the discussion board and she discussed this possibility in the teachers' chats but none of the teachers used the discussion board to help their students share their ideas online.

Throughout the unit Janice used her urban community's resources very well. Her students worked with the Missouri Department of Transportation (MODoT) and other local experts. Janice was able to schedule an engineer from a local engineering firm to work with her students. He came into her classroom three times to work with her students. Her students developed strategies in their Phase 2 expert groups with his aid. He also helped them develop their final solutions to the problem. He came to their presentations and discussed the solutions with the students. His participation became an invaluable aid to Janice as she developed the authentic aspects of the unit. She describes the students' responses to his interaction during the development of Phase 2 strategies and Phase 3 solutions:

Janice: This guest speaker (the engineer) was different than the others. The kids were dependent upon him for clarification. He was able to supply them with information that they needed. They changed their PowerPoint's and refined the information. It had to be accurate. When they began the talking about their solutions with him some of their ideas were childlike. And when they made these suggestions I didn't know when to stop them. I let him listen to them and respond to each solution. He tried to let them come up with ideas and then he talked about some of the important issues.

The buy in for the students was totally different because they needed the information to vote pro or con on the solutions. They knew they had to create slides and use the information. It was very motivating for them. They had a stake in the unit. They were going to present the next day. They were presenting to an audience of real people, Dr.P. (the engineer) and you guys (the researchers) were going to videotape. They had an authentic audience. They were right there with the information. They were closer to it.

These students, despite her initial concerns about their low language abilities, finished all the learning activities described in the unit design template. They addressed the problem locally, how I-70 impacts their urban community, in Phase 1 by identifying the various impacts of the interstate to their community. In Phase 2, although their chats with the other students were limited, they were able to communicate online their Phase 1 understandings with the other students who lived in rural, suburban and small cities in the state. The urban students' responses to this local problem became the driving issue in Phase 2 interactions. During a Phase 2 chat the researcher was working with a suburban student who was part of the online group discussing the

economics of the I-70 problem. During this chat the suburban student suggested a toll-road as a solution to paying for repairing the interstate. The urban student she was chatting with responded with “We use the interstate to go to the store to get bread. We cannot pay a toll every time we go to the store. That solution will not work for us.” As a result the economics group decided to pay for the improvements through other means. During Phase 3 the urban students worked to develop a solution. They worked with the engineer and created a solution that met the criteria of all the online workgroups. They presented their solutions to an audience including the researcher and the engineer.

Their productive response was a catalyst for the teacher to revise her ideas about their learning potential. She described a rise in attendance, the development of their group work skills, the increase in the class’s positive attitudes and individual motivation. At one point following a whole class discussion on the problem, she cried as she described a student’s previous lack of interest and poor attendance prior to the unit and his current productive interactions during the unit. She stated that she “would never teach long division for six weeks again.”

Post-Unit

During the post unit interview Janice said that the unit had met her initial goals, developing communication skills in her students and a sense of other cultures. The students were able to express their ideas in chat rooms, in their groups and with their guest experts. They were able to present these ideas to an audience during Phase 3. She also liked the structure of the template and understood the learning processes designed into the template. She discussed the possibility of using the template to design a new unit on Egyptian History as part of the sixth grade curriculum she would be teaching next year.

Janice came into the pilot project with the most hesitation of any of the teachers. She was unsure of her ability to implement the technology or the student activities in the unit design template. She felt, however, that she was expected to implement this pilot project because she was an eMINTS teacher with access to technology. Despite this feeling of pressure to innovate, she remained open to all forms of collaboration and dialog outside her local context. She described her feelings about participating in this innovative reform project.

Janice: You both (the researchers) were approachable and not judgmental at all. I was very comfortable asking you both for advice and you were there when I needed help. I didn't ask to be involved in the pilot. My district asked me to do this and I felt like I didn't have a choice. Understand when the district technology person came to talk to me about this pilot she also asked me to be part of the Lawrence Kansas project. I told her no to Lawrence and I just didn't feel like I could tell her no twice. When she asked me I knew that Dr. S. (the superintendent of the district) knew about it and I say yes to everything. Because I didn't have a motivation, a buy-in, on the pilot I didn't really feel very comfortable with the unit.

When I was in C. (for ePioneers training) I didn't know how good this was going to be. I was not very excited about the whole thing. I thought it would be a good resource to have and I thought the professional development would be good to know. I was the tech person but I didn't feel like I know a lot about Shadow.

researcher: At what point did you feel that you changed your ideas about the benefits of the unit?

Janice: eMINTS didn't talk to us about the I-70 project. We heard nothing about the units and the benefits for our kids. It was during that first interview (pre-unit) with you guys (the researchers) that I had to think about what this could mean to my students. There was a long time between that first training in C. and that interview. I had time to think about the unit. I didn't want to be in the unit. I didn't think my kids would be

interested. But this unit turned out to be the right one for us. Dr. P (the engineer) was great with the students and it is a local problem so the kids were very interested. It was an authentic problem happening right outside their door. Your support was great. I was not elated at the beginning but it worked out great for me. Eventually I dealt with all the negative parts of all of it and I still found good in it.

Findings

The findings for this study are structured around three progressive issues that arose during *in vivo* data structuring: 1) How does the individual teachers' participation in collaborative professional development influence the implementation of a constructivist-based learning environment? 2) What factors in individual teachers' school environments influence the implementation of a constructivist-based learning environment? 3) How do teachers' beliefs about learning and technology influence the implementation of a constructivist-based learning environment?

Progressive Issue #1: How does the individual teachers' participation in collaborative professional development influence the implementation of a constructivist-based learning environment?

Janice used all the external professional development processes available to her to implement the unit. She was supported throughout the project by the collaborative dialogs with the other I-70 teachers and by staying in contact with the researchers. She used this support system to develop the unit and expand her expectations for her students. In the post-unit interview she was asked what her role was in the implementation process.

Janice: I hate to use the word facilitator because what does that mean? I helped them find information and interpret it as best they could. I taught them how to skim the web sites until we found what we needed. The web sites were very long with one picture and they would read them word for word. I taught them to skim for the terms they needed and then that paragraph carefully. I guess I steered them or guided them. I tried to let them take the lead. I found the whole class discussion difficult. At the beginning of the unit they brainstormed for an hour and a half. I kept watching for them to fall away. Your support during that discussion helped. (the local researcher was present during this brainstorming activity)

researcher: What would you do differently if you did the unit again?

Janice: I would do it the same. All the phases are necessary. The organization of it was excellent. You both (researchers) found resources for us to use. The MODoT site addressed some of their concerns. They emailed some of the MODoT people for help. Not all of them responded though. I thought I was getting excellent support from you (the researchers). You started the phone conference and then the chats.

researcher: Who supported you while you developed this unit?

Janice: You. You were a tremendous support for me. I would have been a basket case without you. The chat and phone conference were helpful. The chats helped me. We also spoke on the phone. The social support was important knowing we could go there for help. All the things you guys created helped me out, the instructional design template and all the materials you gave us. I answered the questions at the end of each phase in the template. It helped me identify the things I had to do in each phases. It reminded me to set up guest speakers.

In the teachers' Chat # 6 which occurred at the end of Phase 1, Janice undergoes reformulation of object as she addresses a contradiction between how she understood the tools and her ideas about the students' responses to the activities:

Suburban Teacher: My kids were so excited this afternoon. After looking at I-70 statistics that apply to J. County (like traffic flow, amount of accidents, truck accidents, etc) they posted the data using excel graphs, then uploaded them into a folder we made for our class in the ImprovingI-70 Folder. They were so excited to get to see each other's. And I was so proud we figured out how to do it. :-)

Janice: Stupid question--where did you find the stats? I like that activity. My kids love to use Excel. Mind if I borrow it?

Suburban Teacher: Yesterday we brainstormed interview questions and made questionnaires for them to take home and ask their parents. I set up a DB with the questions and then they had to pick 3 or 4 questions to post on the discussion board. Finally, they had to read a few and respond. It was great practice for them to see the DB in action and I think they learned a lot from each other's interview results.

Janice: They learned a lot from that activity

Suburban Teacher: The data came from the I-70 study. I printed that whole mammoth document, scanned a few tables and shared them on the smart board. We discussed them and then I assigned different groups various topic to make their graphs. My kids really enjoyed it and I bet yours would too.

Janice: I would love to see the questions your kids asked their family members.

Suburban Teacher: It really helped them look at the local picture, which has been hard because they want to fix the problem right now!! :-) By looking at the data they could see the relationship between some of their concerns (like.... too much traffic flow) and actual data that had been gathered.

researcher: What do you all think about what's happening in the class - and what we're assessing on the scoring guide...?

Suburban Teacher: So far I feel like we have a good start with gathering information, using facts and statistics, we have presented information in small groups and through the DB, we talk everyday about managing our teams, and some kids are doing a great job with problem solving.

Janice: I like the scoring guide you gave us because I think it addresses the areas the kids are working on right now in this phase—gathering info, using facts, presenting, working together, and then setting up the problem. Other things we do I'll assess differently like when we do the Excel graphing.

researcher: In essence, then, what are they doing with information (in this case, the statistics)?

Janice: They will be analyzing and comparing to find relationships.

researcher: ... and also supporting their ideas about why it's important to their community... so it could help you assess both areas

Janice: Absolutely!! They will have to defend their positions using the data.

As a result of this dialog with the suburban teacher and a researcher, Janice identified several functional activities that she later used in her classroom. She also identified resources that she later used during the implementation of the unit. At this juncture, Janice resolved a contradiction in her subject beliefs and the tools, her lack of ability to implement the unit design template and

use the technology, by integrating activities that encourage higher level responses from her students. She was able to resolve this contradiction between subject and tools and expand her object by using the collaboratively suggested learning activities.

Progressive Issues #2: What factors in individual teachers' school environments influence the implementation of a constructivist-based learning environment?

The chat room tool never worked well in Janice's school. She was unable to identify the source of the problem. It was assumed that the server in her school district was not working the chat room well. She did not pursue this issue within her district. Her eMINTS technology support personnel were unable to help with the setup of the server for SNS. She did not ask the UMC technology support people at SNS for aid. She did not establish other sources of online communication with the other students in the other classes. She discussed the possibility of using the discussion board tool but never established a schedule for response with the other teachers. This unresolved contradiction between tool, SNS's functionality, and object, led to a narrowing turning point when she did not give her students consistent access to the other groups studying the I-70 problem in Missouri. As a result, they were less likely to experience problem-solving from multiple perspectives.

Janice had not worked collaboratively in her local school community. She did not discuss her work in the ePioneers project with other teachers in her building because she felt that this would cause resentment. Despite her initial contact with her principal, Janice did have a contradiction arise during the unit in her school community in regard to departmentalization. The science teacher continued to ask for her students to come to his class to do additional testing. She did not disagree with him or contact the principal in order to allow her students time in her classroom for the unit. In her post-unit interview she stated her ideas about the local climate for supporting her innovation.

researcher: What about the other teachers in the building? How do they react to the new things you do?

Janice: You better watch out what you say in the building. My close friends are happy for me. They admire what I do.

researcher: What about the science teacher taking your kids during the unit? Could you have asked the principal if you could keep the kids?

Janice: The science teacher is the golden boy in the building right now. I didn't ask her but I think she would have told me no.

researcher: Did she talk to you about it?

Janice: No. She is very open to new things. He came over and apologized to me about it. But I did not feel that I could say no to it. I thought the principal would support him.

She was unable to resolve this contradiction between rules and object by communicating her needs and goals in her local community. As a result she lost valuable instructional time with her students. This unresolved contradiction restricted her ability to implement the unit more fully and resulted in a narrowing of the object. She had two local unresolved contradictions. Both narrowed her object by reducing the time the students had to work in the unit and reducing the students' access to their only collaborative tool, SNS.

Progressive Issue #3: How do teachers' beliefs about learning and technology influence the implementation of a constructivist-based learning environment?

Initially Janice wanted to implement the unit so her students would be more motivated because they would be able to communicate with the other classes and use the technology. However, she was unclear about the type of cognitive development that was possible for her students as a result of the unit. In the pre-unit interview she described her goals for her students:

Janice: Basically I was interested in developing higher-level thinking skills in the kids, and having them be involved in an exciting project. It would give them a chance to use the technology, have a greater motivation to use the technology, and for the other benefits like the communication skills that they would have a greater desire to develop, collaborate with another class across the state. The possibilities of something like that are really exciting for them. Ummm. The creativity that this kind of project is going to demand. Umm.... the main thing would be a greater enthusiasm for learning. I can that it would be a good benefit of what's going to happen. Greater self-esteem because they have increased competence and greater confidence on the computer.

During the pre-unit interview and subsequent meetings prior to the implementation of the unit the researchers discussed the learning processes that this type of constructivist-based authentic problem-solving unit is meant to develop. During the post unit interview she described the change in her ideas about her students' cognitive capabilities in a problem-based unit in comparison to the traditional instructional model she had used previously:

Janice: When the three of us talked I could see how it could be great for my kids. I teach for the test and I have eliminated so much to stay on target for the test. This stuff is foreign to me. [the advanced problem-solving abilities] When you review you repeat and repeat and repeat. You have to do that to make sure they all have it. Language is a problem for my kids and I have to review over and over to prepare them for it. This unit meant I could try something new that I have wanted to do for awhile. With your support, and all the things you brought in I had a chance for my kids to do something really different.

Her students collaborated within their classroom and used their city resources. They were able to complete all three phases of the unit. They defined the problem and identified strategies for solutions. They presented their solutions to an audience including the local engineer. They developed advanced problem-solving skills, communication abilities, and interacted productively within their classroom groups, with their online groups and with their guest speakers and mentor. Janice developed her new concepts of learning for her students and she changed the activities during the unit to reflect these new understandings. She resolved her contradiction between her beliefs about her students' potential and the rules she had for her instruction. Below in Table 1 is a chart of Janice's object reformulation including the contradictions, the indicator of her turning point response and the object reformulation.

Table 1
Turning Points in Janice's Object Reformulation

Turning Point	Work Activity System Contradiction	Indicator Of Turning Point	Object Reformulation
1	mediating tools (SNS) vs. object	chat conference #8; disturbance cluster (dilemma); discussing the possibility of using a discussion board to offset the inconsistent accessibility of the SNS chatroom server	narrowed; decided not to use the chatrooms with her students
2	mediating tools (unit design framework) vs. subject	chat conference #6; disturbance cluster (innovation); discussing plans for implementing Phase 1 in the classroom	widened (in-depth); decided to incorporate concepts about learning into her design of Phase 1 as shared by another teacher in the group
3	rules (implied expectations for teachers using technology) vs. subject	initial interview; discussing the potential student learning outcomes with the researcher	widened (in-depth); increased her expectations for student outcomes to align more closely with the potential learning outcomes of the unit design framework
4	rules (departmentalization) vs. object	follow-up interview; discussing factors in her school environment that impeded her implementing the unit	narrowed; revised her plans for implementing Phase 2 and 3 with less time during the day to meet the needs of another teacher in her grade level

Summary of Findings

The AT Model for Janice's work activity is represented in Figure 2 below. The turning points (TP) are represented by broken lines; solid if the TP was unresolved, dashed if it was resolved by the teacher. Under each category (node) are the aspects of that node that the researchers identified in Janice's work activity. The two resolved contradictions both radiate from the subject. Janice's ability to use professional development processes to resolve issues in order to provide this involving learning experience for her students was the important change factor in this unit.

Janice did not perceive herself as working in a locally collaborative environment and she was unable to resolve secondary contradictions that arose from her local environment. She had contradictions in her local community between the rules, departmentalization schedule, and her implementation schedule that she was unable to resolve. There was a contradiction between SNS and her object because the chat room tool never worked correctly in her school. She was unable to get the local expertise needed to use the chat room successfully. Her inability to resolve local issues meant that she did not realize as completely her changed motive, to develop the advanced problem-solving abilities of her students. Teachers who implement reform need to address the need to communicate their new goals to their local community whose support is necessary when contradictions arise locally.

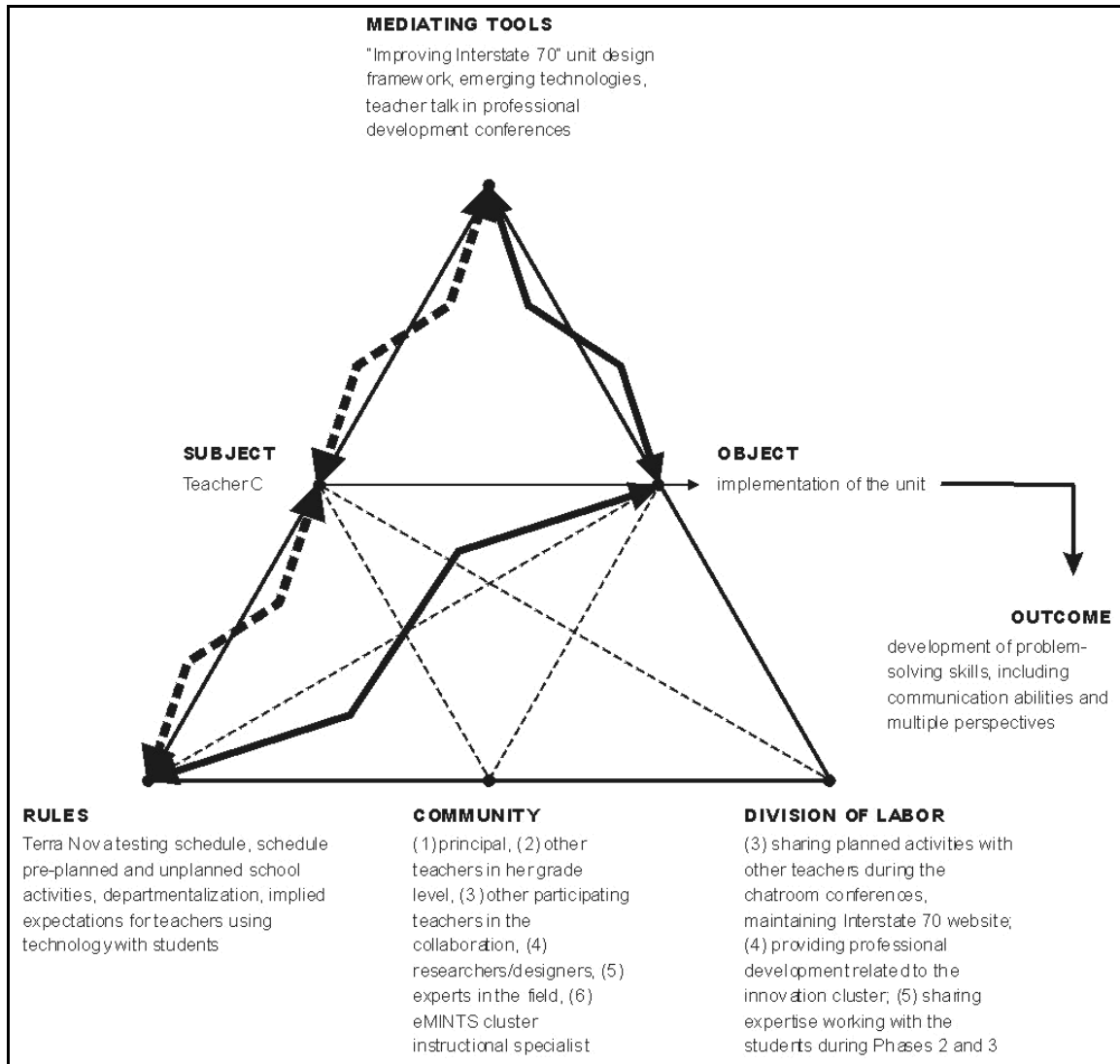


Figure 2: AT Model for Janice

Note: Four Turning Points are identified in the model:

2 Resolved (dashed line) – both identified as changes in subject beliefs

- 1) Subject, beliefs about learning, and the Unit Template
- 2) Subject, reasons for reform and the rules for teachers using technology

2 Unresolved (solid line) --

- 3) SNS, chat room did not function, and the Object, implementation of the unit
- 4) Rules, departmentalization, and the Object.

Janice widened the object overall from her stated pre-unit outcome of developing communication skills using the technology as a motivational factor to the new outcome/motive of developing advanced problem-solving abilities in her students. As a result of her openness to the external resources available to her, Janice's learning goals for her students expanded. She changed her ideas about how the unit could benefit her students. Despite her initial concerns about testing, her concern about her superintendent's expectations, her principal's expectations, the opinions of her peers and her own lack of confidence in herself and her students' abilities to successfully engage in the unit, she developed the unit fully using all the outside resources and expertise available to her. This openness to dialog and reflection on her learning beliefs, albeit outside her local context, made the completed unit possible and made it possible for her students to problem-solve at this level. The identification of primary belief contradictions through professional development processes such as reflection and the resolution of these types of contradictions can be a productive aspect of professional development programs for educators implementing innovation.

Implications

Systems Analysis

Designing studies of innovation in education based on a systemic analysis of change efforts in the teachers' work activity can potentially aid educational researchers hoping to understand how teachers design and implement reform-based learning environments. Alan Schoenfeld wrote in *Looking Toward the 21st Century: Challenges of Educational Theory and Practice* about the ways research in education may develop to meet the challenges of studying complex, fluid educational settings. He asks:

Can we develop theoretical understandings and build functional models of complex social systems? Is it possible to characterize in a precise and detailed way the factors that shape what happens in a school district, in a school, in a classroom? How much, and how, do they matter? And what about individual agency? (1999, p. 8).

He described the need for basic research characterized by its "contribution to general knowledge" which can lead to use-inspired basic research as a goal in educational research. He suggests that "educational research has evolved to the point where it is possible to work on problems whose solutions help make things better and contribute to theoretical understandings (1999, p. 10). In this same article he describes his research goals as:

On the practical side: to improve teaching, you need to understand it. On the theoretical side: Teaching is a wondrously complex, highly interactive, knowledge-dependent act. We have now reached the point where we can hope to understand it, and to build detailed models of it. If we succeed at this, we will have developed enhanced understandings of human behavior in complex social contexts. Please note that this work is situated in practice—we conduct studies of real teachers who are trying to make things work—but also that these studies are conducted with an eye toward theory, both in the selection of the cases and the goal of really understanding what enables teachers to do what they do. (p.11)

Professional Development

A professional development program designed for teachers implementing new programs needs to address the prerequisite to challenge themselves and their students. It should offer the teachers chances to dialog with other innovative teachers in order to evaluate and revise their current concepts and abilities. This process should include dialogs that identify and evaluate learning activities that encourage advanced learning processes in students and also include developing

supportive dialogs that help teachers overcome frustrations and develop their advocacy for their students' potential learning as a result of constructivist-based learning processes.

Korthagen suggests using collaborative dialog and personal reflection as processes to identify the holistic gestalt structures of teachers implementing change in order to identify their pre-existing schema and help them create a new theory of education. He refers to this process as "level reduction" (Korthagen, 1993, p.10). He defined a teacher education model that he called the realistic approach. He suggested that much of teacher behavior is based on previously acquired concepts that form a "gestalt" theory of how teachers respond. Gestalt is a "complex interplay between social, cultural, psychological, and physical factors that are linked to concrete situations." (Korthagen, 1993, p. 9) Korthagen also described the difficulty of changing a gestalt. This change process can be developed through a defined reflection process including collaboration with other teachers working at the same level, or a higher level, of reform.

Kenneth Zeichner writes that "The challenge and support gained through social interaction is important in helping teachers clarify what they believe and in gaining the courage to pursue their beliefs" (Zeichner & Liston, 1996, p. 76).

The innovative teacher's ability to problem-solve and resolve the contradictions that arise when implementing reform is an important aspect of a professional development program for educators. Teachers should be trained to anticipate problems and how to prepare for them by communicating their goals and needs to their local community. Innovative educators should receive professional development in how to communicate their new needs and interests with important personnel in their local context so these people can support them when issues arise that prevent her from meeting her new goals for her students.

Ultimately the most productive professional development program for innovative educators is one that works—one that allows the teacher and her students to experience success in spite of the problems that arise when teachers develop new learning experiences for their students. Janice's changed her beliefs about the learning potential of her students as a result of their successful participation in this advanced problem-solving unit. She transformed herself as an educator as a result. This kind of success and transformation may be especially important for urban teachers who have a myriad of issues that can negatively impact their beliefs about their students' potential and their own contextually-based capabilities to implement constructivist-based learning environments successfully. In this case, despite all the inherent difficulties in her urban setting, Janice transformed her beliefs about her students' potential and her ability of develop their potential. As she said in her final interview

The unit required them to use higher order thinking skills. They got better and better at it as the unit went along. The unit was different than anything they had done before. In the beginning I didn't know what to expect. Now I know what to expect. I would do the unit all over again.

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About the Author



Donna Russell has a BA in elementary education, a master's degree in Curriculum and Instruction and a doctoral degree in Educational Psychology with an emphasis on Cognition and Technology. She has 14 years experience teaching and implementing research in varied K-12 educational settings.

Dr. Russell is an Assistant Professor in the Curriculum and Instructional Leadership department at the University of Missouri- Kansas City. She has designed and is implementing a new master's degree in curriculum and instruction with an emphasis on learning technologies at the university. Her research areas include the systemic qualitative analysis of technology integration in diverse urban settings, innovation in educational settings and online learning environments.

Donna L. Russell, Ph.D., Assistant Professor
Instructional Technology
Curriculum and Instructional Leadership, Suite 309
School of Education
University of Missouri-Kansas City
Kansas City, MO 64110

(cell) 314-210-6996

(office) 816-235-5871

russelldl@umkc.edu

<http://r.web.umkc.edu/russelldl/>

Editor's Note: An important goal of a Doctoral Dissertation is to make a significant contribution to knowledge in the discipline of choice. That requires in-depth knowledge of related research and assurance for the doctoral committee that the topic and issue to be studied is indeed significant. The authors of this paper address the cart-before-the-horse problem where doctoral candidates decide the research method prior to research of the literature and development of the research question.

The Right Horse and Harness to Pull the Carriage: Teaching Online Doctorate Students about Literature Reviews, Qualitative, and Quantitative Methods that *Drive* the Problem

Kim Blum and Brent Muirhead

Introduction

Doctoral students often declare that the choice of a qualitative design is preferred because students fear statistics. The authors of this article have heard this statement from online doctoral students many times. A student's position about statistics often changes when he or she discovers that the only way to resolve to a pressing dissertation problem may be quantitative or a mixed method that requires descriptive statistics; *all* good qualitative designs have *some* quantitative aspects (Yin, 2004).

Once a student understands that the dissertation question or problem drives the choice of methodology, he can focus on choosing an appropriate design for his research. The student must know different qualitative and quantitative designs in order to choose and defend his chosen methodology. His choice should prevail over past biases, fear, or concerns about adaptation for an online medium. He must become expert in methodology that answers or solves the research problem. Furthermore, he must understand the importance of the literature review. That is the purpose of this article.

The Challenge of Doctoral Dissertations

The doctoral dissertation is one of the most intense academic experiences that individuals encounter in their lives. One of the tragic interpersonal moments in the academic community is when individuals share that they were not able to complete their dissertation. The initial ABD – *All But Dissertation* that signifies this academic state is a reminder of the difficult journey to earn the coveted doctoral degree. Curran-Downey (1998) related “being in graduate school and making it all the way through the classes, the exams and the defense of the dissertation is ---take your pick--- marathon, wasteland, jungle, rat race” (para 6). The high attrition rate for students in American doctoral programs is a dark aspect of doctoral education that continues to plague the higher education community. It reflects a degree of failure at the institutional level to assist talented individuals in what is often considered the ultimate academic challenge and represents a tremendous waste of human resources that often undermines career plans.

An important step in developing a research plan is facing the fears associated with writing. A major issue for some students is a negative mindset concerning research writing. Some view the dissertation project as a near impossible task because they doubt their abilities and are fearful of having their proposal rejected. Severe emotional turmoil may diminish a student's ability to work through the more difficult phases of his dissertation. It can halt the writing process and some individuals are tempted to abandon their degree program. Jensen (2005, para 5) encourages a

student to identify when what she calls the *Inner Critic* is attacking by being alert to negative signs:

- **Mental signs:** self-criticism, procrastination, excessive worry, negative thoughts about your options, black and white thinking, confusion, feeling stuck.
- **Emotional signs:** loss of motivation, discouragement, feelings of failure, depression, low self-esteem, fear, feeling powerless.
- **Physical signs:** lack of energy, fatigue, sickness or injury.

It is crucial to implement strategies to overcome mental or psychological barriers to keep the dissertation process moving steadily forward towards completion. The key is to be proactive, dedicated, and create a realistic study plan that breaks the dissertation into manageable parts. Maxwell (1999) recommends measuring personal commitment by examining how much time and energy is devoted to research and writing. A good question to ask yourself, do your daily activities support your goals? The next step is to affirm that certain goals are worth great personal sacrifices. Morris (1994, p. 286) developed seven principles of success that help individuals to formulate goals for their personal and professional lives.

- We need a clear **conception** of what we want, a vivid vision, a goal or set of goals powerfully imagined.
- We need a strong **confidence** that we can attain our goals.
- We need a focused **concentration** on what it takes to reach our goal.
- We need a stubborn **consistency** in pursuing our vision, a determined persistence in thought and action.
- We need emotional **commitment** to the importance of what we're doing, and to the people with whom we're doing it.
- We need a good **character** to guide us and keep us on a proper course.
- We need a **capacity** to enjoy the process along the way.

Research Skills

Tremendous expansion of electronic information resources has exponentially increased research opportunities. This fact makes it important that students are properly prepared to use the new technologies. Hart (1998, p. 5) has identified two basic types of skills required for researchers:

1. **Core skills and abilities-** while the differences make subject disciplines distinctive, there exists a common core of skills and attitudes that all researchers should possess and should be able to apply in different situations with different topics and problems.
2. **Ability to integrate theory and method-** research for all disciplines involves an understanding of the interrelationship between theory, method and research design, practical skills and particular methods, the knowledge base of the subject and methodological foundations (Hart, 1998, p. 5).

Graduate degree programs are an excellent place to develop and refine research skills. Hart (1998) states, "it is important that research education and training does produce researchers who are competent and confident in a range of skills and capabilities and who have an appropriate knowledge base" (p. 6). Students create projects that demand having effective skills in conducting a literature review, developing a research design, writing and presenting their study. Therefore, it

is vital that students must have a sound knowledge of the entire research process to produce research that demonstrates quality work.

The concept of scholarship should include competent investigations and it should transcend multiple activities while involving a diversity of skills and activities. The process requires knowing how use one's imagination and creativity to read and interpret arguments, organize ideas, make connections between academic disciplines and effectively write and present ideas. The scholar must maintain a mindset that is open to new and innovative research methods and they should be willing to experiment with information and ideas. The skill of integration is a vital element in scholarly work. According to Hart (1998), "integration is about making connections between ideas, theories, and experience. It is about applying a method or methodology from one area to another; about placing some episode into a larger theoretical framework, thereby providing a new way of looking at the phenomenon" (p. 8). Integration demands individuals be systematic and reflective in their investigation endeavors. It requires being patient while re-examining and interpreting knowledge and being open to new perspectives on existing theories.

Graduate students should develop a research plan that helps them focus on developing skills that foster integration in their work. They should realize this might take time and substantial effort. It is encouraging to realize that studies on those who are associated with being a genius reported that they were very hard working individuals. Howe (1999) observes, "like ordinary men and women, major authors have had to invest large amounts of time and effort in order to become unusually skilled. Their heavy dependence on training and preparation is one of the many aspects of the human experience that creative geniuses share with other people." (p. 175)

The Literature Review Process

Reviews vary greatly in the scope and depth of material examined. The selection of study topic is a key factor and students should be avoid selecting topics that transcend the requirements of their degree programs. A primary reason for studying the literature is to demonstrate familiarity with research in the field and establish credibility for the individual's current investigation. The literature review should reflectively build upon the work conducted by other researchers who are part of a larger intellectual community (Neuman, 1997).

A metaphor that helps drive home the importance of the literature review process is a good horse without a harness. The horse symbolizes the problem, but without a solid harness the horse cannot pull the weight of the carriage. A literature review that is well designed and thorough gives the problem weight. Everything that has been done before is pulled with the problem and the researcher makes it clear that despite the heavy carriage of *literature*, the horse can accomplish the task because the harness is strong. The harness is a solid literature review.

The dissertation committee expects students to produce literature reviews that uphold high academic standards. Neuman (1997) described four major literature review objectives:

1. **To demonstrate a familiarity with a body of knowledge and establish credibility.**
A review tells a reader that the researcher knows the research in an area and knows the major issues. A good review increases the reader's confidence in the researcher's professional competence, ability, and background.
2. **To show the path of prior research and how a current project is linked to it.**
A review outlines the direction of research on a question and shows the development of knowledge. A good review places a research project in a context and demonstrates its relevance by making connections to a body of knowledge.
3. **To integrate and summarize what is known in an area.**
A review pulls together and synthesizes different results. A good review points out areas

where prior studies agree, where they disagree, and where major questions remain. It collects what is known up to a point in time and indicates the direction for future research.

4. **To learn from others and stimulate new ideas.**

A review tells what others have found so that a researcher can benefit from the efforts of others. A good review identifies blind alleys and suggests hypotheses for replication. It divulges procedures, techniques, and research designs worth copying so that a researcher can better focus hypotheses and gain new insights (p. 89).

The literature review helps the student to understand the historical context of their subject while focusing on current research efforts (Hart, 1998). Literature reviews help students learn how to identify areas of concern and become aware of any neglected issues.

Literature reviews can stimulate student to make changes to their topic choice because, during the literature review process, individuals sometimes discover a more important topic to address in their doctoral research. Also, the literature review can help a student to develop a framework for his own study by noting what others have done with their particular research design such as the data-collection techniques. Reading the literature provides an overview of the major theories and ideas that guided previous researchers. Students must have a good working knowledge of the key concepts in their field of study to develop an appropriate vocabulary and database for writing and communication of ideas (Hart, 1998).

Literature reviews should cover the material related to the research problem. The wise researcher will conduct a review including the following sequential steps:

- **analyze** the problem statement.
- **search** and read secondary literature.
- **select** the appropriate index for a reference service or database.
- **transform** the problem statement into search language.
- **conduct** a manual and/or computer search.
- **read** the pertinent primary literature.
- **organize** notes.
- **write** the review (*Introduction to educational research*, 2003, p. 73).

Students must systematically investigate the literature and cover both electronic and print sources of information. One part of the plan should contain a basic record keeping system that will help organize work accomplished to develop leads for future research and avoid losing valuable data. For instance, students can save links to Internet articles as favorites or bookmarks in their web browser. This makes it much easier to locate the article for future use. Students can improve their ability to recall important ideas and concepts by creating a basic set of questions prior to reading an article (Locke, Silverman & Spirduso, 1998).

A review of the literature requires a systematic analysis and appraisal of each research article. Begin the process by creating a descriptive summary of the study. Next, analyze the article to understand the author's purpose and decisions. Hart (1998) notes "you are aiming to make explicit the nature of the connections between the methodology choices an author has made and the data they have collected through to the interpretations they have made of their data" (p. 56).

Identify the style and structure of the author's reasoning. Explore issues such as methodological assumptions, aims, and purposes of the research and evidence presented. The critical analysis of

articles is one of the more demanding aspects of the literature review but it helps the student discern the quality of work produced within the field (Hart, 1998).

Students should strive to demonstrate their careful and reflective investigation of research studies and vital information resources. Their discussion should reflect a vivid awareness of theories and arguments and acknowledge both their strengths and weaknesses. A balanced review will affirm the usefulness and merits of a theory and at the same time explore areas that need improvement. Research criticism must be based on understandable arguments that identify inadequate or flawed evidence or reasoning. Students may be able to use aspects of different writers work to develop their own synthesis of ideas and offer new perspectives on their subject matter.

The following criteria are useful to evaluate information (Lawlor & Gorham, 2004, p.17):

- **Authority**—who is the author of the material?
- **Date of publication**—when was the information published?
- **Type of publication**—is the material published in an academic article, a newspaper or a textbook?
- **Relevance of content**—how relevant is the material to your research?
- **Hypotheses/Purpose**—what led the author(s) to their hypotheses? What is overall purpose?
- **Methods employed**—what methods were utilized by the author(s) and why?
- **Results**—what results were obtained?
- **Support for hypotheses**—were hypotheses supported?
- **Conclusions/Recommendations**—what were the author(s) conclusions/recommendations?
- **References**—does the author provide a detailed list of references/bibliography?
- **Cited or reviewed**—has the article, book or website been cited or referred to by other authors?

Literature reviews require patience and diligence to carefully select and examine research studies. Gall, Borg and Gall (1996) highlight seven common mistakes that people can make during the review process:

- Does not clearly **relate the findings** of the literature review to the researcher's own study.
- Does not take sufficient time to **define the best descriptors and identify the best sources** to use in reviewing the literature related to one's topic.
- Relies on secondary sources rather than on **primary sources** in reviewing the literature.
- Uncritically accepts another researcher's findings and interpretations as valid, rather than **examining critically all aspects of the research design and analysis**.
- Does not **report the search procedures that were used in the literature review**.
- Reports isolated statistical results rather than **synthesizing** them by chi-square or meta-analysis methods.
- Does not **consider contrary findings** and alternative interpretations in synthesizing qualitative literature (pp. 161-162).

Graduate students sometimes err in their approach to studying the literature by striving to read *everything* that is remotely related to their topic. The result is to waste time on trivial articles and materials. A good literature review will focus on the most important and relevant documents. Students can spend so much time reading that they fail to write about their project. People tend to choose reading over writing because it is less demanding than writing. The writing process is another way to reflect upon ideas and foster a better understanding of information relationships (Language Center, 2004).

Literature reviews build upon established knowledge. Researchers read other studies to glean insights from the academic community that provide direction for their own work by noting any gaps or weaknesses in previous investigations. Contemporary literature reviews can be quite diverse in their scope and depth of knowledge due to the intent of the reviewer. Dissertation reviews must transcend being merely familiar with the material. The literature review is a scholarly essay that establishes credibility for the entire research project. Therefore, it is vital to create a specific review focus that offers the best perspectives on significant studies related to the research problem. Neuman (1997, p. 90) highlights six review types:

- **Self-study** reviews increase the reader's confidence.
- **Context** reviews place a specific project in the big picture.
- **Historical** reviews trace the development of an issue over time.
- **Theoretical** reviews compare how different theories address an issue.
- **Methodological** reviews point out how methodology varies by study.
- **Integrative** reviews summarize what is known at a point in time.

The six review types reflect different approaches and research goals in the literature review process. Self-studies are considered to be personal investigations and lack the depth of coverage of a formal review. Students must devote adequate time to studying primary and secondary sources to avoid missing significant information related to their research problem. It is wise to be patient and open-minded when evaluating the material to avoid hasty interpretations or generalizations about previous studies. The authors encourage students to use the following literature review checklist to improve the quality of their work:

- show a **clear understanding** of the topic
- cite and discuss all **key landmark studies**
- develops, through gradual refinement, **a clear research problem**
- states **clear conclusions about previous research** using appropriate evidence
- shows the **variety of definitions and approaches** to the topic area
- reaches sound recommendations using **coherent argument that is based on evidence**
- shows a **gap in existing knowledge**

(Hart, 1998, p.198)

The Problem Drives the Design

The research problem always drives the choice of the initial methodology (Creswell, 2004; Simon & Francis, 2004; Yin, 2004). A solid research plan defends how the research question or hypothesis is going to be answered using the best method available – the methodology the student chooses to solve or answer the problem.

A metaphor to elaborate on how the problem drives the choice of methodology design is appropriate....

The author of this article once bought a book on how to train a horse to pull a carriage with the desire to ride in a horse-drawn carriage for Christmas; in the country children are taken on yearly caroling hay rides to annoy the neighbors once a year. Up to this point, a tractor and a long trailer loaded with hay was employed.

The instructions in the carriage book said to locate a particular type of horse-drawn carriage. After extensive researching, a place was located that sold Amish furniture that had a carriage outside. Inquires were made to order an appropriate carriage from the Amish Country in Ohio. After considerable expense, a gorgeous two-seater carriage arrived complete with velvet seats.

Now at this point, a carriage was purchased -- *think of the carriage as the problem statement*. It was a problem, sitting in the yard, with no way to *solve* it (to make it move). Neither a harness nor a trained carriage horse trained to pull the carriage was available. Knowledge of what type of harness or *design needed to solve this problem* was missing. After considerable reading and interviewing experts to gain design knowledge on harnesses, a harness was purchased that would pull the carriage.

One of the authors of this article reflected that, with a little work, a previously purchased horse could be trained to pull the carriage by following the instructions in the carriage book.

Unfortunately, the horse rolled her eyes when the little thing over her tail that is critical to pulling a carriage was installed. The horse tolerated the uncomfortable heavy harness around her neck. The horse allowed the trainer to lead her to the corral in the stiff harness without the carriage. Nevertheless, when the driver tried to make the horse walk in a straight line, the horse, a 25-year-old ex-cutting (cow cutting) horse translated long reins into directions with a driver yelling -- walk in circles -- called lunging. Subsequent attempts to hook the horse up to the carriage using the harness resulted in circles.

Similar to this metaphor, if the design is chosen without knowledge of how to apply it, the research problem is difficult to solve. The problem (horse) goes around in circles; some students wind up with an all but dissertations (ABD), and like the fancy carriage, the dissertation rests unpublished, in the field.

Statistics are only one of the straps on the harness attached to the horse. Without proper training on how to *pull the carriage* or write the research plan, the strap will break. If the methodology will not pull the cart or solve the problem, the entire process will not move forward.

Learning about different research design choices is the first step to writing a solid research proposal and dissertation.

Qualitative vs. Quantitative Methods: Which Design to Choose?

Abusabha and Woelfel (2003) argued that “researchers in sociology, psychology, nutrition, public health, and many other related fields have been engaged in a long-standing debate about the use of qualitative vs. quantitative approaches to research” (p. 1). Qualitative research is often labeled as soft, subjective research (Creswell, 2004), while quantitative methods are classified as rigid because quantitative methods puts human behavior, and thus the data, into unrelenting categories (Yin, 2004). Creswell (2002; 2004) posits that qualitative research goes hand-in-hand with literature searches because the researcher first looks for major ideas in previously done studies, as well as recycling through original data several times to spot themes and patterns. Regardless of the method design chosen to solve the problem, researchers must be prepared to defend the choice

– how will the methodology give the researcher the answer or test the data to obtain valid results that are reliable and answer or solve the problem? There are two general types of methodology called qualitative and quantitative research methods.

Qualitative Research Methods

Qualitative research methods are designs that *explore* information (Yin, 2004). Qualitative research methods are designs chosen when the problem is focused on what is or was occurring, inquiring about processes, views, and detailed information. Qualitative methods can generate theories based on the data, where no preconceived models exist. Qualitative methods attempt to describe and interpret data with the goal of detailed and well-rounded information, identifying researcher biases and assumptions.

Because qualitative methods results do not use statistically significant tests, findings are more reliable if the or data are triangulated (Creswell, 2004; Yin, 1991). Triangulation means that different methods with the same data. Triangulation *also* means that the data came from many sources such as archival files, interviews, articles, observations, and patterns are noted using the parameters chosen by the researcher supported by major theories and measured by a validated unit of measurement deemed critical to solving the problem (Yin, 2004) are explained. For example, one online doctorate student used leadership placement practices as the unit of measurement to analyze data in foster care children files. The parameters were housing practices, biological visits, and mental health services – these were the initial variables used to explore patterns; data could discover new patterns and will be explained by the researcher. Pilot studies on a sub-set of the same population are a means to test the methodology in qualitative studies and further triangulates the data.

Qualitative method results can rarely be generalized for a larger population because qualitative data cannot be tested for statistical significance (Creswell, 2004; Sproull, 2004). Another potential problem with qualitative designs is that the researcher must present the literature theories as a basis for the data analysis, and make the entire procedure very logical and clear to the reader (Creswell, 2004).

A key advantage of qualitative methods is the researcher excitement when a new paradigm based on solid trends in data is one of the results of the data analysis. A researcher never knows what data patterns will reveal; entire assumptions made by literature searches could be discovered as invalid, and it is wonderful to discover new patterns so that new practices can be developed in the field. For example, one of the authors of this lecture was part of a study to find out if an online faculty refresher course was effective. Faculty performance practices of a control group who were coached were compared to another faculty group who had coaching *plus* the online training workshop.

Faculty performance records of before and after the workshop were analyzed patterns for three months; the patterns based on key areas were identified as crucial being materials, facilitation, and practices; these were the parameters. The unit of measurement was a measurement tool used to evaluate faculty. Patterns found in online faculty classrooms within the areas of materials, facilitation, and best practices showed there were no differences in faculty performances in either group. Both groups improved for the first month but three months later were going back to the same initial problems in all three critical areas. The result of this study was a drastic online faculty training revision that was data driven and supported by positive outcomes. It was quite fun to be a part of this study and helped create a new framework of successful online faculty coaching and training with measurable outcomes.

Major Qualitative Designs

There are many types of qualitative designs. Simon and Frances (1998, 2004) developed a useful organization of research designs into past, present, and future perspectives. Analyze the problem and determine if it based past, present, or future data. Major general designs are outlined in the next section.

Past Perspectives

If the researcher is primarily interested in solving a problem that requires looking into past events or factors that have contributed to the problem being researched, then consider past perspectives (Simon & Francis, 2004). General past perspectives are explained below; please refer to the reference list for books on each area for detailed instructions on implementing each type of design.

Driven by the question: What and why?

Historical Design

Type: Qualitative

Historical designs typically analyze documents in relation to a theory or concept, describing what occurred by interpreting facts and events of archival documents in a critical manner. This design is useful when interviewing or observing is not possible but the problem can be solved with historical documents (Simon & Francis, 2004).

Driven by the question: What are the trends or patterns? Grounded theory develops new theories from raw data (creates a theory where none existed before).

Content Analysis and Grounded Theory

Type: Qualitative but with quantitative counts, averages, and methods of describing data

Content analysis is used to analyze any written document for patterns. Data is coded and analyzed with statistics *or* patterns can be grounded into theory (in this case the content analysis is really grounded theory). Grounded theory is developed from the raw data with a general theory or theories guiding the initial pattern analysis (Glaser & Strauss, 1967). Grounded theory can be past or futures based depending on the nature of the design. For example, one student is studying leadership decisions based on theories of the best practices in national safety and security by analyzing historical decisions made by President Bush and Clinton. The parameters are grounded in theory; and this design is a past perspective but *could* generate new theories for the future as a framework for leaders in national security and safety. In contrast, if previous data is analyzed for patterns without being grounded in theory, then the design is content analysis (Simon & Frances, 2004).

Present Perspectives

What if the problem must *deal with present information* solve the problem? According to Simon and Francis (2004), present research design examines a phenomenon, as it occurs to understand the nature of the problem.

Driven by the Question: How, why, and when certain phenomena are considered with very specific case situations, people, organizations, or industries.

Case Study

Type of design: Qualitative

Case study findings are valid only for the case being studied with *some* generalizations possible but the researcher should triangulate the methods, data, and incorporates the use of a pilot study to test the findings and allows modification of methodology before the final study is completed. Every effort to explain patterns in an unbiased manner to discover the reality behind the data being studied (Feagin, Orum & Sjoberg, 1991; Simon & Francis, 2004; Yin, 1991; 2004).

Driven by the question: What is the meaning of people's experiences, culture, environment, and perspectives with a problem?

Phenomenology

Type of Design: Qualitative

The researcher must have access to the sample or case *to interview and gain information about the person's innermost feelings*. Access to interview more than once to re-clarify and obtain detailed information in an interactive manner with the sample members. Observations can triangulate the data. A comparison with basic theories is applied to the answers to create a theoretical basis of understanding the context. Examples of the meanings are presented using quotes from the samples (Simon & Frances, 2004; Yin, 2004).

Futures Perspectives

If the research problem is concerned about the future, with the purpose of studying a problem to *change it*, then the research design could be future based (Creswell, 2004).

Caution: Applied and Action research are grey areas that deal with day-to-day problems and are not considered qualitative or quantitative at some universities for the doctorate dissertation so a good tip is to check before going down this road.

Answers the question: How has your experience been meaningful using personal communication?

Heuristics research

Type: Qualitative

Subjects using the heuristics design are studied with no speculation. Instead, open-ended questions using personal communication in relation to the universe, working to find meanings within the context of personal experiences. Patterns in responses are the outcome of heuristics research (Simon & Francis, 2004).

Answers the question: How or why is something occurring using multiple methods of inquiry including literature with many standpoints?

Holistic Research

Type: Qualitative

Researchers use holistic methods to uncover all data in a holistic manner using people, social views, and relationships. Holistic research is a non-traditional method and triangulation of the patterns in the results is critical (Simon & Francis, 2004).

Answers the question: How can theories be developed for a new set of data or a new situation where none exists before based on expert opinion? What do the experts say can be applied to a new area that works well?

Delphi Research

Type: Qualitative

Delphi research is an excellent method when experts in a certain field are located and the problem is solved in a more effective manner based on subjective conclusions. The researcher inquires the experts with open-ended questions, gathers data, and then based on a consensus of the answers, re-interviews the same experts for more opinions. With the advent of emails, this method is becoming easier to achieve. Exploratory information and theories are developed using this method (Simon & Francis, 2004).

Answers the question: How do cultural meanings interpret meanings of experiences?

Ethnographic Research

Type: Qualitative

Most students who have studied the bible are familiar with the ethnographic design. Understanding the meaning of the bible relies on the context of the time the bible was written based on the *culture at the time*. Research studies that use this design examine the culture in perspective to the problem at the time it is studied. An understanding of the samples view at the time of existence is the goal of this method over a long-term period usually months or years (Creswell, 2004; Simon & Francis, 2004).

Answers the question: How can one generate a theory from the data itself?

Grounded Theory Research

Type: Qualitative

Initial theories on variables start exploring patterns in new data of a new population. Few theories are generated based on the patterns within the data; thus, the data is generating new theories. Patterns show how theory is developed, and multiple data sources triangulate the data. Pilot studies are a good way to test methods for analyzing data to develop grounded theory (Glaser & Strauss, 1967).

Quantitative Research Methods

In contrast to qualitative methods that discover themes and explore patterns, quantitative methods to *describes* a problem, or *predict* an outcome. Quantitative methods are not used to *explore* a problem. The problem has occurred and a quantitative method is used when the researcher wants know what or when something has occurred but does not understand why and can use a estimate (a sample) of the proportion of a population “discovering associations between variables” (Cooper & Schindler, 2004, p. 161). Certain assumptions are present if in quantitative designs for example, an assumption is that the data is black or white (no grey); a data item belongs to certain class or it does not.

In contrast to a qualitative design where the researcher would ask open-ended questions, a quantitative design makes educated guesses derived from induction or deduction of the problem called hypothesis (Sproull, 1995, 2004). The study proves the null hypotheses (Creswell, 2004; Sproull, 1995, 2004). The researcher is trying to prove the null is false.

Major Quantitative Designs: Present Perspectives

What if the problem *must have current information* to solve the problem? According to Simon and Francis (2004), present research design examines a phenomenon, as it occurs to understand the nature of the problem. Most quantitative designs use present perspectives.

Driven by the question: What IS occurring (not past) in detail to generate new improvements?

Descriptive Research

Type: Quantitative

When a detailed and accurate picture of phenomenon is required to generate hypothesis to pinpoint needed areas of improvement, descriptive research is useful. Variables are not manipulated and there is no cause and effect. Content is analyzed to determine what others may be doing or in an effort to develop a better framework (Creswell, 2004; Simon & Francis, 2004).

Driven by the question: What correlation if any exists between X and Y?

Correlation Design

Type: Quantitative

From data that is after the fact that has occurred naturally (no interference from the researcher), a hypothesis of possible future correlation is drawn. Correlation studies are not cause and effect, they simply prove a correlation or not (Sproull, 2004).

Driven by the question: What is the cause or relationship of a variable or variables comparing one sample group to another?

Causal-Comparative

Type: Quantitative

Most casual-comparative research is used on groups when the research is studying a comparison of one group with another, for example, comparing the economic level of third-world countries with developed countries using pre-determined variables of comparison to determine which one influences a higher level of economic performance (Simon & Frances, 2004).

The researcher is not determining *why* this occurred, but is focusing on what has occurred for the more successful group in order to gain information on the relationship between the variables, often to make predictions or develop future frameworks (Creswell, 2004; Simon & Francis, 2004).

Pure Basic Experimental Design

Type: Quantitative

This type of research was first type of formal research design (Creswell, 2004) where the researcher has full control of all variables with a control, manipulation, and uses randomization on different populations (Simon & Francis, 2004). It is very difficult to obtain true control so this research requires extensive reading of this type of design and gain knowledge on how to manipulate variables.

Quasi-Experimental Design

Type: Quantitative

This type of research was adapted to provide experiments where at least one of the variables cannot be controlled as in the case of a pure basic experimental design (Burns & Grove, 1993; Sproull, 2004). Statistical methods account for the inability to control certain variables (Sproull, 2004).

Qualitative vs. Quantitative Designs: Key Terminology Differences

Some research plans are vague and it is hard to tell design methodology at a glance. Online doctoral students find this chart helpful to make sure the design has consistent design terms stated in a clear manner without mixing quantitative and qualitative common terms.

Table 1

Qualitative and Quantitative Design Terminology

Qualitative	Quantitative
Explore	Describe
Case Study	Sample
Grounded theory	Relationship between variable and variable
Themes	Correlation between one variable and one variable
Patterns	Compare
Phenomenological	Evaluate
Meanings	Identify
Ethnographic	Descriptive
Behaviors	Investigate degrees of variations
Understanding	Experimental
Historical	Quasi-Experimental
Explained	
Observed phenomenon	
Generating a theory	
Perceptions	

Which Methodology is Appropriate?

The answer of course, is that it depends. It depends on the problem the researcher is trying to solve. It depends on the data the researcher has access and the resources at dispersal. Some helpful steps designed to assist online doctorate student to select a significant problem topic and design are included below.

- *Determine the academic passion.* Students will be studying the research problem a long time, so make sure it is something students can maintain interest over time. If students select a research problem in an area that they something that you do not care deeply about, students will be bored by the time the dissertation is finished.

- *Define the Problem.* Write it out in bottom line ONE line format: *The problem is....*
- *Reflect on the purpose.* Does the problem need exploring or explaining?
- *What data does the researcher need to solve the problem?* Does the researcher have access to this type of data? Can permission \be obtained to gather data?
- *Analyze the design types; which design best matches the problem?* Read more about this design and compare it against a second choice – which designs solves the problem in a significant, doable, timely manner? Do not choose methods that will take decades to complete; narrow it down to a doable, yet important problem that can be accomplished in the time allotted to finish a dissertation.
- Choice of a research methodology design depends on the problem, the questions, the researcher’s own unique style (Simon & Frances, 1998), the data available, and the access rights. There is no concrete model to follow on what design to choose when, the researcher must use a general guideline to make a choice and defend that choice as being valid to answer the question(s) conclusively. The chart below should help narrow down what is available to match the research problem and questions.

Table 2

Problems and Type of Research Design Choices

Problem Researching	Research Design	Specific issues	Qualitative or Quantitative Design
Explores WHAT is happening?	Qualitative Qualitative Qualitative	Exploring common experiences of individual to develop a theory Exploring the shared culture of a group of people Exploring individual stories to describe the lives of people.	Qualitative: Grounded theory. Ethnographic Research. Narrative Research
What is happening is clear but there is no explanation.	Quantitative	Explaining whether an intervention influences an outcome for one group as opposed to another group.	Intervention Research called Experimental Research.
Is based on finding out why something is occurring? Predicting it.	Quantitative Quantitative	Describing trends for a population of people. Associating or relating variables in a predictable pattern for one group of individuals.	Non-Intervention Research: Survey Research. Non-Intervention Research: Correlation Research.
Is exploring both WHAT and WHY?	Mixed method using Qualitative and Quantitative Methods. Used to study education problems in a setting.	To best understand a research problem. To change practices	Mixed Method. Action Research. (careful with this for UOPhx)

Conclusion

This article is an *introduction* to the literature review process and the two main different types of research design, demonstrating how the choice of a horse is critical to driving the carriage, the problem is the horse that always drives the choice of research design. The harness – a literature review – must bear the weight of past studies so that the need to answer the problem is clear. This article is not a comprehensive *how to* explanation of each type within that design. When a solid literature review clearly demonstrates the distinct need for the study, the problem statement will *successfully pull the horse to the end goal of a completed and approved dissertation that is ready to be published.*

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About the Authors



Dr. Kimberly Blum Ph.D.

Dr. Kimberly Blum mentors online doctoral students and teaches doctoral research classes at the University of Phoenix, School of Advanced studies for the past four years, starting over six years ago in the IS&T Online department, as well as conducting quantitative and qualitative research studies. In addition, Dr. Blum trains online doctorate faculty telecommuting with virtual worldwide teams; previous experience includes international system installments and training. Dr. Blum holds a B.S. in Information Systems, Masters in Management of Organizational Management, and a Ph.D. in education researching for the final dissertation online distance education student communication patterns, learning styles, and barriers.

She may be reached via email at:

kdblum@email.uophx.edu



Brent Muirhead Ph.D.

Brent Muirhead has a BA in social work, master's degrees in religious education, history, administration and e-learning and doctoral degrees in Education (D.Min. and Ph.D.).

Dr. Muirhead is the Lead Faculty and Area Chair for GBAM Business Communications in the graduate department at the University of Phoenix campus in Atlanta, Georgia. He teaches a diversity of undergraduate and graduate level courses in Atlanta and online. He is an Associate Editor for Educational Technology and Society and he has worked as a visiting research fellow to Robert Gordon University, Aberdeen, Scotland.

He may be reached via email at:

bmuirhead@email.uophx.edu

Editor's Note: Collaborative communication tools are not limited to facilitation of learning; they provide opportunities for students to participate in every stage of the education process from goal setting to evaluation. The lead article in this issue by Daithí Ó Murchú addressed new student roles as self-learner, team member/collaborator, and knowledge manager/leader. He also listed new teacher roles and how these align with, exist in tandem, or overlap student roles. This paper is an excellent example of Murchú's findings.

In this study, the learners collaboratively design their own course, select tools for implementation, participate as learners, and evaluate the outcomes.

What Makes an Online Group Project Work? Students' Perceptions before and after an Online Collaborative Problem/Project-Based Learning (PBL) Experience

Brenda I. Lopez-Ortiz and Lin Lin

Abstract:

In this paper, we examine factors that make an online group project work. We asked the students in an online class to share their past group experiences at the beginning of the semester. We then used the categories derived from the students' responses as baseline and asked the students to talk about their online group experiences at the end of the semester after they completed the online problem-based learning projects. We compare the responses, analyze similarities and differences, and provide suggestions on what makes an online group project work.

Introduction

In this paper, we examine factors that make an online group project work. We had several questions before we conducted the study:

1. Is doing a group project online more difficult than doing it face-to-face? To what extent is face-to-face meeting important for a collaborative group project?
2. Do students experience more anxiety due to the lack of co-presence in online group collaboration? If so, how do students overcome it and succeed in their projects?
3. Are there opportunities that are important for the success of online group projects which are not presented at face-to-face group projects?

With these questions in mind, we asked students in an online class to share their past group experiences at the beginning of the semester: what they liked or disliked about a past group working experience, and what they considered as important factors that would make a group project meaningful for their learning. We then used the categories derived from students' responses as a baseline and asked the students to talk about their online group experiences at the end of the semester after they completed their online problem-based learning projects.

In this paper, we compare the responses, analyze the similarities and differences, and provide suggestions on what makes an online group project work based on the students' experiences and perspectives.

Conceptual framework

Problem-based Learning (PBL) and Collaboration

PBL has been characterized as an example of constructivist thinking (Duffy & Cunningham, 1996). One of the ways it implements constructivist principles is through the design of educational activities within an authentic situation that embodies knowledge and skills that students need to learn. This authenticity stimulates students to go beyond memorizing facts. It encourages them to perform like active practitioners in the field to analyze, evaluate and integrate the facts and skills into a cohesive approach to solve problems that the situation presented.

Consistent with its goal of making learning a mirror of practice, most PBL implementations encourage collaboration, cooperation, and communication among learners during this process. Learners bring together their previous experiences, skills and current understandings into a negotiation process that should contribute to strengthen their response to the learning situation. The process, which includes consultation of sources of information, negotiation of understandings, and design and refinement of the solution, is facilitated by continuous reflection on content and process. It is improved on an ongoing basis by input from multiple sources and perspectives of assessment. The result constitutes an informed response of students to address the situation.

Collaboration in learning has been defined as “working together to accomplish shared goals” by Johnson & Johnson (1996). These authors emphasize several important aspects that characterize effective group work: positive interdependence among group members to achieve a group goal, group and individual accountability, interpersonal skills, the ability to self monitor group work and ensure consistent progress towards the goal, and the ability to discontinue patterns of behavior that impede the progress. In addition, Johnson & Johnson (1996) incorporate face-to-face interactions as one of the defining aspects of group work. This last point constitutes the biggest challenge for the group of students who participated in our study because most students were not able to meet face-to-face in this online class. The online environment, with various computer-mediated communication (CMC) technologies, provides new opportunities as well as challenges. It is the goal of our paper to find out what students consider as important characteristics that make a group project work in an online learning environment.

Online Learning and Computer-Mediated Communication

Distance learning in various forms has been around for a long time, but it was only until the past few years that it became feasible to offer online distance courses to large numbers of individuals. Statistics indicate that increasing numbers of adult learners choose online distance learning as a way to obtain new knowledge, to keep up with the changing world around them, or to continue their life-long learning (NCE, 2002). The open-ended learning environments provide an authentic, situated and self-directed learning experience with the electronic tools and resources (Hannafin, Hill and Land, 1997).

Based on their research findings, experienced online instructors and practitioners recommend that the main indicator of success in online teaching and learning is a well-designed course that fosters interactivity through the creation of a virtual learning community (Bender, 2003; Collison et al., 2000; Palloff & Pratt, 2001; Preece, 2000; Salmon, 2001; Swan, 2003). That is, the active communication, interaction, online presence, moderated discussions, and formation of an online learning community are the key elements for high quality online education. Problem-based learning (PBL) is one of the educational methodologies that have emerged from traditional classroom practice as a successful approach to strengthen learning. Therefore, designing distance learning experiences with PBL can be one of the alternatives by which institutions provide equal quality distance education to their populations.

In online distance learning environments, synchronous and asynchronous CMC and its technologies becomes the default means to mediate most interactions among students separated in space or time. However, the adoption of all communication technologies as “extension of man” (McLuhan, 1994) is a process that does not happen naturally. Boden & Molotch (1995) highlight the importance of co-presence in human interaction. Studies have also shown that people with different personalities and learning styles enjoy CMC and online learning at different levels and that facilitation, teaching presence, and students’ collaboration play important roles to make learning enjoyable and fruitful in an online environment (Lin & Cranton, 2004).

The Study

Context and Participants

This study was conducted in an online course called “Computer-mediated Communication” (CMC). The course lasted one semester and was conducted completely online using Blackboard. The course explored two major themes: (1) communication theories and (2) CMC technologies (e.g. email, discussion forums, blog, chat, multimedia presentation tools, web, games and simulations). The course assignments included class discussions, individual reflection journals, and a small-group PBL project. The goal of the course was to incorporate students’ learning of communication theories and CMC technologies in design of computer-mediated learning environments. The course was facilitated by one instructor and two teaching assistants.

Thirty-two students were enrolled in the course. Most were graduate students from a communication and instructional technology program. Some students already held jobs in the fields of education or educational technology. Twenty-six of the 32 students participated in the collaborative problem-based learning experience. The 26 students self-grouped themselves into four groups of four students each and two groups of five students each. The criterion for the voluntary self-selection into a group was common interest in the types of learning environments to be supported by CMC (e.g. teacher professional development and support, digital TV, virtual learning communities).

Student Perceptions of Online Group Work Experience at the Beginning of the Process

Students were asked to share some past group project experiences in a discussion forum at the beginning of the semester as a way to be prepared for the coming online PBL projects: to understand each other's interest and styles towards collaborative group work. Some open-ended questions were used as conversation starters: What did you like or dislike about a past group project experience? What do you think makes a group project meaningful for your learning? Twenty-three students posted their ideas for a period of 16 days. The discussion forum had a total of 38 postings including one from the course instructor and one from one of the course’s teaching assistants.

We each analyzed the responses independently and then came together to exchange ideas about similarities and differences of our analyses. Using open coding and computer-mediated discourse analysis methods (Herring, 2004), we agreed on initial categories that students deemed important for a group project. Fifteen students provided an overall appraisal of their previous group work experience. Ten described it as “great” or “good”. Student statements regarding past group experiences focused on obstacles to group work or suggestions to achieve success. Focus, group dynamics, time management, leadership and facilitation, communication policy, commitment, formation of groups, dependencies, grading policy, flexibility, and work ethics were mentioned as important factors that helped make group work successful. A summary of students’ comments was made available to the students to help guide them throughout the group work experience.

The PBL Experience

Students were first encouraged to share their preferences and ideas regarding potential themes for group work during the second week of classes. Groups were more or less officially constituted by the fifth week. During this time interval, they also had the chance to begin exchanging ideas synchronously and consolidating groups by using chat tools. Once the groups were appropriately constituted, small group work focused on further defining the problem from the ill-defined alternative prompts that were provided. These prompts were:

- Design a new CMC tool or technology platform for educational purposes (e.g., a discussion board, virtual learning community, etc.).
- Create a conceptual CMC model for teaching and learning purposes.
- Design an online course for students in K12 or higher education environment.
- Propose a CMC implementation plan for a classroom, a school, a company, or an organization.

Students further defined the types of learning contexts for which they wanted to design CMC support. This included audience, technology access, computer literacy and communication needs. Conversations through synchronous tools such as instant messenger and the group's private chat space on Blackboard and asynchronous e-mail exchanges were the mediation means that supported this process as reported by students. This process of problem definition and refining culminated with submission of a project proposal by each of the groups on the sixth week. The proposal had a dual purpose: one, it was intended as a milestone to get the students started early in the process in the thinking and development of their ideas; two, it was meant as an early instrument for the instructor and teaching assistants to know the direction of each project to provide immediate feedback that could help guide and focus the group work. One concern that was identified in most of the proposals was the need to reduce the scope of the projects based on time constraints enforced by length of the course.

After the groups received their feedback on the proposal, they began making decisions on the communication theories that would describe the communication settings of their target audience and those that would help justify the adoption of particular CMC technologies to satisfy those communication needs. The accessibility of the personal e-mail and the synchronous capabilities of the instant messenger tools helped facilitate this part of the process. Synchronous tools were used primarily to get together and brainstorm ideas for the project. Asynchronous tools were mainly used to exchange results of individual work between synchronous meetings. The submission of a process report at the end of this stage (ninth week) represented another milestone in the PBL process. At this point, feedback focused on ensuring that the relevant communication theories were referenced and that the communication tools selected by students were appropriate to satisfy the communication needs that had been previously identified.

The final stage of group work entailed further refining the decisions made in earlier stages as well as incorporating new ideas from theories and tools that were deemed relevant at this point. E-mail was the tool that was ranked as first or second most useful tool for this stage of the process by most of the students. Students incorporated the feedback suggestions and finalized their projects for presentation to and feedback from the rest of their classmates by the twelfth week. The final three weeks of course work were dedicated to provide peer feedback about the projects as well as to reflect and assess the overall experience.

The process took approximately seven weeks to the completion of projects in addition to the three initial weeks during which students began exchanging ideas about potential projects during the group formation process.

Students Perceptions of the Online Group Work Experience at the End

At the end of the learning process, students commented on their experience participating in an online collaborative assignment. Overall, students used enthusiastic words to characterize it (e.g. enjoyable, successful, refreshing, rewarding, enlightening, exciting, positive, interesting, and unforgettable). Five students went further to describe this as a better online experience or the best they have had. Students commented on educational benefits of the process that were not shadowed by its online implementation. It allowed for an authentic opportunity to integrate communication theories into the design of communication. It provided support that relied on CMC tools for realistic environments in at least two of the groups (work environments of two of the students). The flexibility of selecting design projects in line with students' interests for professional practice contributed to students' perception of the experience as authentic (a learning experience that could be easily transferable to their future or current professional endeavors). Some students acknowledged the strength of the PBL process in establishing a visible link between theory and practice; a link that is not always evident in academic work. These features contributed to students' perception of the learning experience as meaningful.

Students also spoke of the benefits of this learning process as an online experience. In spite of challenges in scheduling synchronous meetings, students pointed out the benefits of the flexibility of online meetings: there is no travel time associated with it, timing is more flexible as later hours can be chosen for work without worrying about late returns back home, and online meetings give the opportunity to work with people that would not otherwise be accessible because of physical separation. Opportunity for review of synchronous conversations, tendency to engage in less small talk, and simultaneous access to multimodal sources of information during negotiation were mentioned as benefits of the distance education process.

As mentioned in the conceptual framework, PBL has been described as a constructivist educational implementation. The authenticity in learning that constructivist thinking attaches to education, together with recommendations to retain the complexities of the original context, place additional demands on students. Students sometimes referred to the process or some of its parts as overwhelming, challenging, frustrating and demanding. Nevertheless, they clearly recognized the benefits of participating in such an experience and acknowledged those as inherent characteristics of meaningful learning. The frustrating and overwhelming nature during the activities was mostly present during the beginning when there was more uncertainty about the overall process. A few students still expressed the wish to meet in person. This is consistent with theories about human communication mentioned above and also studied as part of the content of the class. The learning experience did begin for some with a degree of skepticism about the feasibility of conducting group work at a distance. Nevertheless, in all cases, students acknowledged having gained confidence in the process once it was under way.

Limitation of the media was one of the challenges most commonly mentioned by students. They quoted one of the course readings in justifying their claims in that CMC lacks the "thickness" of the personal exchanges (Boden & Molotch, 1995). Therefore, misunderstandings are more prone to occur, and insecurity about others' true positions regarding ideas exposed are examples of difficulties students find when they cannot count on all the non-verbal communication cues that are present in non-technologically mediated interpersonal exchanges. The volatile nature of synchronous communication was also cited as challenging in this context. Many ideas can be simultaneously exposed making it difficult to follow a single idea, to keep track of all potentially promising ideas and to keep the focus to consistently make progress towards the desired goal. The fact that technology mediates communication adds a layer of access, literacy and readiness that can be transparent or can completely impede communication. Finally, different characteristics of different kinds of tools bear different effects on the communication and learning process depending on the time and purpose of their use.

In this particular experience, students resorted to e-mail (the most accessible communication technology) to share availability between group members to schedule synchronous online meetings. However, the limitations of the e-mail tool as a serial presentation of messages that does not layer or juxtapose similar information for comparison made it harder for students to negotiate things such as common available time slots for those meetings. Thus computer-mediated scheduling was the other challenge that was most commonly mentioned as a shortcoming of conducting online collaborative educational work. The CMC tools available to students from their personal assets and those that the university provides lacks tools to efficiently visualize group member's schedules in order to easily coordinate synchronous activities.

Finally, the continuous intervention of the instructor and teacher assistants in providing feedback and guidance throughout the process was the most commonly cited benefit. Upon submission of the project draft documents, feedback was promptly negotiated and provided by the instructor and teaching assistants. Three different perspectives joined to offer sound advice with regards to the direction of the project every time. One of the teaching assistants participated regularly in the synchronous conversations of the groups that requested her participation. This was deemed beneficial by members of different groups. Her participation helped clarify questions in a timely manner, guide students to make progress during chats, and reinforce them when needed to ensure they were on the right track. E-mail inquiries received prompt responses from the instructor and assistants, who were also instrumental in facilitating discussion board conversations to help students understand course content and explore their relevance for group work.

Discussion, Recommendations, and Educational Implications

As stated above, it is necessary to implement meaningful learning experiences in the research and practice efforts to promote quality online education. CMC presents opportunities as well as constraints in collaborative problem-based learning environments. Student perspectives are useful in informing whether different kinds of guidance or facilitation, tools, rules or approaches need to be implemented to ensure the benefit of this methodology for distance learners.

The students' opinions regarding these particular learning experiences suggested some recommendations for future designs of these types of collaborative learning environments in the context of problem-based learning. Consistent with PBL design theory, authentic problems must be aligned with the kinds of professional activities students would perform if engaged in subject domains as practitioners. Providing these kinds of problems and allowing students to further customize them to better match their interests is a design decision that helps to get the process started with the right foot. These findings are consistent with adult learning theory that suggests that adult learners are more interested in immediate knowledge applications. Moreover, allowing students to group themselves according to common interests facilitates a sense of ownership and thus enhances motivation and investment in the learning activities. This echoes what literature emphasizes as an effective method to encourage meaningful learning in face-to-face settings.

Students relied heavily on synchronous communication to make decisions in their group work. For instance, scheduling was indicated as difficult through computer-mediated communication. One way to address this need is to explore accessible calendar tools that will share schedules.

It is important to ensure access and competence in the use of communication tools. Guidelines for use can be provided to students before they start collaborative work. Features such as recording of synchronous exchanges and use of collaborative tools need to be understood before they take place. Students and instructors must know the purpose of each tools as well as its strengths and limitations. This can help to avoid possible frustrations associated with the selection of an inappropriate tool to support a given task.

One last recommendation has to do with the design of instructor support during the experience. Instructors need to take into account the characteristics of the learning experiences, especially when they are of a constructivist nature, in order to provide support that will allow students to benefit the most from a self-directed learning experience and avoid the frustration of not receiving help when needed. Instructors need to be sensitive of the kinds of support needed by students and its timing so that they provide it when the content or activities in which they are engaged demand it.

Conclusion

As a result of this learning process, it was verified that online collaborative work for educational purposes can happen and result in a positive educational experience for students who would otherwise be isolated by temporal or physical separation. However, in order to ensure its success, educators need to carefully design learning activities so that benefits are maximized and anticipated shortcomings are overcome. Educators need to consider beforehand the combination of factors that stem from the subject matter, technology-mediation tools, and the nature of the activities in which students participate. This way, online learners will be able to benefit from educational methodologies that have been recommended as effective in the practice of face-to-face implementations with the added benefits of the technology mediation and informed prevention of potential limitations.

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About the Authors



Brenda I. López Ortiz is a doctoral candidate in Instructional Technology and Media at Teachers College, Columbia University. Her research focuses on online problem-based learning experiences. Brenda has 10 years of experience teaching English as a second language to 7th to 9th graders using technology. She has also taught software and educational technology to student teachers. More recently, she has co-facilitated online learning in hypermedia and education, computer-mediated communication and research issues in distance education.

Contact Brenda at bil2001@columbia.edu



Lin Lin is a doctoral candidate in Instructional Technology and Media at Teachers College Columbia University, where she has also taught graduate courses and worked as Manager of Faculty Support for distance learning and instructional design for over three years. Lin's research interests include communication, instructional technology, adult and online learning. Lin has presented and written several papers in the above areas, most recent of which is, "Psychological type and asynchronous written dialogue in adult learning" to be published in the coming issue of TC Record.

Contact Lin at lin@tc.columbia.edu

Editor's Note: Business and industry has adopted distance learning in its many forms for flexibility in scheduling, uniformity of training, and economic advantages. There is little reason to question its viability except for one fact. When budgets are tight, training is an easy target if it does not promote competitive advantage or the bottom line. With alternatives to training such as outsourcing, the question is again raised whether training programs, even distance training programs, can be sustained.

Can Interest in Distance Training be Sustained in Corporate Organizations?

Zane L. Berge and Adrian A. Kendrick

Establishment of distance training solutions in corporate organizations has increased on a large scale all around the world. This is especially true among organizations that have employees and clients scattered in various locations around the globe. The implementation of distance training is an effective tool for reducing training cost, saving time, and creating a more knowledgeable and productive workforce. Even so, implementation of distance training in corporate organizations is moving at a relatively slow pace (Lane, n.d.; Portway & Lane, n.d.). One theory is that many organizations just do not have the internal expertise to properly plan for the change in learning paradigms. Other organizations find it difficult to foster wide scale interest and now struggle to maintain their distance training program.

The purpose of this article is to analyze various obstacles that stifle interest in sustaining distance training in corporate organizations. The secondary purpose is to develop some possible solutions that can be used by organizations to implement and maintain distance training programs.

In this article, *a distance training program is defined as an organizational process, consisting of policies and procedures specific to departments' or divisions, functions and responsibilities* (Schreiber and Berge, 1998). The following questions are explored:

1. How does the philosophy of education/learning in an organization affect the sustaining of distance training?
2. How can corporate organizations develop an infrastructure to support Distance Learning?
3. What is the role of leadership in maintaining interest in Distance Education Training?
4. How can corporate culture influence the sustaining of distance training?

Philosophy of Education and Learning

The ability to sustain distance training is deeply rooted in the successful adoption of technology, workplace learning, and the sharing of information. The development of an organizational philosophy that supports technology, life long learning and change can lay the foundation for supporting distance training. Organizations must not only establish a philosophy that uses technology but one that also supports equal access to course materials, updated information, maximizing resources, and promotion of learning that will support organizational objectives.

During the initial planning stages the organizational philosophy can produce answers concerning the rationale for implementing distance learning. The philosophy of an organization will have an impact on the success of distance training in planning, funding, equipment, staffing, and development. Simply put, the organizational philosophy establishes the level of commitment the organization has for distance training and the professional growth and development of the organization and employees.

Using Technology

Many organizations already have access to new technological advances. However, the organization is responsible for determining if current technology infrastructure can support and sustain distance learning. Development of a strong technology infrastructure must be part of the organization philosophy. This requires the organization to support technology, technical expertise and the use of new and innovative technologies. It is difficult to keep up with the fast pace of technological change (Cho and Berge, 2002).

Many instructors lack the knowledge and skills to design and teach distance learning courses, yet their organizations do not provide education opportunities or a support staff to assist them to develop distance learning course materials or provide distance learning training.

Technology will change and require constant updating. If the organization's philosophy does not support technological change it is unlikely that the organization will continue to fund the distance training program over other organizational interest. This will make it very difficult for the organization to stay competitive. The philosophy must support the use of new technologies to maximize the impact of distance training. The organization's support of the use of technology in the learning process will be instrumental in removing employee fears about using advance technology. Instructors fear that increased use of distance learning technologies may decrease the need for teachers. Thus, feeling intimidated by technology may threaten an instructor's sense of competence or authority (Berge, et al. 2002). Either or both of these psychological factors may lead faculty to feel that their job security is threatened.

Providing Access

The use of technology can provide quick access to course materials and allow the free exchange of information to enhance learning. To be effective, an organization's philosophy must support easy access to technology, course materials, and updated information throughout the entire organization. This in turn will sustain interest in distance training. Many organizations that provide distance training do not provide equal access to training sites; others make access difficult. To sustain interest, employees need access to training solutions on demand.

Maximizing Resources

Organizational philosophy must include the desire to maximize the use of resources to implement and sustain distance training. These include human resources, funds, equipment, partnerships and collaborations. It is important that organizations use these resources properly to gain the maximum benefit in meeting organizational objectives and boost their Return on Investment.

Communicating the Philosophy

Often the organization's philosophy concerning training is not communicated beyond senior leadership. This can create a barrier between leaders and other staff members down cultural lines. Communicating the organizations philosophy on education and learning requires competent personnel that have a solid understanding of the numerous cultures operating within the organization, the organization's mission and philosophy, and the organizations desire to offer distance training at all levels of the organization. Knowledge and understanding of the organization philosophy is directly related to work, production, organizational representation, information distribution, receptiveness of personnel, and impact realized on employees and the organization. Distance training signals what the organization and instructors do, while distance learning indicates what the learner does. (Berge, 2001 pg.16)

The development and implementation of a strategic plan will generally bring together representatives from various areas of expertise to make decisions related to the organizational mission, and to establish training needs for stakeholders. Members are generally made up of senior management, communication staff, technology, member services, and financial

management areas. Building blocks of a strategic plan consists of goals, policies, programs, actions, decisions, and allocation of resources that define the organization. (Knox, 1993 pg. 33)

The resulting objectives put the strategies into measurable and qualitative terms; they are the basis for the development of action plans. This is extremely important for organizations entering into stage three and four of technological maturity. It is at this point that the organizational philosophy, policies, and procedures can have the greatest impact on organizational change.

In a survey of distance trainers, Berge and Kearsley's (2003) asked *what are the biggest obstacles or issues associated with sustaining e-learning in your organization*. Of those listed, the most important areas of concern were: 1) finding and retaining e-learning staff, 2) identifying what training needs can best be met by e-learning, 3) creating and maintaining interest in e-learning, 4) lack of consistent direction, support, or involvement from management or senior management, and 5) keeping up with rapid changes in technology.

After analyzing the results of their study, the primary focus from an organizational perspective should be how to sustain leadership interest in distance training. Leaders should be responsible for sustaining the interest of the line employee in their respective departments. The organization's objective should be to ensure that all leaders buy into the value of distance training. Organizations must develop leaders that can champion the cause of distance training by:

1. Develop partnership and collaborations with other organizations.
2. Provide training programs that support the professional development of the leaders at all levels.
3. Provide training and access a wide array of resources where management and their employees can learn according to their own cognitive styles.
4. Provide management with sense of structure, and provide access to as much instructional and technical support as possible.
5. Seek new and innovative technology, stay informed on the newest developments in Internet or Intranet applications, and determine which ones might be suitable to sustain the distance training program at various levels of the organization.
6. Provide funding to allow management to continuously seek a highly qualified staff to maintain a high level of internal expertise and seek outsourcing help when practical.
7. Create policies that support professional development and organizational growth.

The development of a strong culture that supports distance education and training will allow organizations to develop policies and procedures that will enhance distance training efforts and assist in developing and sustaining infrastructure needed to support the *constant changes of technology*.

Developing and Sustaining the Infrastructure

Developing and sustaining an infrastructure that can foster interest in distance training requires effective supporting structures that can make the delivery of learning solutions possible. Sustaining distance training requires interest from personnel at every level within the organization and in some cases those external to the organization. Distance training relies upon the dynamic expertise of a committed and talented staff in roles that can sustain long-term interest in distance training. As businesses continue to grow and meet the challenges of a global market and meeting the demands of their customers, the need to increase the skills and knowledge of employees becomes more important to maintain a competitive edge. Corporations have found that independent, self-directed learners are extremely cost effective and allow the organization to benefit from the immediate impact of new employee skills and knowledge.

While this seems easy, many organizations have found that getting everyone on board requires the application of human resources and systems technology, while gaining a broad understanding of organizational culture and how value is placed internally and externally to the organization. Shepherd (2002) found that “many organizations do not have the skilled personnel, or infrastructure to successfully overcome cultural resistance to enthusiastically support new training solutions. However, today’s corporate training climate finds the cost savings, streamlined training, and instant return on investment too attractive to pass up.”

Corporate organizations of all types and sizes have found distance training to be a viable solution for their organization. The *American Society of Training and Development* (ASTD) pointed out that the investment in learning on the job has contributed to more than half of the nations increase in production over the last thirty years. Through investment of human capital and strategic development, companies are able to use technology more efficiently and development more effective employees who are able to solve problems using creative solutions.

IBM restructured their education and training program in 1984 with the goal of creating a highly trained competitive work force. However, the primary question they wanted answered was, did IBM possess a training department that is adequate for preparing a competitive workforce for the future. Management training is a critical business issue at IBM, and is part of its strategy for adapting to a changing economy. IBM asked researchers from Harvard University to conduct a study of its training program. When the managers were asked which method of delivery they wanted, most of them selected in-person, classroom learning. After participating in the e-learning based training, however, most of the managers selected the e-learning model as their favorite.

The support of senior leadership is key to sustaining distance training. Leadership must understand how distance training can assist them in meeting the organization’s objectives. This is necessary to build and support an infrastructure that will bring about organization maturity to support wide spread change toward distance training.

The first strategy many institutions adopt is to put in place the technology infrastructure (Waller, 2003). The technology infrastructure however, has several elements that are equally important and must be linked to the organizations overall strategy in sustaining a distance training in the corporate culture. These elements are 1) physical, 2) human support, 3) funding the technology, 4) assessing the adequacy of technology, and 5) the relationship between technology infrastructure and academic planning (Bates, 2000 pg.76-80).

In the case of IBM, the physical element, which includes desktops or laptop machines and mainframes or servers, were already in place. Therefore, additional attention was placed on the human support element of building a technology infrastructure, which is far more important in building organization maturity and key to maintain interest in distance training.

During the first stage of technology maturity it is suggested that organizations conduct separate or sporadic distance learning events (Berge, 2001, pg.15). IBM first focused on the leadership of the organization by developing a four-tiered e-learning program. The training content was offered online, was accessible at any time and was delivered via the company Intranet. A primary purpose of the program was the transfer of information and the communication of basic concepts regarding what it takes to be an IBM manager. Additional tools accessed in these tiers include: performance support; access to a massive database of questions; sample scenarios to address common concerns such as evaluation, retention and conflict resolution; access to interactive learning models with more than a dozen simulations; and collaborations using Lotus Learning Space, allowing students to interact and solve problems as a team. IBM's initial training methods represent an example of separate and sporadic training, allowing the organization to foster champions among management during the early stages of organization maturity and get more productivity from the physical and human elements of the technology infrastructure. These efforts can be used as building blocks for stage two and three of organization maturity.

To develop and sustain interest in distance training, organizations must demonstrate the willingness to hire the appropriate staff and increase existing staff competencies to increase the technical expertise that can support the infrastructure needed to sustain a distance training program. Organizations that are willing to provide consistent funding for computing and communications technologies can ensure updates and changes are made that target the specific training and technology needs of the organization. This also can assist in the easy integration of training into the work process. This may require the use of outsourcing and the use of materials created by vendors or materials created through other partnerships and collaborations.

The Funding Element of the Technology Infrastructure

Evaluation plays a key role in sustaining distance training by providing required statistical data and reports to verify budgets, desired outcomes, and financial accountability. Finance professionals ensure that decision-makers have reliable, timely information to make critical training decisions. They should provide accurate reports to internal and external supporters relating training and productivity. This critical role enhances the quality, reliability, and responsiveness of the distance training program to keep up with rapid changes in the marketplace and in technology. Many organizations interest in distance training is limited to potential cost savings for training personnel. Finance personnel can provide information that will allow the organization to analyze the effectiveness of the program, implement additional spending, or determine spending priorities. Data produced by finance personnel can foster increased interest and support for distance training among management and other supporters in the organization.

The Role of Leadership

The role of the organization in sustaining distance training is extremely broad and encompasses an extensive list of issues and concerns that can act as obstacles to sustaining distance training. Just as important, if not more important, is the role of leaders at every level of the organization. Leadership must be willing to respond to the massive changes that the organization will undergo when implementing and sustaining distance training. It is imperative that leaders manage change and be prepared to lead future change efforts as well. This requires leaders to develop learners within their departments who have a motivation for learning for themselves, their department, and the organization, and are willing to champion the cause of distance learning. The leaders that are developed from a sound strategic plan will be characterized by a shared vision, systems thinking, and team learning. It is incumbent upon those leaders to stimulate active participation from their employees by reinforcing the use of new learning theories, new and innovative technologies, and organizational change. This is where the true cultural battle takes place, in the trenches of the organization. For distance training to be successful, the culture must recognize learning as a valued part of what people do and a productive activity, not a waste of time (Rosenberg, 2000).

Training managers must design and develop effective instructional materials based on a systems model of design and evaluation, and integrate adult learning principles throughout their course and program designs. They must also facilitate individual, group, and organizational learning and change, which may require providing flexibility among various corporate cultural issues that affect the design, delivery and evaluation of instruction. The goal of management is to create an environment that encourages learning as a valuable activity of the business supported by senior managers who are truly engaged in the process (Rosenberg, 2000).

Obstacles that could be directly linked to failures in the leadership of the organization include:

1) identifying what training needs can best be met by e-learning; 2) misconceptions about e-learning that result in under use or overuse; 3) need for instructor acceptance of e-learning; 4) getting employees to make time for e-learning; and 5) lack of consistent direction, support, or involvement from management or senior management (Berge and Kearsley, 2003).

Additional requirements by leaders to foster and maintain interest in distance training include:

1. Being accountable for their employees' training.
2. Promoting a unified department.
3. Including time for training during work activities.
4. Continued involvement in distance training initiatives.

The Influence of Corporate Culture

The corporate culture can have a tremendous impact on the sustaining of distance training. These influences can be negative or positive when seeking wide spread acceptance of distance training solutions. In cases where distance training has already made a positive impact, the negative cultural influences may be minimal. The culture that has already seen the positive impact of distance training is more apt to be open to future changes and champion future initiatives.

Organizations that find an excepting culture for distance training must seek to capitalize on this culture during the implementation process and find the right staff to champion the cause. This is especially true with organizations that operate over large geographical areas. In organizations where distance training is new to the organizational culture it requires a much broader approach. The negative impact of a culture that doesn't embrace distance training can be devastating to any training initiative regardless of how great the technology infrastructure is or how much funding support has been placed into the training initiative.

Cho and Berge (2002), found that factors of organizational change include technical expertise, support, and infrastructure are the most frequent and influential barriers encountered. Their analysis determined the most effective way to change the organizational culture is to educate and find champions among the corporate executives. Organization's policy makers must know what the ideal outcome of distance training should be. Organizations want to do the same training for less money while improving quality. This means, increasing effectiveness and making training more accessible to everyone. E-learning can contribute a great deal to this but only if it is part of an overall learning strategy. Learning at a distance is not easy for many students. The isolation from both the teacher and other students, the unfamiliar format and the need to self-pace their learning can be discouraging. To tap into the various organizational cultures the student must ultimately feel a part of the community of learners and share ownership into the over all success of the organization. What will drive change and growth in distance learning? It will be the policies and support from leaders. Success will have to include many of the techniques used to build a successful business to include effective marketing, highly reliable distribution, quality assurance, and the ability to quickly adopt to what works and quickly drop what does not (Strehle, 2000).

Evaluation

Another important area for maintaining is assessment and evaluation.

The best plan for implementing distance training may not be the best plan to sustain the program. To properly assess and evaluate the distance training program the organization must maintain clear and consistent goals. While saving money is important to the organization this should not play an important role in measuring effectiveness, roles and learning. A program evaluation should include specific components that relate to technology-mediated delivery, separate and apart from the more traditional methods that rate the instructor' performance and perceived worth of the content delivered (Berge, 2001 pg. 21).

To sustain interest in distance training the organization must use evaluation methods that measure quality and effectiveness as determined by the organization during the strategic planning process. Included in the evaluation process should be the most important asset, the instructors and students who are the nucleus of the distance training program. Their input concerning the effectiveness of the program can provide the organization with information to enhance the training process and foster cultural acceptance that can help sustain distance training.

Conclusion

Can interest in distance training be sustained in corporate organizations? Previous research suggests that interest in distance education can be sustained, however, the ability to sustain distance training is deeply rooted in the success during the early stages of implementing distance training and the integration of the work and learning environments.

Organizations must be proactive and identify those issues that act as barriers to their distance training efforts. Organizations can sustain distance training by understanding where they are in the stages of technological maturity, developing a comprehensive strategic plan, developing a sound technology infrastructure to include the various infrastructure elements, and building strong leaders to champion their initiatives and philosophy of education and learning.

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About the Authors

Zane Berge, Ph.D. is Associate Professor of Education at UMBC in the Training Systems graduate programs. His teaching and research is in the area of distance training and education. Email: berge@umbc.edu.

Adrain Kendrick is currently a Graduate student at the University of Maryland, University College and is the lead Instructor of Explosives Safety Training at the Business Logistics and Support Division in Jacksonville, NC. Email: akendrick@cox.net.