INTERNATIONAL JOURNAL OF INSTRUCTIONAL TECHNOLOGY AND DISTANCE LEARNING

March 2008
Volume 5 Number 3

ISSN 1550-6908

PUBLISHER'S DECLARATION

Research and innovation in teaching and learning are prime topics for the *Journal of Instructional Technology and Distance Learning* (ISSN 1550-6908). The Journal was initiated in January 2004 to facilitate communication and collaboration among researchers, innovators, practitioners, and administrators of education and training involving innovative technologies and/or distance learning.

The Journal is monthly, refereed, and global. Intellectual property rights are retained by the author(s) and a Creative Commons Copyright permits replication of articles and eBooks for education related purposes. Publication is managed by DonEl Learning Inc. supported by a host of volunteer editors, referees and production staff that cross national boundaries.

IJITDL is committed to publish significant writings of high academic stature for worldwide distribution to stakeholders in distance learning and technology.

In 4 years the Journal has over 2.5 million page views and 500,000 downloads of monthly journals and eBooks.

Donald G. Perrin, Executive Editor

International Journal of
Instructional Technology & Distance Learning

Vol. 5. No. 3.

ISSN 1550-6908

Table of Contents – March 2008

Editorial

The Evolution of Distance Learning

Elizabeth Perrin

The evolution of Distance Learning as a necessity, a philosophy, a burgeoning technology has transformed education as completely as Ford, the Wright Brothers, and a myriad of inventions have transformed the time/ space continuum for the peoples of the world.

Immediacy of contact and exchange does not guarantee quality of learning or performance. Those of us within the evolving Distance Learning phenomena must be committed to continual evaluation of the quality and quantity of learning experiences and outcomes. We must ensure relevance, motivation, and adaptation to the learner and real world needs. We must employ best practices and effective tools to assess, design, disseminate, implement, evaluate and manage learning to meet the needs of the learner in the 21st century.

Editor's Note: Research wise, it would be of interest to redesign and update the TICKIT program as suggested by the authors. In the decade since TICKIT was designed, changes in access and configuration of teaching technologies for students, rural or not, have been exponential.

Professional Development that Increases Technology Integration by K-12 Teachers:
Influence of the TICKIT Program

John B. Keller, Emily Hixon, Curtis J. Bonk, Lee H. Ehman

USA

Abstract

This study investigates the impact of a professional development program on the reported technology integration practices of rural Indiana teachers. Teachers who had taken part in the year-long technology integration program, *Teacher Institute for Curriculum Knowledge about Integration of Technology* (TICKIT), were asked about their technology integration practices. Their responses were compared to those from teachers who had been selected for but had not yet taken part in the program. Practical and statistically significant differences were found between the two groups favoring those who had participated in TICKIT. The findings are considered in the light of current research on effective professional development as well as recent technology trends such as the recent opportunities of the Web 2.0. The impact of the program is discussed relative to other technology integration factors identified by the teachers. The paper concludes with recommendations and implications of the results for various audiences including teachers, administrators, and policy makers.

Keywords: professional development, technology integration, reflective practice, university/K-12 partnerships, action research, rural education.

Introduction

Computers are an increasingly pervasive component of K-12 learning environments. Gradually, the emphasis of investigations about computers in education has shifted from a focus on student-computer ratios--reported to be 7:1 just a few years ago (U.S. Department of Education, 2002)--to determining if and how computers are being used by teachers and students in school settings.

Research suggests that there is a strong tendency for technology to promote standard and traditional teaching practices (Becker, 2000; Cuban, 1986, 2001). As Cuban (2001) reports in his book *Oversold and Underused*, access to technology across educational settings has not proven to be instrumental in changing teacher practice. The federal government, in fact, is now funding large scale efforts to explore how the integration of educational technology is taught in teacher training programs (Gammill, 2007; Kleiner, Thomas, & Lewis, 2007).

In the recent shift from access to use, the professional development of teachers is seen as the vital nexus between the presence of classroom computers and instruction that takes advantage of them (Burns, 2002; Mouza, 2003). The importance of high-quality professional development opportunities for teachers in rural and urban areas is especially important in closing the digital divide. Lawless and Pellegrino (2007) note that "the digital divide could actually widen over time with the increased investment of technology in schools unless urban and rural K-12 educational settings attract and maintain a teaching force equipped to use technology effectively in support of student learning" (p. 578). This study reports the teacher-perceived impact of one program

focused on helping teachers in rural Indiana settings improve their technology integration practices.

New Visions of Professional Development

While the importance of professional development related to effective technology integration has been demonstrated (e.g., Burns, 2002; Mouza, 2003), not all professional development opportunities are equally effective. Newer approaches to professional development in K-12 education involve a shift from traditional to more progressive views of teaching. In his book, *Designs for Learning*, Bredeson (2003) notes that these new ideas of professional development require a transformation that will not be easy:

Redesigning professional development into a new architecture for career-long growth and development in schools will not be easy. Everyone is in favor of improvement in professional development; it is changing professional development as they know it that bothers them. Changing the paradigm requires rethinking, restructuring, and reculturing professional development . . . Changing the paradigm of professional development requires a vision of where we want to be and what it should look like (p. 17).

To promote change and guide the design and implementation of effective professional development opportunities, researchers have identified specific principles and features of effective professional development models consistent with progressive views of teaching and learning (Ehman, Bonk & Yamagata-Lynch, 2005; Guskey, 2003). Some of the key strategies are noted below.

Features of Effective Professional Development

In a review of nearly a decade of studies related to effective principles of teacher professional development programs, Guskey (2003) found twenty-one characteristics or traits that were shared among the myriad lists. However, he also found a lack of common agreement related to what "effectiveness" actually means. Such lack of agreement or consensus on effectiveness is, of course, a primary inhibitor for replication and change within teacher professional development.

Despite such variation and limited alignment of effective principles of professional development, Garet, Porter, Desimone, Birman, and Yoon (2001) present a research-based model that identifies critical factors regarding the design of professional development that changes classroom practice and further suggests how these factors relate to one another. Their research revealed six features that contribute to the effectiveness (i.e., positive change in teacher practice) of professional development. In a model based on a national data sample of math and science related professional development supported by the Eisenhower Professional Development Program, Garet et al. (2001) identified three structural features and three core features that contribute to effective professional development (See Table 1).

Structural features of effective professional development experiences include form, duration, and collective participation. Structural features that establish the context for effective professional development are reform-oriented activities that encourage collective participation and involve significant amounts of time over an extended period.

Core features of effective professional development include a focus on content, active learning opportunities, and coherence. When structural components of professional development are in place, they create a context supportive of the core components of professional development. The core features lead to change in knowledge and skill and ultimately to change of practice. The work of Garet et al. (2001) is certainly not the final word on professional development in K-12 settings but it does provide a model that explains which, among the many features and principles urged in the literature, are necessary for professional development to be effective. As such, the

model provides the rationale and guidance for those making research-grounded decisions about the designs of professional development experiences.

Table 1

Key Features of Professional Development (based on Garet et al., 2001)

	Components	Description
Structural	Form	Reform vs. traditional (study groups or networks vs. workshops or conferences).
	Duration of experience	Number of hours and span of time.
	Collective participation	Participation by established groups (same school, grade, department vs. educators from various schools).
Core	Content focus	Professional development aimed at increasing disciplinary knowledge.
	Active learning	Meaningful analysis of teaching and learning (examining student work, getting feedback on teaching).
	Coherence	Degree of consistency between professional development and teachers' goals, standards, and opportunities for continued professional communication.

Context for the Study

When examining the effectiveness of professional development programs, Lawless and Pellgrino (2007) emphasize that any such research "must take into account the nature of the professional development program design with respect to features known to make a difference" (p. 582). This section presents a description of the professional development program being examined in this study and a discussion of how its design relates to the principles and features of effective professional development programs.

The *Teacher Institute for Curriculum Knowledge about Integration of Technology* (TICKIT) (Bonk, Ehman, Hixon, & Yamagata-Lynch, 2002; Ehman, Bonk, Keller, & Lynch, 2002, Ehman et al., 2005; Keller et al., 2005; Yamagata-Lynch, 2003) served groups of teachers in rural central and southern Indiana schools, with the goal of helping them design technology infused lessons for use in their classrooms. The overall design of TICKIT included many of the features and principles of effective professional development models discussed earlier. Teacher growth in the use of technology was grounded in the classroom practices of each teacher. Throughout the academic year, TICKIT teachers were helped to connect their learning to their immediate context.

The broad design of the TICKIT program was consistent with the model of effective professional development features outlined by Garet et al. (2001). Because TICKIT was a reform-type activity, extended over an entire year, and was cohort-based, it aligned well with all three key structural features of the Garet et al. model as depicted in Table 1.

Cohorts of four to six teachers from four to six schools (approximately 25 teachers) participated in the Institute each academic year (2 semesters). The cohort approach maintained an emphasis on collaboration and helped ensure ongoing support for participants and their non-TICKIT colleagues even after they completed the program; such components are critical aspects of effective professional development (Hawley & Valli, 1999). Similarly, participating in a cohort encourages intellectual, social, and emotional engagement with ideas, materials, and colleagues (Little, 1993).

In addition to employing cohorts, the TICKIT program also aligned well with two of the three core features of Garet et al.'s (2001) model (Table 1). More specifically, the program was content-based as well as characterized by active learning on the part of each teacher. The action research that each TICKIT teacher conducted was based on his or her design, implementation, and evaluation of a technology integration project in his or her content area.

Participants of the program were enrolled in six hours of graduate study and were required to complete a number of activities including reflection papers, article critiques, various online activities (e.g. debates, chats, and reflections), project reports, presentations at a professional conference, and local reports to colleagues along with give-back projects designed to benefit local schools. These activities were designed to ensure that participants first had a solid theoretical base for the more practical application of their ideas in their classrooms. This focus on theoretical knowledge is one of the principles identified by Hawley and Valli (1999) and it encourages engagement in inquiry and freedom to express "informed dissent" that Little (1993) recognized as valuable components of progressive professional development models.

To maintain a focus on the practical application of these ideas and further support an emphasis on classroom-based inquiry and the evaluation of multiple sources of information, teachers participating in TICKIT had to complete two technology integration projects (one each semester) and report on the results of the projects to their TICKIT peers (Keller, Bonk, & Hew, 2005; Keller, Ehman, & Bonk, 2003). Teachers based their reports on action research that they carried out during their implementation of the technology-supported lesson or unit. Reports included a strong emphasis on teacher reflection and discussion of the student data that they had collected during the use of their technology-supported lesson or unit. As pointed out in a recent report from Lawless and Pellegrino (2007), the "design-based component" of professional development programs where teachers are given "the opportunity to learn how to use specific technologies situated in the context of their curricular needs"(p. 594) has been shown to be a key component in effective professional development programs.

TICKIT emphasized the role of participants in planning the Institute to ensure that its goals, content, and structure met real needs. Teachers came to Indiana University three times for a total of four days of workshops, with the remaining interactions occurring online and during TICKIT staff visits to the respective schools. Although time-consuming for TICKIT staff (since they made multiple visits to multiple schools that could be up to three hours away from the university), the school visits were vital to maintaining a focus on the overall context or classroom situation of each teacher. During these school visits, the TICKIT staff members led workshops addressing the specific content and skills requested by the teachers. Prior to the school visits, TICKIT staff members researched the school environment, focusing specifically on the technology equipment and support available to teachers. Assessing the technological environment ensured that TICKIT staff members were able to provide relevant and accurate information to teachers, but equally important, it forced TICKIT participants to make connections with the appropriate support personnel in their buildings and/or districts.

Methods

This study examines the effect TICKIT had on teachers' perceptions of their ability and decision to integrate technology into their teaching. A survey was administered to assess and compare the levels of perceived technology integration of teachers who had been through the program (TICKIT Completers) and teachers anticipating enrolling in the program (TICKIT Applicants). Comparing these populations controlled for teacher interest in participation in professional development focused on technology integration.

Respondents

Over the five years of the program, teachers from 18 different school districts participated. There were 25 cohorts of teachers averaging five teachers per cohort. Four school districts had teachers in TICKIT multiple years. The school districts were relatively small and all located in rural central and southern Indiana. The districts' total student enrollment in all grades ranged from 592 to 3,792, with an average of 1,889 students (note: the median size of an Indiana school district in 2005-2006 school year was 1,722 students). The smallest combined junior/senior high school had an enrollment of 286 students, and the largest high school had 1,179. About half the schools received state technology grants that paid for all or part of the school's share of teacher costs (about $1,200/teacher) in TICKIT. As a condition of participating, schools had Internet-connected, modern computers for each teacher in their classroom, student computer labs, and e-mail systems and dedicated or ISP leased Web servers for teachers' work.

Teachers

Two groups of teachers (n=133) were compared in this study. TICKIT Completers were teachers who had participated in the program (cohorts from 1998-99; 1999-00; 2000-01; 2001-02). TICKIT Applicants were those teachers who were going to participate in the program (the cohort of 2002-2003). Over the course of the TICKIT program, several teachers dropped out for both personal and professional reasons. With the exception of the 2000-2001 cohort when all teachers completed the six credit hour institute, each year's cohort lost between one and four teachers. Given continual refinement of TICKIT, it was not too surprising that the final three years of TICKIT experienced fewer drop-outs than the first two years.

Participants responded to a survey comprised of two parts. The first section created by the TICKIT staff (see Appendix A) asked questions about demographics, changes in teaching practice, and their TICKIT experiences. Items in this section included forced choice, free response, and Likert-type questions. Examples of questions asked in this section include:

- From which individual do you seek primary guidance, information, and/or direction relating to the integration of technology into your curriculum?
- Describe one or two ways that you use or have used technology in your classroom that have the most impact on student learning.

Formatted: Bullets and Numbering

The second section of the survey contained 50 questions from the Levels of Technology Implementation (LoTi) questionnaire developed by Moersch (1994, 1995, 2001) (see Appendix B for a list of the questions asked). Choices on each question on the LoTi instrument ranged from 0 to 7 on a continuum from "not true of me now" to "very true of me now." Examples of questions asked in this section included:

- I use my classroom computer primarily to track grades and/or answer email.
- My students use the Internet for collaboration with others, publishing, communication, and research to solve authentic problems.

Formatted: Bullets and Numbering

Levels of Technology Implementation (LoTi) Questionnaire.

The idea behind LoTi is that as people adopt an innovation (e.g., technology in teaching), they progress through various levels of adoption marked by varying concerns. The idea was originally promoted by the work of Hall and Hord (1987) in their concerns-based adoption model (CBAM).

Because one of the most prevalent innovations to impact schools in the past years has been the infusion of computer technology, the notion of stages of adoption with respect to technology has been of some interest to those promoting educational technology use in schools. Prior to the development of the LoTi instrument by Moersch, the work of Dwyer, Ringstaff, and Sandholtz

(1990, 2000) suggested that teacher progression through the innovation-adoption cycle follows a sequence of stages. The interest in determining a teacher's stage of technology adoption comes from the notion that this knowledge can be used to address and overcome teacher concerns particular to that stage.

The LoTi instrument was designed to assess the level of a teacher's technology use along a continuum of eight levels[1] as well as Personal Computer Use and stance toward Current Instructional Practices. In all, the instrument was reported to contain 10 subscales (eight levels of technology integration, one for Personal Computer Use, and one for Current Instructional Practices) of five items each.

When the questions comprising the eight subscales corresponding to levels of technology integration were analyzed, only three of the eight scales achieved a reliability of 0.6 or higher. Because 0.7 is a generally accepted minimum reliability (Fraenkel & Wallen, 2000), the original eight "levels" were abandoned and a factor analysis that yielded three major factors was conducted. These three factors were: (1) technology integration, (2) technology limitations, and (3) technology resistance (see Appendix B for a list of questions contributing to each factor). In creating these factors, we eliminated items that did not load decisively (0.4 or higher) or fit conceptually with a particular factor (Questions 11 and 17 loaded on Factor Three but were eliminated because of their lack of conceptual coherence with the factor). When complete, the reliabilities of the three factors ranged from 0.66 to 0.93 (see Appendix B for the loadings of each question). The scale scores for each respondent on each of the factors were then compiled. These scores were used in comparisons between TICKIT Completers and TICKIT Applicants.

The remaining two subscales of the LoTi instrument, Personal Computer Use and Current Instructional Practices demonstrated acceptable reliabilities. A factor analysis on these particular subscales of the LoTi instrument supported these two constructs and resulted in the elimination of one question that did not load decisively on either factor (see Appendix B). These two subscales were relabeled 'Computer Proficiency' and 'Learner-Centered Instruction' to better reflect the constructs being represented.

In the end, a total of five factors were identified instead of the original 10. The highest scale scores possible for each of the five factors were 126 (Technology Integration), 28 (Technology Limitations), 56 (Technology Resistance), 35 (Computer Proficiency), and 28 (Learner-Centered Instruction). A summary of the factors and their reliabilities are reported in Table 2.

Table 2

Reliabilities for Five Factors

Factors	Reliability
Technology Integration	.93
Technology Limitations	.78
Technology Resistance	.66
Computer Proficiency	.80
Learner-Centered Instruction	.79

[1] Although the levels of the LoTi range from Level 0 to Level 6, Level 4 was split into Level 4a and Level 4b yielding a total of eight levels.

Procedure

Surveys were mailed to the teachers with follow-up mailings sent to those who did not respond by the return date. The final return rate was 79% (Table 3).

Table 3

Survey Returns by Year

Cohort	Surveys Sent	Surveys Returned	Return Percentage
1998-99	25	16	64
1999-00	29	21	72
2000-01	30	22	73
2001-02	22	20	91
2002-03 Applicants	27	26	96
Total	**133**	**105**	**79**

Results

Computer Access and Demographic Information

The survey began with questions about computer access (Table 4) and teacher demographics. Teachers reported high levels of access to computers at home (93%). Similarly, TICKIT teachers' reported high access to the Internet; in fact, 100% of TICKIT teachers had access at school and 85% also had access at home. It is important to note, however, that schools accepted by the TICKIT program had to meet some minimum technological requirements due to the nature of the courses, and, therefore, are probably not representative of all small rural Indiana schools.

Table 4

Teacher Access to Technology

Survey Questions	Percentage "Yes"
Functional multimedia computer and printer at home	**93**
Functional multimedia computer and printer in classroom	**99**
Internet connection in the classroom	**100**
Internet connection at home	**86**

(n=105)

Demographic data revealed that teachers also entered TICKIT with a range of technology competency. Teachers also varied in their years of teaching experience from two to thirty-six years with an average of 11.5 years.

Levels of Technology Implementation

Significant differences favoring the TICKIT Completers over the TICKIT Applicants were found for each of the five factors assessed by the questions from the LoTi instrument (see Table 5).

Table 5

Comparison of TICKIT Completers and TICKIT Applicants on Five Factors

Factors	Means		t	Sig.	Effect Size[a]
	TICKIT Completers[c]	TICKIT Applicants[c]			
1. Technology Integration	74.05	38.25	7.663	.000***	1.81
2. Technology Limitations	11.60[b]	15.79	-3.281	.002**	.63
3. Technology Resistance	4.37[b]	7.91	-3.143	.003**	.80
4. Computer Proficiency	25.51	18.84	4.614	.000***	1.20
5. Learner-Centered Instruction	18.29	12.40	5.120	.000***	1.22

**p< .01 ; ***p< .001

[a]All effect sizes favor TICKIT Completers

[b]Lower scores on factors two and three indicate more positive responses

[c]The 'n' for each comparison varies due to incomplete data. We used list-wise deletion of missing data (Completers n=66-77; Applicants n=18-20)

To give some perspective to Table 5, the highest scale scores possible in each of the five categories were 126, 28, 56, 35, and 28, respectively. For the first factor, "Technology Integration," teachers could have obtained a score between 0 and 126. TICKIT Completers scored slightly higher than half of the total score, which, on a scale of 0-7 would be 3.5 corresponding to "somewhat true of me now."

The constructs underlying each of the factors that we have identified are not hard-edged. For example, teachers are unlikely to be entirely lacking or entirely in possession of any one of these factors, thereby making the extreme scale scores highly unlikely. As a result, the practical range of the scale scores of these factors is likely smaller than the theoretical range. Also, there is not an equal interval that communicates discreet differences between teachers who vary on these factors. Nevertheless, the TICKIT Completers consistently report practices and dispositions that are more frequent and favorable to technology integration than the self reports of the TICKIT Applicants.

Influences on Technology Use

To better understand the possible impact of TICKIT on teachers' attitudes toward technology and reported technology integration, respondents were asked to rank order the three most important influences on their use of technology in the classroom. The list of factors influencing technology use included various professional development opportunities (e.g., conferences, training, TICKIT, professional development other than TICKIT, etc.), personal interests, community and parental expectations, and monetary rewards (e.g., stipends, grant money, etc.) (see Table 6).

The findings revealed that more than 75% of the teachers indicated that personal ambition and interest in computers was a key influence (one of their top three choices) in their use of technology in the classroom. The next most important influence was the professional development opportunities of the TICKIT program, followed by in-school professional development as well as conferences and workshops outside the school system. A modest number of respondents mentioned the importance of peer support, curriculum expectations, and administrative support. Factors receiving surprisingly low importance ratings included undergraduate training, graduate training, and stipends.

Table 6

Self-Reported Influences on Teacher Technology Use (TICKIT Completers n=79)

Source of Influence	1st	2nd	3rd	% Ranking it in top 3
Personal ambition and interest in technology	34	16	12	78
TICKIT professional development	15	23	16	68
In-school professional development other than TICKIT	4	6	15	32
Conferences, institutes, and other external	5	9	8	28
Curriculum technology integration expectations	3	5	5	18
Peer teacher support	3	5	4	15
Administrative support	4	3	4	14
Graduate courses outside TICKIT	2	4	4	13
Parental and community expectations	1	2	3	8
Grant Money	0	2	2	5
Undergraduate training	0	1	3	5
Stipends	1	1	0	3
Other	5	2	1	10

Further help in understanding the relative impact of TICKIT was revealed in the teachers' responses regarding which individuals they turned to for help with technology integration concerns (Table 7). This table indicates that teachers tend to have a number of individuals from whom they seek technology-related help, but that they perhaps tend to seek help most frequently from those who are quickly and easily available such as other teachers as well as the local technology coordinator.

Table 7

Source of Technology Assistance

Source of Help	% Choosing as one of their choices
Technology Coordinator	76.2
Classroom Teacher	62.9
Student	14.3
University Professor	14.3
District Coordinator	10.5
Site Principal	8.6
Business Partner	1.9
Other (Internet, friends, family, other school personnel)	21.9

Discussion

When respondents were asked to identify the most important influences on their use of technology in the classroom, two of the top three influences were professional development activities (TICKIT and other in-school professional development opportunities). As discussed above, the design and structure of the TICKIT program incorporates many of the features and principles of effective professional development models, which could explain why it is frequently mentioned as a key influence on teachers' technology integration practices and attitudes.

The results of the LoTi questionnaire also support the impact of professional development, specifically the TICKIT program, on teachers' perceived integration and their ability to integrate technology into their teaching. Teachers who had completed the TICKIT program report that they exhibited more practices and dispositions consistent with effective technology integration than TICKIT Applicants. Similarly, the scores of TICKIT Completers indicated that they believe themselves to be more computer proficient and more knowledgeable about learner-centered instruction than TICKIT Applicants. Responses on the LoTi questions also suggested that TICKIT Applicants are more resistant to the use of technology and have more difficulty overcoming barriers related to the use of technology than those who have been through the TICKIT program. Each of these factors will be discussed in more detail below.

Technology Integration

The substance of the survey questions supporting this factor suggest general principles for determining degrees of technology integration including:

- Frequent/regular student use of computers.
- Technology is used to support good teaching practices and to foster learning. Effective instructional approaches with technology often take the form of project-based or thematic instruction.
- Students are given structured opportunities to learn with a computer rather than simply learning about them.
- A variety of current technology is used for a diverse set of learning tasks, some of which extend the boundaries of the classroom.

TICKIT Completers scored nearly two standard deviations higher than program Applicants on this factor (see Table 5). As discussed later in this article, there are no means to determine what part of the total variance between these groups is attributable to the TICKIT experience, but it is plausible that the year-long professional development experience which focused on technology integration played a direct and important effect in the self-reported differences in the practice of these teachers. This conclusion is supported by respondents' comments on the open-ended survey questions, such as:

- "I feel that my confidence has grown with using technology in my classroom and my students have benefited from this."
- "I use a wider variety of technologies. I am more effective in teaching students to utilize the Internet."
- "The skills I have developed have opened a new aspect of my profession."

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Technology Limitations

The technology limitation factor is primarily one of perceived access to technology. Problems of access range from simply not having enough computers for student use to inability to make old technology satisfy current needs.

TICKIT Completers viewed access to computers as less of a problem than TICKIT Applicants (11.60 vs. 15.79). While the difference was less dramatic than the technology integration factor, the effect size was substantial and statistically significant. Without assuming that participation in TICKIT can explain all of the difference, TICKIT may contribute in a number of ways. The intensive TICKIT experience helped teachers think about using technology. While this may seem obvious, our experience with these teachers suggested that the difference in the two groups on this factor may be explained partially by the increased ability of the TICKIT Completers to conceive of ways to use their limited resources. Furthermore, our experiences suggest that due, in part, to the TICKIT program, TICKIT Completers gained access to technology through grants that they wrote or simply by asking for technology that would better enable them to accomplish what they wanted to do pedagogically. This speculation is supported by a teacher's comment on an open-ended question: "By participating in TICKIT, I was able to observe how other teachers used the technology. Also by participating, my school system purchased equipment for me."

Technology Resistance

The factor related to technology resistance included technology use that supports only traditional pedagogy, reticence about computer use based on skill level or time constraints, and lack of perceived pedagogical value of computers and technology. While there was a large difference in such perceptions between the Completers and Applicants on the technology resistance factor, such differences were likely mitigated by the fact that a large percentage of both groups indicated that personal interest in and ambition to learn about computers was an important stimulus affecting their use of computers. Stated another way, the beneficial effects of TICKIT on technology resistance may not be as apparent with those who volunteer for such a program—a point which will be further addressed later. Hence, to see an impact with volunteer groups is notable.

If the TICKIT experience is responsible for some of the differences between the groups on this factor, it is likely that TICKIT lowers resistance by helping teachers broaden their pedagogical repertoire to include instructional methods supported by technology. As recognized by Little (1993) and Garet et al. (2001), collective participation and being part of a cohort may also help to further reduce resistance to technology by allowing participants to see what other teachers are doing and helping them create a vital support network that will be in place even after the program ends. A comment made by a TICKIT Completer reflected this perspective, "TICKIT gave five teachers time together to work on computer and related technology. Most importantly we now seek each other out for help and support."

The on-site school visits by the TICKIT staff may also have contributed in helping build a local support network for teachers that incorporated key personnel at their school and in their district since those individuals were consulted and included in the training opportunities. Consistent with the principles of effective professional development identified previously, professional development should be school-based and take into account the teachers' context and experience, thereby encouraging the collective participation identified as a key structural feature of successful professional development models (Garet et al., 2001). As respondents reported, they are most likely to seek assistance from their technology coordinator and other classroom teachers; therefore, building those connections is critical to their continued success.

Computer Proficiency

Computer proficiency is an index of one's general comfort level and confidence in using computers. Aspects of computer proficiency include mastery of basic skills and some facility with basic computer applications. One's sense of computer proficiency is also related to the ability to tackle and solve computer problems.

Not surprisingly, dramatic differences between the Completers and Applicants were evident on this factor. Much of the time in the introductory two-day TICKIT workshop and TICKIT school-based workshops conducted during the school year was spent on instruction on particular pieces of software (e.g. PowerPoint, Inspiration, Dreamweaver, etc.). Additionally, course interactions beyond the university and school-based workshops included those via e-mail as well as in chat systems and discussion forums within various course management systems (e.g., Blackboard, WebCT, the Virtual University, Oncourse, etc.). The use of such tools and systems required repeated and regular computer use. It is likely, therefore, that gains in computer proficiency were related to the technology integration factor since it is likely that increased facility with computers increases teacher willingness to use technology as a regular and integrated part of professional practice. A response to an open-ended question provides some insight on this topic, "The more exposure I have to technology, the more comfortable and able I am at pursuing it on my own."

Learner-Centered Instruction

This factor assesses teacher orientation to learner-centered classroom practice. Learner-centered instruction is characterized by attention to personal needs of students, lessons, and curricula that are in some measure responsive to student interests. It is also related to assessment strategies that are performance oriented (American Psychological Association, 1995).

TICKIT Completers demonstrated a much stronger disposition (18.29 vs. 12.40) toward learner-centered instructional practices. Again, it is critical to note that many intervening experiences and influences might explain the differences between the two groups. But the projects that TICKIT teachers designed and implemented in their classrooms tended to have many if not all of the features of learner-centered pedagogy. In the great variety of technology integration lessons (i.e., oral histories, WebQuests, virtual tours, electronic fieldtrips, and online simulations), there were frequently projects that promoted and capitalized on student interest while requiring them to assemble their own understandings and demonstrate those understandings through meaningful projects and presentations. Making no claims of causality, it can be argued that TICKIT supported and encouraged teachers to learn about and use technology to support their teaching. At the same time, they were also experimenting with and gaining experience in learner-centered instructional practices. Comments from two respondents support this argument:

- "TICKIT is a great incentive because I do not want to fail. I really want to make learning more interesting.
- "I want to be able to help provide the most challenging, interesting lessons for my students. As a result of this I need to keep current."

Formatted: Bullets and Numbering

While being cautious in the claims of the TICKIT programs' role in the substantive differences between the groups found in this study, it can be argued that whatever effect TICKIT did have was largely possible because of the voluntary participation of teachers who were interested and motivated to learn to use computers and to make them part of their professional practice. Professional developers and policy makers looking for a solution to the lack of technology integration among teachers would do well to note that although TICKIT is closely aligned with principles of effective professional development, much of its success is due to the fact that teachers who wanted to know about computers were helped to learn about and integrate computers into their practice. It would be naïve to assume that similarly designed programs could produce the same results in populations of teachers where interest in computers and motivation to learn about and to use them are normally distributed or noticeably lacking.

Limitations of this Study

Inferences drawn in this paper about the impact of the TICKIT program on teachers' attitudes and actions have several limitations. Generalization of the findings is limited because the sample is relatively small and non-random – the sample is composed of self-selected teachers who were most likely already interested in learning and applying knowledge and skill related to technology integration. Second, self-report data are used as the sole source. Sustained and systematic observation of teachers, for example, might add confidence in the measures. Third, using intact, non-randomly assigned groups for comparisons eliminates strong causal inferences. Nevertheless, the best available group to compare to those teachers who had completed TICKIT was used in this study; namely, teachers who had been selected for participation, but who had not yet experienced the program. A fourth problem relates to unequal group sizes in the comparisons. Although more conservative t-test involving the unequal variance assumption was used, a statistical weakness remains.

Finally, the most important limitation is the lack of student learning data. Whereas the intent of the TICKIT program was to impact teachers and their instructional practices, the ultimate goal of teacher involvement in the program was to increase student learning. No such learning data with which to examine this phenomenon of student learning and use of technology was available.

Recommendations and Implications

Given the current interest in teacher professional development as well as technology acquisition and use, it is not surprising that there are several implications that arise from this study. The findings here should interest researchers, teachers, administrators, and policy makers.

First of all, future research may wish to confirm the resulting subscales or perhaps extend this instrument in new directions. In fact, with the emergence of the Web 2.0 and associated opportunities for student participatory learning (Alexander, 2006; Downes, 2005), it might be advantageous to develop an entirely new instrument. Today, students are contributing to their own learning through hands-on activities such as digital storytelling, social networking, blogging (Lenhart & Fox, 2006), entering data or information into a wiki (Ferris & Wilder, 2006), playing online games (Kirriemuir & McFarlane, 2004), producing online radio shows in the form of podcasting (Deal, 2007), exchanging information with international colleagues (Crane, 2006; Lee & Hutton, 2007), and recording and posting YouTube videos (Battelle, 2007). In effect, students are content creators with technology, instead of merely browsers with it and users of it (Lenhart & Madden, 2005). It is imperative now to think about how emerging technologies can help schools and teachers foster the skills needed to not only survive in the twenty-first century, but to flourish (Cassner-Lotto, & Wright Benner, 2006). A revised instrument that addresses these new technologies and their broad instructional applications could be a valuable tool in helping educators adapt to the ever-changing technological landscape.

Research might also determine if the proposed TICKIT model (Ehman et al., 2002; Ehman et al., 2005) can be applied to other forms of teacher training or within less intensive endeavors. While the TICKIT program required teacher participation for a year, could similar results come from one-week training institutes? In terms of technology-based solutions, could online simulations be developed that contain aspects of programs such as TICKIT that might be made available to teachers across the planet, while being respectful of different cultural norms and practices? At the same time, could social networking technologies (e,g,, Facebook or MySpace) be employed to create communities of practice for teacher educators using such simulations or other online professional development components? And might still other technology-related activities with podcasts, wikis, and blogs add to or supplement those simulations for students while simultaneously helping to share, replicate, and further refine professional development programs

such as TICKIT? Given that the TICKIT program involves face-to-face training as well as online discussions and support, could enough features be effectively replicated in a fully online program? What type of aids, supports, agents, and other scaffolds might be needed?

Since the design of the TICKIT program nearly a decade ago, there have been gigantic leaps in educational technologies available to educators and their students. With each wave of new media, opportunities to be learner-centered with technology are certainly more obvious and rampant. Activities made apparent by the Web 2.0 are just the tip of the iceberg of what will be possible during the coming decades. Consequently, there undoubtedly will be a growing need for comprehensive and contextualized professional development that promotes the effective integration of these new technologies.

As the need for TICKIT-like programs grows, researchers might compare such programs to determine the features that are more valuable or essential for effective teacher technology integration. What components contribute the most positive effects? Are the positive effects in this particular study due to teachers working in cohorts? Is the one-year length of the program a key factor? Is the high success attributable to technology support provided on demand? Or it is due to the focus on learner-centered projects and activities that often involve real-world tasks?

In addition to researchers and curriculum developers, this study should be of interest to K-12 teachers and computer coordinators who have made heavy investments in technology. While it is only one project and one study, the long-term nature of this program and the high practical and statistical significance of the findings related to teacher technology integration and change should assist in teacher and technology coordinator promotion of various technologies and technology integration in their respective schools and school districts. Small school districts, in particular, may want to utilize some of the support factors used in TICKIT such as cross-school pairings of teachers to support collegial interaction as a means of providing an outlet for teachers to discuss their technology integration ideas and activities.

The results should also pique the interest of school administrators and policy makers who have spearheaded campaigns for or against technology expenditures. School administrators will want to know about the success factors of this university-school partnership. How might similar programs be designed in other colleges and universities? They might also want additional research to illuminate how schools and universities can simultaneously benefit from such programs. Both administrators and politicians want more evaluation of the return on investment from programs such as TICKIT. They should find the present evaluation helpful as they designate portions of school technology funding to professional development.

The TICKIT program was not the sole determiner for growth of TICKIT teachers reported here. Findings suggest that certain components and thoughtful structuring of the TICKIT project played a vital role in teacher change and growth observed in this study. Those attempting to develop programs like TICKIT or refine existing ones should keep in mind the importance of a cohort model, collaborative interactions, long-term engagements for teacher training, high impact of blended learning approaches within such training, and adequate technology support for any of it to be worthwhile. At the same time, teachers involved in such professional development efforts must value technology integration possibilities and be motivated to use technology in their teaching. Projects such as TICKIT speak to many audiences: those teaching with technology, those assessing it, and those providing the funding for it. Hopefully, as the importance of technology in K-12 education continues to skyrocket, positive findings of the TICKIT project will be replicated and extended to teacher professional development in other settings and organizations.

References

Alexander, B. (2006, March/April). Web 2.0: A new wave of innovation for teaching and learning? *Educause Review*, *41*(2), 32-44. Retrieved November 22, 2007, from http://www.educause.edu/apps/er/erm06/erm0621.asp

Alexander, P. A., & Murphy, P. K. (1998). The research base for APA's learner-centered psychological principles. In N. M. Lambert & B. L. McCombs (Eds.), *Issues in school reform: A sampler of psychological perspectives on learner-centered schools* (pp. 33-60). Washington, DC: American Psychological Association.

American Psychological Association. (1995). *Learner-centered psychological principles: A framework for school redesign and reform*. Washington D. C.: American Psychological Association.

Battelle, J. (2007, February 18). A brief interview with Michael Wesch (The creator of that wonderful video). *John Battelle's Searchblog*. Retrieved November 22, 2007, from http://battellemedia.com/archives/003386.php

Becker, H. J. (2000, July). *Findings from the teaching, learning, and computing survey: is Larry Cuban right?* Paper presented at the 2000 School Technology Leadership Conference of the Council of Chief State School Officers, Washington D.C.

Bonk, C., Ehman, L., Hixon, E., & Yamagata-Lynch, L. (2002). The pedagogical TICKIT: Web conferencing to promote communication and support during teacher development. *Journal of Technology and Teacher Education, 10*(2), 205-233.

Bredeson, P. V. (2003). *Designs for learning*. Thousand Oaks, California: Corwin Press.

Burns, M. (2002). From compliance to commitment: Technology as a catalyst for communities of learning. *Phi Delta Kappan, 84*(4), 295-302.

Cassner-Lotto, J., & Wright Benner, M. (2006). Report: Are they really ready to work?: Employers perspectives on the basic knowledge and applied skills of new entrants to the 21st century U.S. workforce. The Partnership for 21st Century; Retrieved June 21, 2007, from http://www.21stcenturyskills.org/documents/FINAL_REPORT_PDF9-29-06.pdf

Crane, E. (2006). Global nomads: At-risk students connect with peers worldwide. *Edutopia*, The George Lucas Education Foundation. Retrieved August 31, 2007, from http://www.edutopia.org/global-nomads-group-worldwide-videoconferencing

Cuban, L. (1986). *Teachers and machines: The classroom use of technology since 1920*. New York: Teachers College Press.

Cuban, L. (2001). *Oversold and underused: Computers in classrooms*. Cambridge: Harvard University Press.

Darling-Hammond, L. (1997). *The right to learn*. San Francisco: Jossey-Bass Publishers.

Deal, A. (2007, June). Podcasting. A teaching with technology white paper. Educause. Retrieved July 5, 2007, from http://connect.educause.edu/files/CMU_Podcasting_Jun07.pdf

Downes, S. (2005, October). E-learning 2.0. *E-Learn Magazine*. Retrieved November 22, 2007, from http://elearnmag.org/subpage.cfm?section=articles&article=29-1

Dwyer, D. C., Ringstaff, C., & Sandholtz, J. H. (1990). Changes in teachers' beliefs and practices in technology-rich classrooms. *Educational Leadership, 48*(8), 45-54.

Ehman, L., Bonk, C., Keller, J., & Lynch, L. Y. (2002). *A model of teacher professional development to support technology integration.* Paper presented at the Annual Conference of the American Educational Research Association, New Orleans.

Ehman, L., H., Bonk, C. J., & Yamagata-Lynch, E. (2005). A model of teacher professional development to support technology integration. *AACE Journal (AACEJ), 13*(3), 251-270. http://www.aace.org/pubs/aacej/current.cfm

Ferris, S. P., & Wilder, H. (2006, June/July). Uses and potentials of wikis in the classroom. *Innovate Journal of Online Education, 2*(5), Retrieved November 22, 2007, from http://www.innovateonline.info/index.php?view=article&id=258

Fraenkel, J. R., & Wallen, N. (2000). *How to design and evaluate research in education* (4th ed.). Boston: McGraw Hill.

Gammill, A. (2007, November). IU to study technology in schools: $3.1m federal contract will fund unprecedented analysis. *Indy Star.com*. Retrieved December 8, 2007, from http://www.indystar.com/apps/pbcs.dll/article?AID=/20071119/LOCAL/711190386/-1/LOCAL17

Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal, 38*(4), 915-945.

Guskey, T. R. (2003). *The characteristics of effective professional development: A synthesis of lists*. Paper presented at the American Educational Research Association, Chicago, IL.

Hall, G. E., & Hord, S. M. (1987). *Change in schools: Facilitating the process*. Albany: State University of New York Press.

Hawley, W. D., & Valli, L. (1999). The essentials of effective professional development. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession: Handbook of policy and practice* (pp. 127-150). San Francisco: Jossey Bass Publishers.

Keller, J., Bonk, C. J., & Hew, K. (2005). The TICKIT to teacher learning: Designing professional development according to situative principles. *Journal of Educational Computing Research*, *32*(4), 329-340.

Keller, J. B., Ehman, L., & Bonk, C. J. (2003, April). *Professional development that increases technology integration by k-12 teachers: The influence of the TICKIT program*. Paper presented at the American Educational Research Association (AERA) annual convention, Chicago, IL.

Kirriemuir, J. & McFarlane, A. (2004). Literature review in games and learning. A Report of NESTA Futurelab. Retrieved November 22, 2007, from http://www.futurelab.org.uk/resources/documents/lit_reviews/Games_Review.pdf

Kleiner, B., Thomas, N., & Lewis, L. (2007). *Educational Technology in Teacher Education Programs for Initial Licensure* (NCES 2008–040). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC. Retrieved December 8, 2007, from http://nces.ed.gov/pubs2008/2008040.pdf

Lawless, K. A., & Pellegrino, J. W. (2007). Professional development in integrating technology into teaching and learning: Knowns, unknowns, and ways to pursue better questions and answers. *Review of Educational Research*, *77*(4), 575-614.

Lee, M., & Hutton, D. S. (2007). Using interactive videoconferencing technology for global awareness: The case of ISIS. *International Journal of Instructional Technology and Distance Learning*. *4*(8), 3-14. Retrieved November 22, 2007, from http://itdl.org/Journal/Aug_07/article01.htm

Lenhart, A., & Fox, S. (2006, July 19). *Bloggers: Portrait of America's new storytellers*. Washington, DC: Pew Internet & American Life Report. Retrieved on November 22, 2007, from: http://www.pewinternet.org/pdfs/PIP%20Bloggers%20Report%20July%2019%202006.pdf

Lenhart, A., & Madden, M. (2005). *Teens content creators and consumers*. Washington, DC: Pew Internet & American Life Report. Retrieved on November 19, 2006, from: http://www.pewinternet.org/pdfs/PIP_Teens_Content_Creation.pdf

Little, J. W. (1993). Teachers' professional development in a climate of educational reform. *Educational Evaluation and Policy Analysis*, *15*(2), 129-151.

Moersch, C. (1994). *Levels of Technology Implementation*. Retrieved February 13, 2002, from http://www.learning-quest.com/LoTi/lotihome.html

Moersch, C. (1995). Levels of Technology Implementation (LoTi): A framework for measuring classroom technology use. *Learning and Leading with Technology*, 40-42.

Moersch, C. (2001). Next steps: using LoTi as a research tool. *Learning and Leading with Technology*, *29*(3), 22-27.

Mouza, C. (2003). Learning to teach with new technology: Implications for professional development. *Journal of Research on Technology in Education*, *35*(2), 272-289.

Sandholtz, J. H., Ringstaff, C., & Dwyer, D. C. (2000). The evolution of instruction in technology-rich classrooms. In Jossey-Bass (Ed.), *The Jossey-Bass reader on technology and learning* (pp. 341). San Francisco: Jossey-Bass.

Trotter, A. (2007, March 29). Getting up to speed. *Education Week*. Retrieved November 22, 2007, from http://www.edweek.org/ew/articles/2007/03/29/30tcpolicy.h26.html

U.S. Department of Education. (2002). *No child left behind--A desktop reference*. Washington, D.C.: Office of Elementary and Secondary Education.

Yamagata-Lynch, L. (2003). Using activity theory as an analytical lens for examining technology professional development in schools. *Mind, Culture and Activity*, 10(2*), 100-119.*

Appendix A

Survey Questions about Demographics and Changes in Teacher Practice

A. Do you have a functional multimedia computer and printer in your home?

B. Do you have a functional multimedia computer and printer in your classroom?

C. Do you have an Internet connection in your classroom?

D. Is your home computer connected to the Internet?

E. Do you have an Internet connection at home?

F. How many years have you been teaching?

G. How many hours of technology-related professional development have you received over the past two years?

H. How many hours of curriculum-based professional developmen (e.g. performance-based assessment, thinking skills strategies, inquiry-based learning) have you received over the past two years?

I. How many full-days of professional development devoted to technology integration have you particiapted in during the past two years?

J. From which individual do you seek primary guidance, information, and/or direction relating to the integration of technology into your curriculum?

K. Other teachers come to me for help in integrating computers in their teaching.

L. Have you received hardware, software, or professional development as a result of participation in a technology grant to your district?

M. In what school do you currently (or did you) teach?

N. For which of these academic years did you apply to be part of TICKIT?

O. For how many years have you had your students use computers in your classroom(s) to promote their learning?

P. From the list below, choose the item that has been the most influential in the way that you use technology in your classroom(s).

Q. Thinking of your answer to the question above, describe how the option you chose has influenced the way that you use technology in your classroom(s).

R. Describe one or two ways that you use or have used technology in your classroom that have the most impact on student learning.

S. During the past 5 years, describe the amount of change in your personal beliefs about teaching.

T. Thinking about your answer to the question above, explain why you chose what you did.

U. When entering the TICKIT program, how confident and comfortable were you about integrating technology in your classroom? (IF YOU WILL BE IN THE UPCOMING COHORT, ANSWER WITH YOUR CURRENT LEVEL OF COMFORT.)

V. When you completed the TICKIT program, how confident/comfortable were you about integrating technology in your classroom?

W. How has your use of technology with students to promote learning change in the past 5 years?

Please explain briefly why the decrease, constant level or increase has happened.

Appendix B

New Categories based on Questions from the LoTi instrument:

Technology Integration; Technology Limitations; Technology Resistance; Current Instructional Practices; and Computer Proficiency

Factor 1: Technology Integration

Loading	Questions
.73	5. I assign daily or weekly computer-related tasks that support my curriculum (analyzing data from a survey, creating multimedia presentations that showcase students' understanding of important content researching information via CD's or the internet).
.78	8. I provide short-term (daily or weekly) assignments using the classroom computer(s) that emphasize the use of different software applications (spreadsheets, databases, Internet use, multimedia).
.77	10. I alter my instructional use of the classroom computer(s) based upon the newest software applications and research on teaching, learning, and standards-based curriculum.
.66	14. I seek professional development, software applications, and peripherals that maximize the use of the endless array of computers and technology available to my students.
.67	16. I allocate time for students to practice their computer skills on the classroom computer(s).
.57	19. Using the classroom computer(s) is not a priority for me this school year.
.71	21. I integrate the most current research on teaching and learning when using the classroom computer(s).
.52	22. Students in my classroom participate in on-line interactive projects with other schools to solve relevant problems (not including exchanging email).
.79	28. My students' authentic problem-solving is supported by continuous access to a vast array of current computer-based tools and technology.
.79	29. My students discover innovative ways to use the endless array of classroom computers to make a difference in their lives and in their community.
.68	33. Students taking action at school or in the community relating to the content learned in class is a vital part of my approach to using the classroom computer(s).
.64	34. It is easy for me to evaluate software applications to determine whether the use of the computer(s) is seamlessly linked to students' critical thinking skills and authentic problem solving.
.64	35. My students use the Internet for collaboration with others, publishing, communication, and research to solve authentic problems.
.74	36. I have the background to show others how to merge technology with integrated thematic curricula.
.82	37. I seek out activities that promote increased problem-solving and critical thinking using the classroom computer(s).
.62	38. I plan computer-related activities in my classroom that will improve my students' basic skills (e.g. reading, writing, math computation).
.60	39. In my classroom, students use technology-based computer and Internet resources beyond the school (NASA, other government agencies, private sector) to solve authentic problems.
.74	43. It is easy for me to design student-centered, integrated curriculum units that use the classroom computer(s) in a seamless fashion.
.81	47. Using cutting edge technology and computers, I have stretched the limited instructional computing in my classroom.

Factor II: Technology Limitations

Loading	Questions
.65	25. I need more and/or more current computers in order to begin to use technology with my classroom instruction.
.59	30. Though I currently use integrated, thematic units, it is still difficult for to design these units to take advantage of the limited (one or two) computers in the classroom.
.74	31. Designing integrated, thematic curriculum units that use the limited computers (one or two) in the classroom is my immediate concern this school year.
.77	40. My immediate professional development priority is to learn more ways to use limited (one or two) computers to address student outcomes.

Factor III: Technology Resistance

Loading	Question
.50	4. I primarily use drill and practice or tutorial software programs in my classroom (excluding fundamental keyboarding programs).
.52	9. I rely on others (student assistants, parent volunteers, close friends) to do my computer-related tasks for me in my classroom.
.41	12. I do not find computers to be a necessary part of classroom instruction
.56	23. I prefer that my students go to a school computer lab for instruction without me.
.58	24. I would like to use the classroom computer(s) but do not have the time.
.60	42. I am not comfortable using a computer.
.48	44. I prefer to use existing curriculum units that integrate the classroom computer(s) with authentic assessment and student relevancy rather than building my own units from scratch.
.42	48. I don't find the use of computers to be practical for my students.

Factor IV: Computer Proficiency

Loading	Questions
.59	13. I access the Internet quite frequently.
.77	15. I am proficient with basic software applications (word processing, Internet applications, CD ROMs, games).
.76	18. I am proficient with different multimedia authoring tools (HyperStudio, PowerPoint, Impact, etc).
.84	26. I can troubleshoot hardware problems with computers (printers, peripherals).
.68	49. I am able to troubleshoot various software problems (translations, compression/decompression, cross—platform issues, system management).

Factor V: Learner-centered Instruction

Loading	Questions
.69	6. My students are involved in establishing individual goals within the classroom curriculum.
.84	20. In addition to traditional assessments, I consistently provide alternative assessment opportunities that encourage students to "showcase" their content understanding in nontraditional ways.
.81	32. Students' authentic use of information and inquiry skills guides the type of instructional materials used in my classroom.
.74	41. My instructional approach emphasizes experiential learning, student involvement, and students solving "real-world" issues.

About the Authors

Dr. John B. Keller *is the Assistant Director of P-20 Data Systems at the Indiana Department of Education. Prior to joining the Department of Education, John was the Director of Education for the Indiana Humanities Council and led in the development of the smartDESKTOP, a portal-based suite of tools for teachers now provided to Indiana teachers by the Department of Education. Earlier work included teaching 5th and 6th grade in northern Indiana and serving as an adjunct professor at Indiana Wesleyan University and Ball State University. Research interests center on improvement of instruction at the K-12 level.*

Contact Information*: Indiana Department of Education, 151 W. Ohio Street, Indianapolis, IN 46204. Email:* jbkeller@doe.in.gov
Phone: 317.234.5703

Dr. Emily Hixon *is an Assistant Professor of Educational Psychology in the Department of Teacher Preparation at Purdue University Calumet. Prior to joining the faculty at Purdue Calumet, Dr. Hixon spent 5 years working in the field of faculty development and enhancement as an instructional designer at university teaching and learning centers. Her research interests involve effective technology integration and professional development and enhancement at both the K-12 and higher education levels.*

Contact Information: *Purdue University Calumet, 2200 169th St., School of Education, Hammond, IN 46323.*
Email: hixone@calumet.purdue.edu

Dr. Curt Bonk *is Professor of Educational Psychology as well as Instructional Systems Technology at Indiana University. Dr. Bonk is also adjunct in the School of Informatics at IU and recently was a Senior Research Fellow with the DOD's Advanced Distributed Learning Lab. Dr. Bonk is in high demand as a conference keynote speaker and workshop presenter. He is President of CourseShare and SurveyShare. More information is available at http://mypage.iu.edu/~cjbonk/*

Contact information*: Indiana University, 201 N. Rose Avenue, Department of Counseling and Educational Psychology, Bloomington, IN 47401.*
Email: cjbonk@indiana.edu
.

Dr. Lee Ehman *is Professor Emeritus of Education at Indiana University. He taught 34 years on the Bloomington campus in the departments of Curriculum and Instruction, and in Counseling and Educational Psychology (Inquiry courses). He was part of the computer education program within the teacher preparation program. He co-directed for five years, with Curt Bonk, the TICKIT Institute, involving 25 teachers in a year long program to assist them in thoughtful infusion of technology into their classrooms. His teaching and research interests included technology use in classrooms and systems of support for teachers' use of technology.*

Contact information*: Indiana University, 201 N. Rose Avenue, Room 3230, Bloomington, IN 47401*
Email: ehman@indiana.edu

Editor's Note: The author raises a plethora of issues to be solved in the new technology saturated educational environment. Should learning institutions provide technology and support equivalent to modern business in order to truly support learning?

Cultivating Social Presence in the Online Learning Classroom: A Literature Review with Recommendations for Practice

Brandi Scollins-Mantha

USA

Abstract

In the traditional classroom research indicates that social presence enhances instructional delivery and the classroom experience. Despite earlier held notions about the online learning classroom being devoid of social cues, social presence has emerged as a quality emphasizing the connections between participants that serves to enhance both student satisfaction, perceptions of learning, and retention. By defining social presence, understanding how to measure it and exploring the ways in which teachers, instructional designers, and students can enhance social presence, a richer, more engaging learning community can be formed in the online learning classroom. This paper seeks to define social presence and present best practices for cultivating social presence in the online learning classroom through a literature review.

As greater numbers of students and their schools turn to their computers for education, many people question whether or not online learning can deliver the same results that a traditional classroom with a teacher and other students can. The resulting research, much of it catalogued on No Significant Difference website, indicates that little to no difference exists between online and on-ground classes in terms of student outcomes (Hofmann, 2002, p. 30; Burnett, 2001). Rovai aptly summarizes: "it is the method not the media that matters most in learning effectiveness" (2002, p. 41). What used to distinguish distance and traditional education is evaporating (McIsaac & Gunawardena, 1996, p. 403).

The promise of the research into the lack of difference between face-to-face and online learning classrooms further drove the adoption of online learning and also sparked more research into how to improve online learning (Wulff, Hanor, & Bulik, 2000). As Palloff and Pratt note, the time for concern, "with best practices and improving interaction and interactivity is upon us" (2005, p. 3). One area of great interest to both researchers and teachers is social presence theory.

While much of the research into social presence theory seeks to define it, measure it, or explore its benefits, little finds its sole focus on ways to cultivate it. Many researchers provide some listing of best practices as revealed by their findings, but few seek to fully categorize and test the ways in which social presence can be fostered and encouraged in the online community (Wise, Chang, Duffy, & Del Valle, 2004, p. 265). This paper seeks to offer practical ways to cultivate social presence in the online classroom.

Keywords: Social presence theory, constructivism, constructivist, social presence, instructional design, best practices, emoticons, small group work, chat rooms, blogs, netiquette, online learning, computer-mediated classroom, audio, facilitation

Defining Social Presence

Short, Williams, and Christie (1976) defined social presence as both a factor of the communication media and the level at which people involved in a transaction via that media feel socially aware of each other. Computer Mediated Communication (CMC), despite its lack of

social cues, can engage, interest and stimulate students (Gunawardena, 1995). The concept of social presence can be defined as the amount to which a person feels "socially present" in their environment (McIsaac & Gunawardena, 1996, p. 408). Tu & McIsaac offer that "social presence is the degree of feeling, perception, and reaction to being connected by CMC" to another person through text (2002, p. 140). A simple definition "sense of being with another" (Biocca, 2003) captures the main thrust of social presence, but this fails to capture the other factors at work such as connectedness and community. Being social presence implies more than just being with another, but being connected or engaged with that other in some form of exchange.

Recommendations for Cultivating Social Presence

Social presence can be cultivated in the online learning classroom (Gunawardena, 1995, p. 162). Cultivating social presence in the online learning classroom falls in the hands of teachers, instructional designers, and students. These three groups must work together to face the challenge of creating social presence in the virtual world.

Instructor Issues

Many people cite the adage, "guide on the side, not the sage on the stage" when discussing online learning classrooms. The role of the teacher automatically shifts when the physical is replaced by the virtual. Employing new instructional strategies will afford teachers and their online learning classrooms greater success in building a social presence space where students learn actively from each other, the instructor and the content. The new role of the instructor should be "redefined as a facilitator, organizer, and manager" (Cooper & Hendrick-Keefe, 2001, p. 566). Online teachers must realize their role in shaping the social aspects of the online classroom (Rovai, 2002, p. 53). Gunawardena & Zittle (1997) note that student's perceptions of social presence will depend on the atmosphere created by the teacher in the online learning classroom. The teacher plays a critical part in establishing social presence for the entire learning community (Wise, Chang, Duffy & Del Valle, 2004). The teacher that seeks to hone skills and techniques related to forming social presence will be the ones most likely to impact students perceptions (Gunawardena, 1995). There are several ways suggested in the literature for promoting and developing social presence in the online learning classroom.

Feedback & time

In order to generate social presence between students and the teacher, the teacher must take into account the isolation felt by students when online communication lags. If time frame expectations are not met, students feel less socially connected in the online learning classroom (Tu & McIsaac, 2002, p. 144). Answering email with a shorter turn-around time is pertinent to fostering social presence in the online learning classroom (Aragon, 2003, p. 64). Immediacy stems directly from timely response to email (Woods & Ebersole, 2003).

Feedback in an online classroom is more important than in a face-to-face class; if not told exactly how they are doing, students have no other non-verbal cues to go on (Vrasidas & McIsaac, 2000, p.6). Feedback also offers acknowledgment and immediacy (Woods & Ebserole, 2003).

Facilitation of discussion

An instructor's role in the discussion board is varied; they must offer information, provide feedback and corrections, and ask questions. Instructors must also manage the socio-emotional side of the classroom by quenching any flames, drawing out lurkers, and toning down more loud participants (Rovai, 2001).

Teachers must also be participants in the discussion board (Aragon, 2003, p. 63); as discussed later, modeling appropriate behavior goes a long way toward establishing the norms within the classroom. While teachers may not reply to all discussion postings, students should also be aware

that their work is read by the teacher, thus promoting immediacy and acknowledgement of the exchange (Aragon, 2003, p. 64).

Discussion board must also be managed in terms of their organization and page-view set-up. Multiple threads and the variety of discussion can be overwhelming and isolating (Picciano, 2002, p. 23; Tu, 2002b). Clearly labeling discussion forums and changing the subject headings for replies can go a long way toward sorting and shaping the discussion board. Guidelines should also be in place for instructing students on how to properly manage their postings through the reply feature and subject headings (de Bruyn, 2004). When discussions are left unchecked and unorganized, learning is not promoted; messages must be organized according to a well defined structure that stabilizes and promotes cognition (Thomas, 2002).

Tone

Text-based communication may "say" exactly what spoken words convey in terms of meaning, but the text-based communication lacks the inflection of voice, the nod of the head, the hand gesture, or the smile or the frown that gives the communication added meaning, such as tone. The tone of our spoken communication is effected by a variety of physical cues,; text-based communication we must be more out-spoken about our tone and actually tell people when we are making a joke, or happy, or sad, or confused (Weiss, 2000, p. 48). By adding a statement of tone like, "I'm joking here" or "Wow—can you explain that a different way, I am having a hard time understanding," teachers can foster relationships with their students in a much more clear and direct fashion. Adding the statement of tone, while seeming awkward to write, helps to clarify the context of the text-based communication and helps to avert any damaging miscommunication (Aragon, 2003, p. 65).

The use of emoticons (Weiss, 2000, p. 49) can also add clarity to the context and help forge connections between participants in the online learning classroom. Emoticons mimic facial expressions through text (Aragon, 2003, p. 65). In order for humans for form connections, they must be able to share feelings and emotions (Tu & McIsaac, 2002, p. 143). Emoticons offer a short-hand way to express emotions, feelings add context, and create an informal atmosphere through text (Gunawardena & Zittle, 1997, p. 10; Gunawardena, 2002). The use of emoticons may also increase student's feelings of satisfaction with the class (Gunawardena, 2002). See Figure 1: Common Emoticons for a listing of some common choices.

Typed Text	Meaning
:-)	Smile
:)	Smile
LOL	Laugh out Loud
:(	Frown
;)	Wink
;-)	Wink
|-)	Sleepy

Figure 1: Common Emoticons

Sharing personal information

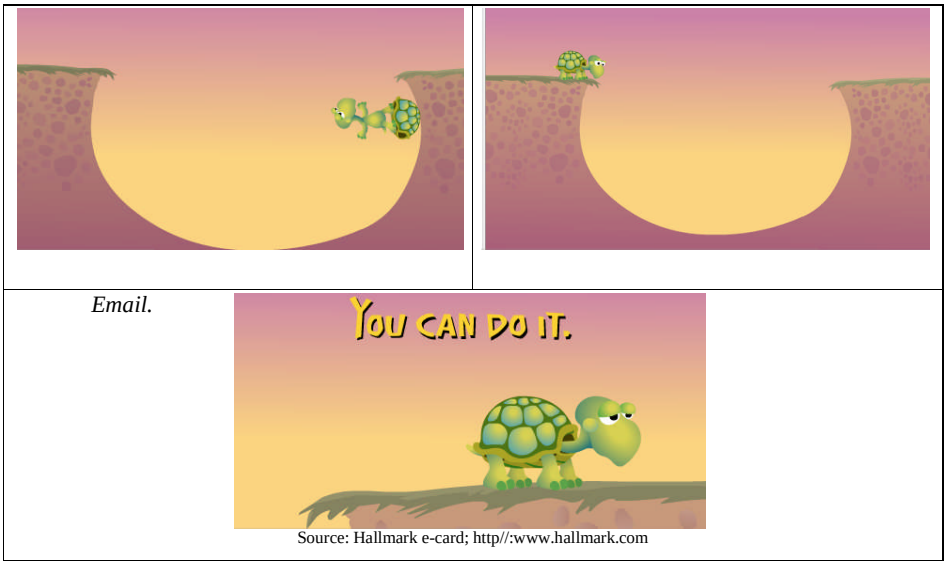
While some instructors hesitate at breaking the barrier between personal and professional lives, in the online learning classroom sharing personal information offers teachers with a way to connect to students and to show them connections from the class to real world material, while building social presence (Aragon, 2003, p. 65). This personal information could also be housed on a website showcasing the less academic side of teacher (Savery, 2005).

Humor

Just as humor works to diffuse tense situations in face-to-face contexts, humor can be used in the online classroom to foster social presence. Humor "reduces social distance and conveys goodwill" by offering students something to share in (Aragon, 2003, p. 65). Humor has also been tied to improving learning outcomes (Woods & Ebersole, 2003).

A surprising source of humor for the online classroom comes from a commercial source: greeting card companies that offer online e-cards. Periodically throughout the term, at holiday times or prior to stressful periods like midterms or major paper assignments, teachers can send students e-cards to their email address. If chosen appropriately, an e-card can get both a laugh, support, and a connection to the students.

These e-cards can also be used when students share personal milestones or challenges such as new children or grandchildren, deaths in the family, or illness. Reaching out the "virtual Hallmark card" shows students that the teacher not only cares but that they are paying attention. See Figure 2: You Can Do It E-card for an example of a motivational e-card.



Source: Hallmark e-card; http//:www.hallmark.com

Figure 2: Animated You Can Do it E-Card

The rise in the online learning classroom enables us to use a variety of communication methods to reach out to students. Email is one very rapid and informal way of sharing insight, feedback, or support with students. Email can be broadcast to a group for general announcements or can be specific and personal for one-on-one communication.

Encouraging the use of email between students also fosters the creation of a socially present online learning classroom (Leh, 2001). Email is a less formal medium, and students can be informal and more personal with each other outside of the class context (Leh, 2001). Email is the form of communication commonly used in the personal lives of students; students are accustomed to sharing jokes, funny video clips, and Internet shopping coupons with friends and family online. Encourage them to do the same with classmates increases social presence by extending student's already existing social networks to include classmates.

One of main benefits to a socially present online learning classroom stems from the supportive framework students and teachers can provide one another. And like many aspects of creating a socially present classroom, a circular relationship exists; if teachers offer support to students in terms of their personal situations in addition to content issues, thereby displaying a higher level of social presence through their awareness of student's lives, students then in turn feel greater social presence. Email also allows the students to engage in a more personal way with their teacher (Woods & Ebersole, 2003).

One way to offer such support is through the off-topic email that seeks to "check-in" with students and asks them how they are doing both in terms of the class and their personal lives (Perry & Edwards, 2005). Figure 3: Checking In Email provides an example of one such email.

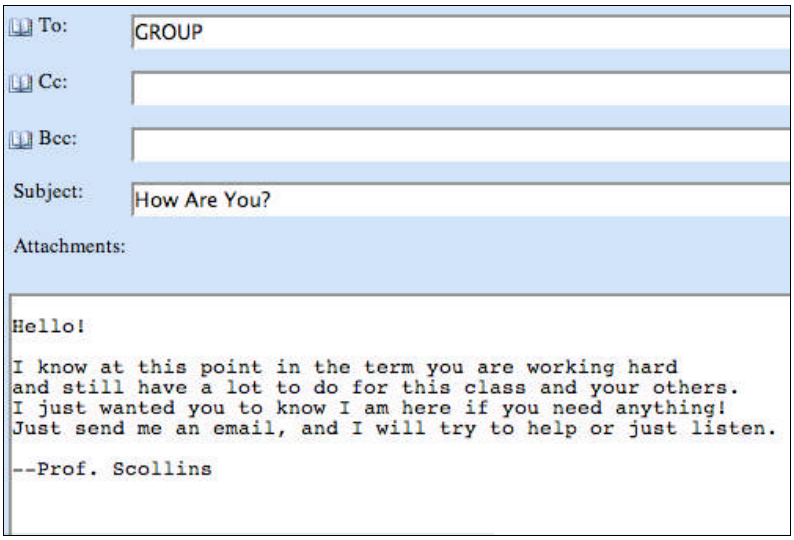


Figure 3: Checking In Email

The student response to this email demonstrates how students reacted in a way that would demonstrate high levels of social presence. They shared personal information and gratitude for the offer of support:

> Thanks very much! I can't believe that this term will be over next week!!
>
> Thank you so much I just have a ton going on, this is my sixth senior class this semester and I am just trying to get by with everything. I am sorry that I put a lot of my online work off until the end of the week, but those are my only time off between regular classes and working 40 hours. I will try harder to do more in the discussion board and a little earlier. I am sorry that I haven't done as good as I would have liked to I just have an overloaded plate right now. I will try harder for the next couple of weeks. Thank you for the email.
>
> Thank you so much for reaching out to us this way! This is very kind and refreshing to have a professor that is so reachable. Things are going ok for me so far. I am really enjoying this class.

> *Actually, I've thought about emailing you but never did. I am having trouble keeping up with everything right now. I am taking additional classes which also meant working more to pay for those classes. I'm full time day with extra online classes. My boyfriend of awhile and I suddenly broke up, which also took quite a toll on me. In addition to all of that, my cat became very ill and I have been in and out of hospitals with him, blood transfusions and the whole nine yards, which sounds crazy I know but I love him. Anyhow, I was kind of embarrassed and ashamed that I couldn't keep up with my work and unfortunately avoided asking for help. I know I should have contacted you earlier but I just can't seem to find the time for things right now. I messed up and I apologize. I just feel like life is a little out of control right now. Thank you for your concern and again, I'm so sorry for not contacting you sooner. I will do my best to keep up for the remaining weeks.*

The above experience is similar to one recounted in Woods (2002). Students, while they did not demonstrate higher levels of social presence due to email when completing a social presence assessment tool, demonstrated high levels of social presence through replies to the teacher's email expressing gratitude for the teacher's efforts (Woods, 2002).

Audio

In addition to email, teachers may wish to consider vmail, audio files attached to email. Though research indicates that email and vmail contribute equally to the creation of social presence (Johnson & Keil, 2002).

New software also enables teachers to create .mp3 files to share with students via file exchange programs or email. Creating .mp3 files adds a voice to the text, supplies and added social cue, and works to further connect the student to the teacher. Audacity, free audio recording and editing software can be found at http://audacity.sourceforge.net/.

One caution is that not all students have the capabilities to download and play large audio files. Teachers must take care that they understand the technological limitations of their student's computing hardware and computing skills.

Modeling desired behavior

One of the best ways to encourage a certain way of participating is to model that behavior for students (Weiss, 2000, p. 50; Palloff & Pratt, 2005, p. 22). If the professor uses first names (Aragon, 2003, p. 65; Bibeau, 2001), with careful attention to spelling and learning nicknames, in their postings or pulls quotations from student's replies to comment on or question, the members of the class will see that style of contribution and hopefully begin to emulate that style of dialogue (Stacey, 2000, p. 145). Teachers need to give what they hope to expect from their online students (Stacey, 2000, p. 146). Students will follow the lead offered by teachers (Savery, 2005). By providing concrete examples in their own postings, teachers offer students valuable lessons in how to participate (Vrasidas & McIsaac, 2000, p. 7).

Managing small group work

One suggestion for allowing this social presence to develop in the small group space is that teacher must monitor but not dominate the discussions; teachers should offer guidance when groups struggle, but allow students plenty of leeway in shaping of their small group work (Stacey, 2000, p. 150).

Prior to the start of small group work, the teacher may wish to explain the purpose of the group work and encourage the groups to set out and agree to their own rules of conduct; doing so enables students to engage with and buy-in to the process (Palloff & Pratt, 2005). Any steps you

take to ensure successful student engagement with their classmates or the content increases the chances that a socially present learning community will be formed.

When small group is in the new stages, teacher may also offer additional guidance in the form of assigned roles such as moderator, starter, or wrapper (deBruyn, 2004). The assigned roles helps students know where to begin when faced with the independence of the small group work assignment; this added comfort protects and encourages social presence. Additionally, if students feel they need the other member of the group to complete the task and receive their grade, they worked harder at group cohesiveness (Kreijins, 2003).

Instructional Design Issues

The online learning classroom in its shift from the physical to the virtual may require new ways of approaching instructional design to best capitalize on the qualities that the online learning classroom offers (Mortera-Gutierrez, 2002, p.191). Designing the online learning classroom with an eye towards creating social presence is one such way that instructional design can be used to meet the challenge of the virtual classroom space.

Constructivism

When cultivating social presence in the online learning classroom, many teachers find the shift from teacher-led to student-led inquiry becomes not only possible but beneficial (King, 2002; Huang, 2002). Constructivism, first noted by Piaget (1969) which posits that students create meaning through their interactions with the material, peers, their environment, and their teachers, is uniquely suited for the online learning classroom (Palloff & Pratt, 2005, p. 6). The dialogue of a community of learners fosters critical and deeper thinking (Wulff, Hanor, & Bulik, 2000, p. 150). Palloff & Pratt offer several reasons why constructivism in the collaborative environment of the online learning classroom works:

1. Allows students to forge deeper knowledge
2. Encourages new ideas and critical thinking
3. Fosters shared goals and the beginnings of the learning community
4. Accommodates all types of learners and their unique styles
5. Supports and acknowledges cultural differences in learning (2005, pp. 6-7).

When students work together to build knowledge, interactivity is enhanced, intimacy is developed, and personal connections to both fellow students and the class content are forged (Wulff, Hanor, & Bulik, 2000, p. 158). Communication with both self and others through reflection and dialogue is “fundamental to individual and social presence” in the learning process (Wulff, Hanor, & Bulik, 2000, p. 159).

Chat rooms

Technology, such as the conferencing tool now commonly know as the chat room, can create both immediacy and interaction in the online learning classroom as a way to build social presence (Lauzon, 1992). Synchronous communication is lauded as a way to dramatically increase immediacy and connections between students and the teacher; it is a much more personal engagement than the asynchronous discussion board (Wang & Newlin, 2001).

Real time chat offers both interaction, immediacy, communication of a social nature, and a sense of community. It requires that the teacher step away from their traditional in-charge role due to its informal nature and the ability of students to rapidly ask many questions. (Robertson & Klotz, 2001). By discussing both on-topic, on-content issues and off-topic, more personal information, the chat room presents a unique way to be at a distance yet foster social presence (Aragon, 2003,

p. 64). Students in chat rooms may also come to view their instructor as a real person (Woods & Ebersole, 2003).

Discussion boards

Discussion boards represent the prime area of engagement between students and students and the teacher in the online learning classroom. One way to increase engagement in the discussion board, and in turn, social presence, is to assign a grade appropriate to the level of interaction required. If an instructor places emphasis on discussion board participation with a grade weight of 20% and clear guidelines for participation, student engagement and community development are more likely to occur (Rovai, 2001, p. 45). A specific requirement for responses to fellow student's postings, in addition to a clear grading rubric, also helps to ensure participation, and in turn, the formation of community (Swan, Shen & Hiltz, 2006).

Amount of discussion postings required is another areas of instructional design that can be design to foster social presence. Too many discussion postings, on too many topics, may serve to dis-engaged and overwhelm students (Tu, 2002a, p. 15). Requiring a smaller number of postings and specifying a target number for replies helps to direct the discussion board traffic and strike the balance between creating a learning community and a tidal wave.

Lounge

Off-content or off-topic conversations often allow students in face-to-face settings to form community. Space in the online learning classroom should also be set aside for such conversations (Weiss, 2000, p. 49). This social space addresses the more personal and human side of students (Gunawardena, 2002). Social exchanges of an off-topic nature serve to build cohesiveness (Gunawardena, 1995). Consistent off-topic communication also serves to facilitate the development of social presence over time (Kreijns, 2003, p. 349). The instructor may even want to consider making this forum private, for student use only to encourage bonding among students (Weiss, 2000, p. 49).

Ice-breakers & welcoming messages

At the start of the class, many advocate the sharing of personal information and biography in the discussion forum or through the creation of a student homepage (Weiss, 2000, p. 49). Any information provided, whether it is text or visual helps students create an awareness of each other to begin the process of connecting (Aragon, 2003, p. 62).

Instructors should also supply the class with information about themselves and offer a welcome to the students (Aragon, 2003, p. 62).

Ice-breakers and warm activities can also serve to begin the interaction between students and content while fostering social presence at the same time. Instead of simply focusing the ice breaker activities on off-task, off-content topics, the teacher ask students to share something related to the content; this begins the process of on topic sharing and social presence (Wise, Chang, Duffy, & Del Valle, 2004).

Group learning

Group work is often lauded as a way to make learning both more engaging and productive in the classroom, both face-to-face and online. Additionally, small group work is also seen as training for the professional arena. Using small groups online to collaborate on assignments also can add to the sense of social presence felt by participants. Moving from the main class forum to a smaller group forum, which is often student-led, creates a less formal space and greater ease for connecting socially (Stacey, 2000, p. 147). When students communicate amongst themselves, they feel more at ease and equal to their peers (Tu & McIsaac, 2002, p. 142).

Another benefit to use of small group work lies the forming of a more personal support network within the large context of the online learning classroom; students that otherwise might feel isolated in the larger discussion used the small group experience to connect to others and the material (Stacey, 2000).

Just as the discussion board participation requirements and grading rubrics must be clearly spelled out to encourage and reward engagement, both the individual's effort and the group's effort should be graded (Palloff & Pratt, 2005, p. 44). The reward for collaboration must be built into the small group work experience (Kreijns, 2003).

To increase student's interactions with the content small group work might benefit from an emphasis on case studies, simulations role playing, problem solving, and authentic learning (Palloff & Pratt, 2005; Huang, 2002). Bring the real world into the interaction between student and content and the interaction between student and student fosters interactivity, engagement, and promotes the building of a learning community (Swan, Shen, & Hiltz, 2006). Feeling socially present within the small group context enables students to work together successfully together to explore concepts and create meaning, just as the process of working together helps to generate greater feelings of social presence.

While small group learning exercises allow students to increase their levels of social presence in the online learning classroom, a study of 37 online students, choice in collaborative structure and teammates resulted in course higher satisfaction ratings (Stein & Wanstreet, 2003, p. 197). Providing students with some say in how they work in small groups may increase their satisfaction. The addition of choice acknowledges that not all learners desire or appreciate or perceive the same things in the online learning classroom (Tu & McIsaac, 2002, p. 142). A small study of six Chinese graduate students concludes that the experience of social presence varies with users perceptions, culture, and experience; it is not a one size fits all concept (Tu, 2001). Gender may also play a role in a student's desired level of social presence in the online learning classroom (Rovai, 2001). Adding choice to the structure of a group-learning situation could help to accommodate student's preferences for varying degrees of social presence, increase a student's comfort and satisfaction with the experience.

Many books offer teachers excellent advice for forming and managing collaboration and small group work in the online learning classroom. Tu (2004) offers twenty-one different ways to create an online collaborative community. Palloff and Pratt (2005) showcase the beneficial role of collaboration online in addition to concrete and specific detailed plans for implementation.

Scheduling

Time is also related to how social presence forms within an online learning classroom; for true social relationships to form we must allow students time to interact and engage (Kreijins, 2003). In order to best accommodate group formation and the development of social presence, we should allow students time to be off-topic with each other at the start of the term, and at the start of group projects. Building off-content focused time into the class space will afford students the opportunity to interact and engage. Do not expect social presence to occur rapidly; it is a simmering process.

Blogs

Blogs like discussion boards rely on text to communicate information between participants. Unlike discussion boards however, blogs are typically hosted outside of the online learning classroom on commercial web service like Blogger (http://www.blogger.com). The use of this commercial space may remove a layer of formality from student expression. The commercial services also offer greater personalization for the posting space such as colors, photos, and music uploads. This opportunity to fully express themselves in text, visuals, and audio can enable

students to authentically share their ideas with classmates and the teacher. By extending the online learning classroom beyond the scope of its own URL, students can increase their social and content connections with each other. This learner control fosters both social interaction and constructivist learning principles (Beldarrian, 2007).

Student Issues

Students also play a critical role in shaping the social presence of the online learning classroom. As key players in the equation of community building, students must be able to negotiate their interactions between classmates, the teacher, and the technology used to create the online learning classroom.

Technical support

The interaction between student and technology is key in the determination of transactional distance and social presence. Some even posit that the interactions between students and technology creates a new "educational domain" (Morrison & Lauzon, 2001). If students are unable to use the online classroom they cannot fully engage with the material or the teacher or their fellow classmates; as such instructional design should take into account the learner, the technology available to them, and their computing skills (McIsaac & Gunawardena, 1996, p. 407). Eliminating sources of confusion promotes greater community (Rovai, 2002, p. 53). Confusion in the online learning classroom often stems from the interaction between students and technology. Incompatible files, dropped ISPs, and the inability to make use of online resources stymie students, their efforts at learning, and their engagement with the class. Technology can be a barrier with social implications (Bibeau, 2001).

To tackle this issue of the interaction between students and technology that stands as a barrier to forming a social present online learning classroom, teachers, instructional designers, students, and schools should ensure that students have a chance to explore the technology prior to the start of the class (Burnett, 2001, p. 4).

Netiquette

The world of the online classroom, devoid of visuals, populated by students holding down full-time jobs alongside family pressures and other classes, can be a tough place. People often dash into class, quickly type their replies, and dash on to the next challenge of the day. With the often hurried pace, students may lose site of their classmates on the receiving end of their work. Offended or confused, some students may reply with a flame email, a very negative email, often of a personal nature.

Offering an education in netiquette, the etiquette of online communication with students would provide a firm foundation for establishing a socially present classroom and a community of learners (Weiss, 2000, p. 50). The Internet offers a host of websites dedicated to the rules of netiquette. Broaching this subject with students and providing them with links to further information would ensure that all students know the conduct expected of them in this new type of classroom environment. Teachers may wish to create a discussion or brief quiz on the subject (Savery, 2005). Ensuring netiquette is adhered to in the online learning classroom safeguards the creation of a socially present environment.

Conclusion

Social presence theory offers a way to better shape the online learning classroom to meet student's needs in the virtual world. By promoting the degree of connection between participants in the online learning classroom, students perceived satisfaction and perceived learning increase. In turn, this creates opportunities for use a student-focused learning environment and the fundamentals of constructivism to enhance both learning and the building a learning community.

When teachers, instructional designers, and students work together to cultivate social presence, the entire system of the online learning classroom benefits. The environment becomes richer and more engaging for all involved.

References

Allen, I. E. & Seaman, J. (2004). *Entering the mainstream: The quality and extent of online education in the United States, 2003 and 2004.* The Sloan Consortium, Needham, MA, 2003. Retrieved on February 10, 2007 from Google Scholar database.

Aragon, S. R. (2003). Creating social presence in online environments. *New Directions for Adult and Continuing Education, 2003(100),* 57-68.

Baskin, C., Barker, M., & Woods, P. (2005). When group work leaves the classroom does group skills development also go out the window? *British Journal of Educational Technology, 36(1),* 19-31. Retrieved January 23, 2007, from ERIC database.

Beldarrrian, Y. (2007, August). Distance education trends: Integrating new technologies to foster student interaction and collaboration. Distance Education, 27(2). Retrieved on March 1, 2007 from the Pennsylvania State University Library.

Bibeau, S. (2001). Social presence, isolation, and connectedness in online teaching and learning: From the literature to real life. *Journal of Instruction Delivery Systems, 15(3),* 35-39. Retrieved January 23, 2007, from ERIC database.

Biocca, F., Harms, C., & Burgoon, J. (2003). Toward a more robust theory and measure of social presence. *Presence: Teleoperators and Virtual Environments, 12(5),* 456–480.

Burnett, K. (2001). Interaction and student retention, success, and satisfaction in web-based learning. *Paper presented at 67th IFLA Council and General Conference,* Boston, MA.

Card, D., Polin, L., Parra, J., Rhoads, J. & Sartori, T. (2006, January). Can you hear me now? The return of voice to distance learning. Paper presented at the Proceedings of the 5th IASTED International Conference on Web Based Education, January 23-25, 2006. Puerto Vallharta, Mexico. Retrieved on March 1, 2007 from the Pennsylvania State University library. "College enrollment gender gap widens for white and Hispanic students, but race and income disparities still most significant new ACE report finds." (2006, July 11). Retrieved on August 3, 2006 from http://www.acenet.edu

Cooper, H., & Keefe, C. (2001, September). Preparation of teachers of visually impaired students via distance. *Journal of Visual Impairment & Blindness, 95(9)* 563-566.

de Bruyn, L. L. (2004). Monitoring online communication: Can the development of convergence and social presence indicate an interactive learning environment? *Distance Education, 25(1),* 67-81. Retrieved January 23, 2007, from ERIC database.

Flottemesch, K. (2000 May-June). Building effective interaction in distance education: A review of the literature. *Educational Technology 40(3),* 46-51.

Garland, D. & Martin, B. (2005). Do gender and learning style play a role in how online courses should be designed? *The Journal of Interactive Online Learning, 4*(2). Retrieved on June 6, 2006 from The Pennsylvania State University World Campus Libraries.

Garrison, R. (2000). Theoretical challenges for distance education in the 21st century: A shift from structural to transactional issues. *International Review of Research in Open and Distance Learning, 1(1).* Retrieved February 22, 2007 from Google Scholar database.

"Growing by degrees: Online education in the United States, 2005." (2005). Retrieved on August 3, 2006 from http://www.sloanc.org/publications/survey/survey05.asp.

Gunawardena, C. N. (1995). Social presence theory and implications for interaction and collaborative learning in computer conferences. *International Journal. of Educational Telecommunications, 1(2/3),* 147-166. Retrieved on January 23, 2007 from Google Scholar database.

Gunawardena, C. N. (2002). Social presence and the Sociocultural Context of Online Education. *A paper presented at Symposium on Open/Distance Education: New Horizons in Educational Communications and Technology, May 20-23, 2002, Eskisehir, Turkey.* Retrieved February 8, 2007 from http://aof20.anadolu.edu.tr/bildiriler/Charlotte_Lani.doc.

Gunawardena, C.N. & Zittle, F.J. (1997). Social presence as a predictor of satisfaction with a computer-mediated conferencing environment. *American Journal of Distance Education, 11,* 8-26.

Gunn, C. (2003, February). Dominant or different? Gender issues in computer support learning. *JALN 7(1).* Retrieved on June 8, 2006 from http://sloan-c.org/publications/jaln/v7n1/v7nI_gunn.asp

Hillman, D. C., Willis, D. J., & Gunawardena, C. N. (1994). Learner-interface interaction in distance education: An extension of contemporary models and strategies for practitioners. *The American Journal of Distance Education, 8(2),* 30-42. Retrieved February 22, 2007 from Google Scholar database.

Hofmann, D. (2002, August). Internet-based distance learning in higher education. *Techdirections,* pp. 28-32

Huang, H (2002). Toward Constructivism for Adult Learners in Online Learning Environments. *British Journal of Educational Technology 33(1).*

Jaffe, J.M., Lee, Y., & Huang, L. & Oshagan, H. (2001). Gender, pseudonyms, and CMC: Masking identities and baring souls. *Interpersonal CMC: Socioemotional and Relational Communications.* Retrieved on January 28, 2007 from Google Scholar database.

Johnson, R. D., & Keil, M. (2002). Internet-enabled audio communication: A richer medium for students feedback? *Proceedings of the 17th Annual Conference of the International Academy for Information Management: Barcelona, Spain, December 13-15, 2002.* Retrieved on January 23, 2007, from ERIC database.

Johnson, S., Suriya, C. Yoon, S., Berret, J., & Lafleur, J. (2000). Team development and group processes of virtual learning teams. *Computers and Education, 39,* 379 393. Retrieved on January 28, 2007 from Google Scholar database.

Jolivette, B. J. (2006). Social presence and its relevancy to cognitive and affective learning in an asynchronous distance-learning environment: A preliminary literature review. Retreived January 23, 2007, from ERIC database.

King, K. (2002). Technology catalyzing change in how faculty teach and learn. *Journal of Continuing Higher Education, 50*, pp. 26-37.

Kregins, K., Kirschner, P. & Jochems, W. (2002). The sociability of computer-supported collaborative learning environments. *Educational Technology & Society 5 (1).* Retrieved on January 23, 2007 from http://ifets.ieee.org/periodical/vol_1_2002/kreijns.html.

Lauzon, A. (1992). Integrating computer based instruction with computer conferencing: An evaluation of a model for designing online education. *The American Journal off Distance Education, 6(2)* pp. 32-46.

Leh, A.C. (2001). Computer-mediated communication and social presence in a distance learning environment. *International Journal of Educational Telecommunications, 7(2)* p. 109-208.

Li, Q. (2005). Gender and CMC: A review on conflict and harassment. *Australasian Journal of Educational Technology 21(3)* pp. 382-406. Retrieved on July 12, 2006 from Google Scholar database.

Lim, J. & Lim, Y. (2004). Technology type, gender and social presence: An experimental study. *Paper presented at Pacific Asia Conference on Information Systems, Shanghai, China.* Retrieved on July 17, 2006 from Google Scholar database.

Lin, G. (2004). Social presence questionnaire of online collaborative learning: development and validity. *Association for Educational Communications and Technology.* Retrieved on February 8, 2007 from http://eric.ed.gov/ERICDocs/data/ericdocs2/content_storage_01/0000000b/80/2b/c7/78.pdf..

McIsaac, M. S., & Gunawardena, C. N. I. (1996). Distance education. In D. H. Jonassen (Ed.), *Handbook of Research for Educational Communications and Technology* (pp. 403-437). New York: Simon & Shuster Macmillan.

McLellan, H. (September-October 1999). Online education as interactive experience: Some guiding models. *Educational Technology, 39(5)* p. 36-42.

Moore , M. (1989). Editorial: Three types of interaction. *The American Journal of Distance Education, 3(2),* 1 -7.

Moore, M.G. (1990). Recent contributions to the theory of distance education. *Open Learning, 5(3),* 10-15.

Morrison, D. & Lauzon, A. (1992, July). Reflection on some technical issues of 'connecting' learners in online education. *Research in Distance Education, 4(3)* pp. 6-9.

Morterra-Gutierrez, F. (2002). Instructor interactions in distance education environments. *Journal of Interactive Learning Research, 13(3),* pp. 191-209.

Palloff, R.M. & Pratt, K. (1999). *Building Learning Communities in Cyberspace*. Jossey-Bass: San Francisco.

Palloff, R.M. & Pratt, K. (2005). *Collaborating online: Learning together in community.* Jossey-Bass: San Francisco.

Perry, B., & Edwards, M. (2005). Exemplary online educators: Creating a community of inquiry. *Turkish Online Journal of Distance Education--TOJDE 6(2).* Retrieved January 23, 2007, from ERIC database.

Piaget, J. (1969). *The mechanisms of perception,* London: Routledge & Kegan Paul.

Picciano, A. G. (2002). Beyond student perceptions: issues of interaction, presence, and performance in an online course. *Journal of Asynchronous Learning Networks, 6(1)* 21-40.

Pope, J. (2006, January 15). Some students prefer taking classes online. *USA Today.* Retrieved on February 28, 2007 from http://www.usatoday.com/tech/news/2006-01-15-college-online-courses_x.htm.

Reio, T. G.,Jr, & Crim, S. J. (2006). The emergence of social presence as an overlooked factor in asynchronous online learning. Retrieved on January 23, 2007, from ERIC database.

Ractham, P. & Zhang, X. (2006, April). Podcasting in Academia: A New Knowledge Management Paradigm within Academic Settings. *Paper presented at Proceedings of the 2006 ACM SIGMIS CPR conference. Claremont, California, April 13-15.* Retrieved March 1, 2007 from Pennsylvania State University library.

Rettie, R. (2003) Connectedness, Awareness and Social Presence. *Paper presented at Presence 2003, 6th International Workshop on Presence.* Retrieved February 13, 2007 from Google Scholar Database.

Richardson, J.C. and Swan, K. (2003 February). Examining social presence in online courses in relation to students' perceived learning and satisfaction. *Journal of Asynchronous Learning Networks, 7(1),* p. 68-88.

Roberson, T. & Koltz, J. (2001, November). Chat: The missing link in on-line interaction. *Paper presented at the Annual Meeting of the Mid-South Educational Research Association, Little Rock, AR.*

Rourke, L, Anderson, T, Garrison, D R & Archer, W, 1999 Assessing social presencein asynchronous text-based computer conferencing. *Journal of Distance Education 14,(2),* 50–71.

Rovai, A. (2002, July). A preliminary look at the structural difference of higher education classroom communities in traditional and ALN courses. *JALN 6(1).* Retrieved from Penn State Libraries January 28, 2006.

Rovai, A.P. (2002, Autumn). Development of instrument to measure classroom community. The Internet and Higher Education 5 (3) p. 197-211.

Rovai,A.P. (2001). Building classroom community at a distance: A case study. *Educational Technology Research and Development 49(4)* p. 33-48.

Savery, J. (2005). BE VOCAL: Characteristics of successful online instructors. *Journal of Interactive Online Learning, 4(2),* 141-152. Retreived on February 8, 2007 from Google Scholar Database.

Short, J., et al, 1976, *The Social Psychology of Telecommunications*, John Wiley, London, United Kingdom.

Smelser, L. (2002, March). Making connections in our classrooms: Online and off. *Paper presented at the Annual Metting of the Conference on College Composition and Communication, Chicago, IL.*

Stacey, E. (2000). Quality online participation: establishing social presence. *Research in Distance Education, RIDE,* Deakin University, Geelong. Ch 13.

Stacey, E. (2002). Social presence online: Networking learners at a distance, education and information technologies. *Education and Information Technologies, 7(4),* pp.287-294.

Stein, D., & Wanstreet, C. (2003). Role of Social Presence, Choice of Online or Face-to-Face Group Format, and Satisfaction with Perceived Knowledge gained in a Distance Learning Environment. *Paper Presented at the 2003 Midwest Research to Practice Conference in Adult Continuing and Community Education.*, 193-198.

Swan, K. (2001). Building learning communities in online courses: the importance of interaction. *Distance Education, 22(2),* 306-331.

Swan, K., Shen, J., & Hiltz, S. R. (2006). Assessment and collaboration in online learning. Journal of Asynchronous Learning Networks, 10(1), 45-62.

Thomas, M. (2002). Learning within incoherent structures: the space of online discussion forums. *Journal of Computer Assisted Learning, 18*, 351-366.

Tu, C. (2001). How Chinese perceive social presence: An examination of interaction in online learning environment. *Educational Media International, 38(1)* 45-60. Retrieved July 2005 from Pennsylvania State University libraries.

Tu, C. (2002a). The impact of Text-based CMC on Online Social Presence. *The Journal of Interactive Online Learning, 1(2),* 1–24.

Tu, C. (2004). *Online collaborative learning communities.* Libraries Unlimited: Westport, CT.

Tu, C. (2002b). The measurement of social presence in an online learning environment. *International Journal on E-Learning, 1(2),* 34-45.

Tu, C., & McIsaac, M. (2002). The relationship of social presence and interaction in online classes. *American Journal of Distance Education, 16(3),* 131-150. Retrieved January 23, 2007, from ERIC database.

Vrasidas, C. & McIsaac, M. S. (2000). Principles of pedagogy and evaluation for web-based learning. *Educational Media International, 37(2),* 105-111.

Wang, A. Y., & Newlin, M. H. (2001). Online lectures: Benefits for the virtual classroom. *T.H.E.Journal, 29(1),* 17-18,20,22,24. Retrieved January 23, 2007, from ERIC database.

Weiss, R. E. (2000, Winter). Humanizing the online classroom. In R. E.Weiss, D. S. Knowlton, & B. W. Speck (Eds.), New directions for teaching and learning: No. 84, *Principles of effective teaching in the online classroom* (47-51). San Francisco: Jossey-Bass.

Wise, A., Chang, J., Duffy, T., & Del Valle, R. (2004). The effects of teacher social presence on student satisfaction, engagement, and learning. *Journal of Educational Computing Research, 31(3),* 247-271. Retrieved January 23, 2007, from ERIC database.

Woods, R. & Ebersole, S. (2003). Becoming a "communal architect" in the online classroom: Integrating cognitive and affective learning for maximum effect in web-based learning. *Online Journal of Distance Learning Administration, 6(1).* Retrieved on January 23, 2007 from http://www.westga.edu/~distance/ojdla/spring61/woods61.htm

Woods, R. & Ebersole, S. (2003, March). Social Networking in the Online Classroom: Foundations of Effective Online Learning," *Ejournal, 12(13).* Retrieved on January 28, 2007 from www.ucalgary.ca/ejournal/archive/v12-13/v12-13n1Contents.html.

Woods, R.H. (2002). How much communication is enough in online courses? Exploring the relationship between frequency of instructor-initiated personal email and learners' perceptions of and participation in online learning. *International Journal of Instructional Media, 29(4),* 377–394.

Wulff, S., Hanor, J., & Bulik, R. (2000). The roles and interrelationships of presence, reflection, and self-directed learning in effective World Wide Web-based pedagogy. In R. A. Cole (Ed.)., *Issues in Web-based pedagogy: A critical primer*. Westport, CN: Greenwood Press.

Yates, S.J. (1997). Gender, identity, and CMC. *Journal of Computer Assisted Learning*, *13*, 281-290. Retrieved on July 16, 2006 from Google Scholar Database.

About the Author

Brandi Scollins-Mantha is an online adjunct English professor for many colleges and universities. She holds an MFA in Fiction from Sarah Lawrence College and a Masters in Adult Education with an emphasis on Distance Education from Penn State University. She lives in Plainsboro, NJ, with her husband, Mahesh, and together, they home-school their daughter, Megan, and care for two corgis, Riley and Red Sharkey. When she is not writing or teaching or mothering, she is honing her archery skills as the New Jersey State Adult Female FITA Recurve Champion.

Email: brandi.scollins@gmail.com

Publishing credits include:

My Intended: A Novel published in March 2000 by William Morrow, Inc./HarperCollins

Floaters: A Novel published in March 2006 by Blast Press

"Toll Plazas and Truck Stops." *Pebble Lake Review*, Fall 2004.

Intended Semi-finalist in James Fellowship for Novel in Progress 1998

"Holding Pattern." *The Literary Review*, Fall 2001.

"Inner Harbor." *Pleiades, Spring 2002*

"Palm Reader." *Kelsey Review*, September 1999

"What's Inside." *Folio*, Fall 1999

"Getting It." *Kelsey Review*, September 1998

"Toll Plazas and Trucks Stops," 1997 *Mississippi Review* Prize, Entry of Merit.

"Chew Toys." *City Primeval*, January 1997

"Family Heirloom." Honorable Mention Seventeen Magazine Fiction Contest, 1994

Women's Suffrage in Florida. Florida State Attorney General's Commission on the Status of Women Annual Report, 1994

"A Phoenix Soap Opera." *Mangrove Review*, 1994 edition

Editor's Note: The proof of the pudding, as always, is in the eating. These techniques may have a sequential impact that will provide sustenance for Distance Learning environments.

Communication:
The tool to interact with and control your online classroom environment

Eric J. Schmieder

USA

Abstract

This paper discusses ways to ensure that students have regular contact with their instructor and with other students in the class to foster collaborative learning environments that keep students engaged and learning. A brief literature review illustrates the effectiveness of collaboration tools in online education environments and their impact on fostering an atmosphere where students are engaged in the learning process. Experience and research has shown that while these tools are effective in theory, actual online classroom environments often fall short in implementation. This paper will present ways in which you can use these tools more effectively to control the classroom environment and encourage interaction among your students.

Keywords: Chat sessions, discussion forums, web-based meetings, online learning, distance education, teaching methods, collaboration, virtual teams, course development, virtual classrooms, web-based instruction, teaching online, online courses, student interaction, online education, course management, teaching styles.

Introduction

Have you ever attended or hosted a chat session online that seemed to get out of hand quickly and where the students seemed to ramble on about their personal lives rather than the class subject? Are your discussion forums populated with bare minimum requirements or true discussion among the students? Research shows that "learning is more effective when interaction occurs between learners" (Hentea, Shea, & Pennington, 2003).

"An estimated 1.2 million students in the United States – seven percent of all post-secondary students – enrolled in wholly online degree programs in 2005" (Kamberg, 2007), programs which "often comes under criticism for being an industrial production process that lacks the human dimension of group interaction" (Natale II, 2002). In order to foster an environment conducive to online learning, effective communication methods are key (Sheard, 2004).

The nature of class interaction in online learning environments is identified as a controversial pedagogic issue (Picciano, 2006). Research claims that social interaction and group process learning, present in face-to-face teaching is non-existent in an online classroom (Natale II, 2002). Additionally, the spontaneity associated with lecture situations and the related student questions and responses common to a traditional classroom are also lost in the online format (Hirschheim, 2005). Communication influences student satisfaction ratings as indicated by high satisfaction ratings for frequent and productive instructor interaction, constructive and dynamic discussion components (Abromitis, 2002), and collaborative and peer-oriented elements of course design in recent studies (Gill, 2005).

It is the role of the teaching staff to establish, maintain and manage online learning communities (Sheard, 2004). While it is suggested that "more synchronous activities should be part of the overall learning experience" (Saldivar, 2005), the broader subject of establishing communication

channels with and among students is the key to fostering an effective online classroom environment.

Purpose of Study

E-learning communities are created to fulfill the human need for social interaction with peers and instructors in an online class (Osberg, 2002). Interaction through effective e-learning communities is "necessary for some kinds of learning, such as social, behavioral, and physical skills development" (Hentea, Shea, & Pennington, 2003). It is therefore important to the learning process that educators provide facilities to enable interaction among online students and with the educators in online learning environments (Sheard, 2004).

A recent study illustrated student opinion that learning was enhanced by a variety of web-based communication tools, namely "private email (92.3%), calendaring (88.5%), course notes (88.5%), discussion forums (84.5%), online grades (84.5%), assignment descriptions (80.8%), and online quizzes (80.8%)" (Green, van Gyn, Moehr, Lau, & Coward, 2004). In end-of-semester surveys discussed in other research, the highest rated aspects of the online course design were collaborative and peer-oriented elements (Gill, 2005). Beyond student opinion and satisfaction, computer-mediated, collaborative tool usage in online classes has shown significant performance enhancement in student as compared to non-collaborative online methods of instruction (Hentea, Shea, & Pennington, 2003) and collaborative environments have shown a higher completion rate among students than self-paced e-learning course offerings (Osberg, 2002).

Learning is enhanced in collaborative environments by providing participants access to the work of others for comparison as the sharing of ideas fosters more advanced ideas than the student may have thought of on their own (Saldivar, 2005). It is the teacher's role to establish and manage these online learning communities (Sheard, 2004). While feedback can be received in a variety of ways in a traditional, face-to-face classroom, through both verbal and non-verbal student communication, feedback must come in different form online, however it is important that this feedback still be both valid and timely (Hentea, Shea, & Pennington, 2003).

Another aspect of online classrooms is that no student is able to "sit in the back of the room and hide" (Kamberg, 2007). Interactivity is most effective through bidirectional teacher-to-student interaction via synchronous communication activities (Saldivar, 2005). Two benefits of instructor-to-student and student-to-student communication in online courses are an increased potential for student completion of the course and increased likelihood that knowledge will be retained (Osberg, 2002). By establishing and maintaining tools to foster interaction among students in the design of online courses, distance educators are able to effectively "reduce the barriers of time and space, and therefore foster community" (Hentea, Shea, & Pennington, 2003).

Due to the increased availability of broadband Internet, online education programs are able to capitalize on the impact that enhanced multimedia communication tools such as online video, live chat sessions and live audio can have on the quality of the learning environment (Kamberg, 2007). According to research regarding attrition rates of online students "it is critical that educators put together a framework for engaging the distance learner" (Angelino, Williams, & Natvig, 2007).

Assuming the following statement to be true: "Learning is more effective when interaction occurs between learners" (Hentea, Shea, & Pennington, 2003), this paper seeks to explore the various tools available for fostering online communication among and with students through a brief literature review, and to propose a method for effectively using the tools in the online classroom.

Background and Literature Review

Asynchronous Communication Tools

Asynchronous communication tools are tools in which communication occurs in delayed format across longer periods of time. A common form of asynchronous communication in online classrooms is the discussion forum. Discussion forums can be very effective in the creation and sharing of knowledge among students when students are engaged in the dialogue process (Dennen & Paulus, 2005). "A class discussion, for example, can go on for days without being constrained by a bell schedule" (Picciano, 2006). Although it is imperative that for a discussion to take place, participation is necessary, there may be levels of participation that do not result in learning or the development of knowledge (Dennen & Paulus, 2005). Appropriate participation by students in a discussion forum, however, can greatly enhance the learning process through the sharing of work and ideas with one another (Picciano, 2006).

A second form of asynchronous communication common to course management systems that often goes overlooked in its potential effectiveness for enhancing the learning process is the chat log or transcript. In his research regarding the effective use of chat logs for improving and reinforcing the communication process established in a chat session, Saldivar defined five components to providing asynchronous feedback relative to the chat session. Those components are: "planning the discussion session; having the discussion; analyzing the chat log/transcript, with the instructor adding feedback; posting the chat log/transcript with instructions for students to revisit; [and] having a follow-up session" (Saldivar, 2005).

In either form, asynchronous communication allows students time to reflect, review, and commit additional thought to ideas presented before responding and in threaded form also provides a clear illustration of the development of ideas over time. Other forms of asynchronous communication that may be used in online learning environments include email, voice mail, fax, cell phone, and text messages (Hentea, Shea, & Pennington, 2003).

Synchronous Communications Tools

Synchronous communication tools are tools that enable real-time communication among students and/or instructors in the online classroom environment. Simulating a face-to-face dialog process and promoting a sense of connection and community, "synchronous communication (real-time) allows participants to communicate via video/computer conferencing, audio-graphic conferencing, picture phones, chat sessions, [and] instant messaging" (Hentea, Shea, & Pennington, 2003). Synchronous communication, often in the form of chat sessions in online classrooms, is an opportunity for instructors to fulfill the student expectation that the instructor be present in class (Saldivar, 2005) and consequently encourages active student participation in the learning process (Saldivar, 2005).

Although little to no student-to-student interaction occurs in online chat sessions (Mock, 2001), interaction between students and the teacher in a direct and active manner often is present (Saldivar, 2005). Synchronous communication tools also provide timely responses to student questions and concerns and can often supplement asynchronous forums for final decision making processes or to resolve heated conflicts on the discussion boards (Bailey & Luetkehans, 1998).

Challenges of Online Learning Environments

Online learning environments present key challenges for online learners which can be overcome through active communication. In particular, due to the physical separation inherent to the online classroom environment distance learners often feel isolated, unsupported, and disconnected (Angelino, Williams, & Natvig, 2007). When communication among students is not encouraged nor actively conducted, online learners can be left feeling unnoticed and "lost in cyberspace"

(Bailey & Luetkehans, 1998). It is the responsibility of the instructor to establish and maintain a collaborative classroom environment capable of overcoming these challenges.

A Collaborative Classroom Environment

"Interactivity is sometimes uncritically promoted as the key to active learning in the online environment" (Wong, Greenhalgh, Russell, Boynton, & Toon, 2003). Due to the time and space differences among many online learners and the flexibility that the online learning environment provides, much of the collaboration and communication fostered in online classes is in the form of asynchronous communication methods. These methods rely heavily on the ability of students to express themselves clearly and effectively in written form, a skill not fully developed by most online students (Bailey & Luetkehans, 1998). This issue is further complicated by the time delays associated with asynchronous communication tools (Holmberg, 1989). As a result, "usually students have little or no means of communicating with each other; even those who have the means of communicating with others in their class via online chats or email may not receive any encouragement to do so" (Hentea, Shea, & Pennington, 2003).

Face-to-face classroom environments encourage and foster social interactions and group processes that are often difficult to establish in online learning communities (Natale II, 2002), however, when discussion forums and chat sessions are effectively implemented and students actively participate, some really intense and productive discussions can result (Saldivar, 2005). In order to maintain interest in online learning as an alternative to traditional classroom environments, the social aspects of a learning community should be integrated into the course development plan. This is most effectively accomplished through the integration of communication tools into the course environment (Osberg, 2002).

Integration of communication tools not only fosters social interaction and a sense of community and belonging, but also enhances the learning process. Research shows that "students agreed that seven of the nine functions provided by the web-based online course management system enhanced their learning: private email (92.3%), calendaring (88.5%), course notes (88.5%), discussion forums (84.5%), online grades (84.5%), assignment descriptions (80.8%), and online quizzes (80.8%)" (Green, van Gyn, Moehr, Lau, & Coward, 2004). Each communication tool has a prescribed use and purpose within the online learning environment and not all students will actively use the tools simply because they are made available. Rather, the choice to participate in communication established through certain media "is driven by his/her perceptions of how well communication task requirements and media characteristics fit each other" (Hirt & Limayem, 2000).

Student motivation and success in distance-study courses has been shown to correlate with the level of communication established as part of the course character (Holmberg, 1989). Students are more frequently satisfied with courses that establish opportunities for frequent and productive instructor interaction as well as constructive and dynamic discussion with their peers (Abromitis, 2002). "Various studies have shown the importance of providing facilities to enable learners working online to interact with other learners and with their educators" (Sheard, 2004). While face-to-face interaction in a traditional class holds benefits such as spontaneity, humor, and physical interaction, online, and in particular, asynchronous, communication can produce potentially longer and more significant interaction among students through comments about and references to each other's work and ideas (Picciano, 2006).

When using synchronous forms of communication that do not provide such opportunity for reflection and often more closely resemble the traditional nature of classroom interaction, it may be beneficial to enhance the communication process by holding a follow-up discussion where students can ask questions and provide constructive criticism (Saldivar, 2005). Students ask questions more frequently when the lecture leads them to think of questions and when they feel as

though they can receive an immediate response (Hirschheim, 2005). Synchronous communication tools provide greater opportunity for these criteria to be met.

Proposed Method for Successful Online Communication

Fostering a Collaborative Environment

Engaging students in the learning process through the use of communication tools that foster a collaborative environment is shown to reduce attrition and to keep e-learners online (Osberg, 2002). "Interactivity is sometimes uncritically promoted as the key to active learning in the online environment" (Wong, Greenhalgh, Russell, Boynton, & Toon, 2003). Therefore, it is important to ensure that every student is actively engaged in the learning process. Unlike traditional classrooms, online learners are not able to simply show up, "sit in the back of the room and hide" (Kamberg, 2007). In order to encourage and foster student participation, the educator must also maintain an online presence (Sheard, 2004). By maintaining an online presence and through the use of technology as a tool to facilitate interaction among students, the educator is able to reduce the barriers of time and space and foster an online community which promotes active learning (Hentea, Shea, & Pennington, 2003). Although "online students, in general, prefer independent learning situations; they are willing and able to participate in collaborative work if they have structure from the teacher to initiate it" (Angelino, Williams, & Natvig, 2007).

In an effort to understand the habits of his own students in an online learning environment, Mock "asked several students why they did not use the bulletin board. The overwhelming response was that nobody else was posting, so why should they?" (Mock, 2001). In order to encourage participation, students must feel secure in their participation. Lecturers are responsible for building and maintaining a trusting environment where this is possible (Sheard, 2004). One way that this can be accomplished is through the use of group projects and assignments that encourage students to develop relationships with other students through online communication (Angelino, Williams, & Natvig, 2007). Mock also noted in his self-study that "despite some surveys that indicated students might resent mandatory assignments using such tools, most of my students gave positive feedback" (Mock, 2001).

Students require encouragement to take advantage of the communication tools available to them in the online learning environment (Hentea, Shea, & Pennington, 2003). For online learning to be successful, classroom communities must be formed through interactive communication (Abromitis, 2002). This interaction can be fostered through the use of discussion forums, chat sessions and virtual classes (Osberg, 2002). Discussion forums can be very rich environments for knowledge creation if students are engaged in the dialogue (Dennen & Paulus, 2005). "It is therefore imperative that the educators provide appropriate guidance and monitoring to ensure that the interactions within an online discussion forum foster and support effective communication and collaboration" (Sheard, 2004). To ensure participation by all students, it is often effective to require interaction among students with both their peers and you as the instructor (Hardin, 2004).

When really intense and productive discussions take place, as they sometimes do (Saldivar, 2005), it may be beneficial to allow additional time for analyzing, critiquing, problem solving and additional inspiration by the students (Picciano, 2006). To encourage the exchange of ideas, planned and coordinated chat sessions may also be effective (Saldivar, 2005). The instructor should create a sense of community through enhanced communications and encouragement of information sharing in the online classroom (Osberg, 2002). The use of feedback further enhances the development of a collaborative environment by providing a personalized interaction with students (Saldivar, 2005).

The Instructor's Role in a Discussion Forum

In online learning environments, the use of asynchronous communication tools such as discussion forums is predominantly student-driven communication with little to no instructor participation. "Research shows that instructors talk 90 percent or more of the time in the classroom, whereas online instructors post fewer than 10 percent of the comments" (Hardin, 2004). This dramatic shift in participation by the instructor significantly reduces the impact that the instructor can have on the learning process. Discussion forums, when used effectively, can be the foundation for an electronic learning community providing students with assistance, support, and social structures usually associated with face-to-face traditional classroom environments (Sheard, 2004). Further, discussion forums provide an opportunity for an instructor to interact with *every* student rather than the select few questions time constraints allow for in traditional environments (Hardin, 2004). Without the restrictions of time and space, discussion forums provide considerable opportunity for active learning and the sharing of multiple perspectives with and among student participants (Sheard, 2004).

The instructor should guide, but not dominate the discussion in an asynchronous forum while maintaining an active presence when student-to-teacher conversation is necessary or warranted. "Give students opportunities to respond to each other, rather than immediately answering all questions" (Hardin, 2004). By allowing more time for students to reflect on the questions posed in a discussion forum, greater opportunities for inspired and engaged learning occur in the online classroom (Picciano, 2006). Research also shows that students are more responsive to questions posed by other students, than to those posed by instructors (Sheard, 2004). As a result, instructors should participate more in an encouraging role by posting affirmations and reinforcing summaries of student contributions, participating only when necessary (Bailey & Luetkehans, 1998).

Instructors should provide a model through their postings that students can follow and actively monitor student posts for appropriateness, addressing issues when necessary (Sheard, 2004). In times of critical decision making and other times of intense discussion, the presence and participation of a neutral facilitator is appreciated. Instructors should assume this role in the online classroom (Bailey & Luetkehans, 1998). If conflict escalates to an unproductive or personal level, the instructor should intervene, and if necessary, establish a synchronous discussion opportunity for faster resolution potential (Bailey & Luetkehans, 1998). Instructor feedback and participation provides a personalized interaction with students (Saldivar, 2005) and serves to control the online environment maintaining order and appropriateness of postings (Bailey & Luetkehans, 1998).

Online discussions are often noted by students as significantly contributing to the active learning process (Wong, Greenhalgh, Russell, Boynton, & Toon, 2003), however, some students are reluctant to contribute to online discussions (Sheard, 2004). Instructors should encourage, and if necessary, require participation by all students so that everyone can benefit from the active learning process.

The Instructor's Role in a Chat Session

Chat sessions are commonly used synchronous communication tools in online learning environments simulating face-to-face dialog through the use of video, audio, or instant messaging communication systems (Hentea, Shea, & Pennington, 2003). In these synchronous environments, studies show that there is "little to no student-to-student interaction" (Mock, 2001). As in a traditional classroom environment, these tools are commonly viewed by students as a method for instructors to convey information in real-time with an opportunity for feedback, rather than as a tool for students to share ideas with other students.

While it is true that instructors should provide a structure and focus for the chat session and keep the discussion on track (Saldivar, 2005), student participation should be encouraged at a level

beyond answering questions asked by the instructor. By structuring chat sessions in a way that questions provide opportunity for discussion among students rather than simply re-statement of textbook content, the chat session can foster the exchange of interesting ideas in a way that immediate feedback is available to the student (Saldivar, 2005). The instructor should establish guidelines and etiquette prior to the discussion and establish the topic to be discussed so that off-topic conversation can be addressed (Saldivar, 2005).

Once the topic is established and the discussion commences, the instructor should encourage student discussion and thought beyond textbook regurgitation through the use of inquiry-based questions (Saldivar, 2005). Once the question is posed, instructors should allow students the opportunity to respond both to the initial question and to other student responses, providing reinforcement and encouragement as appropriate. Especially in cases where time is limited, as often the case in synchronous chat sessions, the instructor should control the direction of the discussion by maintaining a flow and timing to the asking of subsequent questions (Saldivar, 2005). If discussion begins to get off topic or out of control, the instructor should regain control of the chat session with posts that encourage focus and discourage inappropriate conversation among students.

It has become common practice for instructors to record chat sessions and post logs for review, especially by those students who were unable to participate in the live session, however many instructors do not understand the value of chat logs as supplemental instructional material (Saldivar, 2005). Chat logs can be used "to guide, to teach, to elaborate, and to make students realize that what they say can be important and can lend to the overall learning process" (Saldivar, 2005). Unedited logs are unfortunately less useful to students because it is often difficult, if not impossible, to see which responses and discussions were relevant and important. By editing the chat log before posting, an instructor can highlight key points and topics, diminish off-topic or unimportant comments, and can provide additional information where the discussion was cut short or responses were unclear (Saldivar, 2005).

Effective Management of the Virtual Classroom

To effectively manage a virtual classroom, the instructor must be present and provide individual feedback to the students. Clear and personal feedback from the instructor can reduce the feelings of isolation, confusion, anxiety, and frustration often reported by students in online courses (Angelino, Williams, & Natvig, 2007). The majority of students in a recent study reported anxiety due to unclear course requirements resulting in negative feedback and a preference for traditional lecture-based face-to-face classroom environments (Green, van Gyn, Moehr, Lau, & Coward, 2004). The virtual classroom must therefore be designed in similar fashion to the traditional classroom with targeted skills and clearly stated objectives (Bailey & Luetkehans, 1998).

In addition to having a clear understanding of what is expected of them, students need a clear understanding of what they should expect from the course. "The reason most often reported by high school counselors to virtual high school teachers for students dropping a course and becoming non-completers has been that the course was not what students had expected" (Crawford, 2006). Communication between instructors and students, frequently and in real-time, is essential to this process (Hentea, Shea, & Pennington, 2003). A critical need of adult learners is the knowledge that they have properly understood and mastered the material presented; this knowledge can only be gained through feedback received from the instructor (Osberg, 2002). Students who receive feedback faster have higher course completion rates and overall students expect to receive comprehensive feedback in as few days as possible (Holmberg, 1989). Delayed feedback diminishes the value of the feedback (Hentea, Shea, & Pennington, 2003).

Students should be required to stay engaged in the class through interaction with the instructor and their classmates (Hardin, 2004). Online students expect and desire this interaction with the

instructor through active correspondence and frequent virtual office hours (Osberg, 2002) or via email 24 hours a day (Hirschheim, 2005). While these expectations of the instructor's availability are unreasonable, the instructor does need to be available and it is good practice to establish guidelines and realistic expectations that the students can count on, such as a response to student emails within 24 hours, or virtual office hours at a regularly scheduled time each week. Without clear establishment of boundaries and expectations the student's can count on, students may become frustrated or the instructor may become overwhelmed with the volume of student-to-professor interaction that may occur (Hirschheim, 2005).

Communication tools as discussed in this paper, both asynchronous and synchronous, provide opportunities for students to develop an online learning community which often allows them to collaborate and find their own answers to questions without relying solely on direct communication with the instructor for learning to take place. The instructor can then serve as a neutral facilitator in times of critical decision making (Bailey & Luetkehans, 1998) or to provide focus and leadership in the discussions to keep them on track (Saldivar, 2005), but does not have to be overwhelmed with a high-volume of individual correspondence with students.

Communication establishes clear expectations, guidelines for acceptable behavior, and overall structure and control mechanisms for a virtual classroom, but must be done early, preferably the first session (Saldivar, 2005). After establishing the learning environment structure, communication allows a professor the opportunity "to adapt content and pace to the rate at which the students understand the material" (Hirschheim, 2005). As discussion continues and learning takes place, communication tools allow students the opportunity to ask questions and for students and instructors to provide constructive criticism relative to the learning process (Saldivar, 2005).

Discussion

Learning is a social process for most people (Osberg, 2002), therefore to promote active learning in an online environment, interactivity is key (Wong, Greenhalgh, Russell, Boynton, & Toon, 2003). While feedback is received differently in online environments than in traditional face-to-face classrooms, the ability to send and receive this feedback in a valid and timely fashion is very important to the learning process (Hentea, Shea, & Pennington, 2003). In order to provide opportunity for student interaction and feedback, communication tools should be incorporated into the online learning environment (Sheard, 2004).

Student success and motivation is shown to be greater in distance-study courses that incorporate communication tools and provide opportunity for dialogue and conversation rather than those that possess "an impersonal textbook character" (Holmberg, 1989). Peer-to-peer dialogue in distance learning provides "a rich opportunity for collaborative knowledge building" (Dennen & Paulus, 2005). Using communication tools to foster this dialogue among students and encouraging collaboration and peer relationships through group projects and assignments, students more effectively explore existing knowledge and expand the knowledge base of the entire learning community (Angelino, Williams, & Natvig, 2007). Although physical interaction, spontaneity, and humor factors of traditional classroom environments are lacking online, peer-to-peer interaction can be richer and lengthier in an online classroom (Picciano, 2006). Successful online learning is driven by such interaction and the creation of online learning communities (Abromitis, 2002).

Educators must therefore develop a course framework that engages the distant learner and persists the involvement of the learner in the learning process (Angelino, Williams, & Natvig, 2007).The number one issue preventing student success in online learning identified by recent studies is a lack of time management skills possessed by the students (Angelino, Williams, & Natvig, 2007). Through the provision of appropriate guidance and monitoring by the instructor, thereby ensuring

interaction, communication, and collaboration (Sheard, 2004), students are more likely to overcome such issues. To ensure effectiveness of the feedback provided by instructors to students on assignments and tests, communication must be timely (Hentea, Shea, & Pennington, 2003).

It is further reported that the presence of the educator online through postings and participation in the communication process encourages learner participation (Sheard, 2004). Additionally, studies show that students who participate in "computer-mediated, collaborative, Web-based learning perform significantly better than the students using only Web-based learning methods" (Hentea, Shea, & Pennington, 2003). It can therefore be concluded that greater online presence by the instructor, thereby encouraging learner participation in collaborative learning processes, leads to greater success of the online student. This conclusion is supported by research indicating that greater numbers of students complete courses that require communication than the 25 percent who finish strictly self-paced online courses (Osberg, 2002).

In general students expect the instructor to lead the course and to establish the requirements for student success. As a result, it is not surprising that in his 2001 self-study, Mock found that "despite some surveys that indicated students might resent mandatory assignments using [communication] tools, most of [his] students gave positive feedback" (Mock, 2001). To be most effective, the instructor must establish the guidelines associated with the use of the tools. These guidelines may include general rules of etiquette, models for student postings, or specific topic and schedule information (Saldivar, 2005). By engaging students in the subject through the use of communication tools, course dropout rates are shown to decrease (Osberg, 2002).

In describing limitations of online learning environments, Hirschheim claimed that "students miss the lectures, discussion, questions, assignments, group work, and the professor's views and perspectives—all part of traditional classes" and that "spontaneity is also an element of a lecture situation that is lost in the online format" (Hirschheim, 2005). Effective use of communication tools in the online learning environment can prevent such losses and in some cases may not only serve to add these components back into the online learning environment, but to do so in a greater capacity by requiring "every student to actively participate in the discussion" (Hardin, 2004). It remains the responsibility of the instructor to maintain control of the conversation online, just as they would in a traditional classroom, and instructors must "direct students to refrain from chatting about irrelevant or non-topic-related issues" (Saldivar, 2005). Instructors can benefit from the asynchronous nature of online discussions as they are provided opportunity to look up facts and information not immediately recalled during a discussion, whereas, in a traditional format, the instructor must have full command of the facts associated with the discussion due to time constraints which prevent the luxury of looking up information (Gill, 2005).

Online communication tools provide opportunities for students to engage in the learning process, thus promoting higher levels of success. They also allow the instructor ways to interact more personally with every student in the class and to gain better control of the discussions occurring in their online classrooms. Active participation, effective management, and increased presence all promote an active learning environment which can improve retention, reduce attrition rates, and provide greater opportunity for student success in online learning. Implementing such communication practices into development of your online classroom benefits everyone involved.

Future Opportunities for Research

The growing availability of broadband Internet services and the higher level of interaction provided by social networking websites, video conferencing technologies and other online communication tools provide many opportunities for research regarding the impact that these technological advancements and trends have on the online classroom. Exploration of the effectiveness of adopting these additional communication tools in the learning environment is worthy of study.

References

Abromitis, J. (2002). Trends in Instructional Technology and Distance Education.

Angelino, L. M., Williams, F. K., & Natvig, D. (2007). Strategies to Engage Online Students and Reduce Attrition Rates. The Journal of Educators Online , 1-14.

Bailey, M. L., & Luetkehans, L. (1998). Ten Great Tips for Facilitating Virtual Learning Teams. Distance Learning '98. Proceedings of the Annual Conference on Distance Teaching & Learning, (pp. 19-25). Madison, WI.

Crawford, D. L. (2006). Characteristics Leading to Student Success: A Study of Online Learning Environments. Texas A&M University - Commerce, United States -- Texas: Ed.D. dissertation.

Dennen, V. P., & Paulus, T. M. (2005). Researching "Collaborative Knowledge Building" in Formal Distance Learning Environments . Proceedings of th 2005 conference on Computer support for collaborative learning: learning 2005: the next 10 years! (pp. 96-104). Taipei, Taiwan: International Society of the Learning Sciences.

Gill, T. G. (2005, March). In-depth tutorials: Distance Learning Strategies that Make Sense, Part 1. eLearn , p. 1.

Green, C. J., van Gyn, G. H., Moehr, J. R., Lau, F. Y., & Coward, P. M. (2004). Introducing a Technology-Enabled Problem-Based Learning Approach into a Health Informatics Curriculum. International Journal of Medical Informatics , 173-179.

Hardin, K. (2004). Teach them to Fly: Strategies for Encouraging Active Online Learning. Turkish Online Journal of Distance Education-TOJDE , 10-14.

Hentea, M., Shea, M. J., & Pennington, L. (2003). A Perspective on Fulfilling the Expectations of Distance Education. Proceedings of the 4th conference on Information technology curriculum (pp. 160-167). Lafayette, Indiana, USA: ACM.

Hirschheim, R. (2005). The Internet-Based Education Bandwagon: Look Before You Leap. Communications of the ACM , 97-101.

Hirt, S. G., & Limayem, M. (2000). Integrating Three Theoretical Perspectives to Explain Internet-Based Technology Usage by University Students: A Qualitative Study. Proceedings of the twenty first international conference on Information systems (pp. 473-478). Brisbane, Queensland, Australia: Association for Information Systems.

Holmberg, B. (1989). Key Issues in Distance Education: An Academic Viewpoint. European Journal of Education , 11-23.

Kamberg, M.-L. (2007, Mar/Apr). The Evolution of Continuing Education. Women in Business , pp. 22-26.

Mock, K. (2001). The use of internet tools to supplement communication in the classroom. Journal of Computing Sciences in Colleges , 14-21.

Natale II, R. D. (2002, January 21). Ensuring Quality from a Distance. Community College Week , pp. 4-5.

Osberg, C. (2002, October). How to Keep E-Learners Online. T + D , pp. 45-46.

Picciano, A. G. (2006). Online Learning: Implications for Higher Education Pedagogy and Policy. Journal of Thought , 75-94.

Saldivar, J. A. (2005). Chat Transcripts: Once the Chat is Over, is it Really Over? Distance Learning , pp. 13-16.

Sheard, J. (2004). Electronic Learning Communities: Strategies for Establishment and Management. Proceedings of the 9th annual SIGCSE conference on Innovation and technology in computer science education (pp. 37-41). Leeds, United Kingdom: ACM.

Wong, G., Greenhalgh, T., Russell, J., Boynton, P., & Toon, P. (2003). Putting your course on the Web: lessons from a case study and systematic literature review. Medical Education , 1020-1023.

About the Author

Eric Schmieder is Computer Faculty Coordinator at Blue Ridge Community College in Flat Rock, NC and a Ph.D. student through an online consortium program in Technology Management. He has taught in both traditional and online environments since 2001.

Among Eric's research interests are issues in effective use of technology for course delivery.

Email: eric@trinity-communications.com

Eric Schmieder

Editor's Note: Training and Human Resource Development (HRD) improve performance in competitive business environments. Instructional technologies play a key role in assessment, design, development, delivery, evaluation, and management of training programs. Additional research is needed to guide adoption and implementation of appropriate technologies and ensure continuous quality improvement

Instructional Technologies in Human Resource Development: Impact, Models, and Changes

James E. Bartlett, II

USA

Abstract

This paper provides an introduction to instructional technologies that can be used in human resource development (HRD). An overview of the HRD discipline is provided and a discussion is presented that demonstrates how HRD can provide solutions to business problems and improve performance. Instructional technologies are demonstrated as part of solutions the HRD professionals can access from their box of tools. Instructional technologies are presented in terms of learning management systems, synchronous and asynchronous tools for both formal and informal learning. An overview of an evaluation technique that provides scientifically based findings to demonstrate "what works" is presented. The paper provides details on how instructional technologies are changing the HRD profession. The paper concludes with the future trends and impact in the field.

Introduction

Technology, globalization, and the changing demographics have created new workplaces that are dynamic in nature requiring effective and strategic human resource development (HRD) for organizations to stay competitive. Human resource development is conducted in a wide range of organizations for a variety reasons and in turn focuses on an array of content. Within human resource development, Swanson and Holton (2001) state the "two core threads of HRD are (1) individual and organizational learning and (2) individual and organizational performance" (p.3-4). The literature in HRD does not view the areas of learning and performance the same However, the overall goal is to improve the individual and/or organization in a specific area.

Similarly, instructional technologies are being used with a variety of content in a number of disciplines with the overarching goal to improve learning. Learning and performance are two major paradigms within the field of human resource development (Kuchinke, 2000). Instructional technology can be used to impact both learning and performance. The purpose of this paper is to provide an overview of instructional technologies that can be used in the HRD process and, specifically, in training and development.

Human Resource Development

Human resource development (HRD) is an emergent field that builds upon multiple disciplines including psychology, business, and education (Kuchinke, 2001). The HRD field is well established in practice, however has had only a brief formal existence in academia in comparison to many other disciplines (Swanson and Holton, 2001). When examining the theories of HRD, Weinberger (1998) reported definitions in the field as early 1970. Only recently has HRD been identified as a field in academia. According to the National Center for Education Statistics the *Classification of Instructional Programs: 2000 Edition* identified HRD as a new academic discipline and provided a specific code in 2000.

The literature has provided many definitions of HRD. The definitions of HRD key components demonstrate the multi-disciplinary nature of the field and include behavioral change, adult learning (formal and informal), performance (human, organizational, individuals level, work process), performance improvement, organizational and personal goals, development (career and organizational), training and development, learning, learning climate, and learning organizations. Key definitions have a variety of underlying theories including psychological, systems, economic, philosophical, human performance, organizational performance, and performance system. While a wide variety of perspectives in the field of HRD can provide a view that is not limiting, it can also create too broad a field of study that is hard to define. For the purpose of this paper, HRD will be defined as the "…process for developing and unleashing human expertise through organization development, and personnel training and development, for the purpose of improving performance" (Swanson & Holton, 2001, p. 4). Swanson and Holton (2001) include system, psychological, and economic as underlying theories in the framework for HRD.

While all areas of HRD are important, this paper will focus on training, the acquisition of skills to perform a job to the current standards. Training individuals is only one focus of the HRD professional; since training widely uses instructional technologies to mediate learning it will be the main focus of HRD in this paper. Instructional technology is another focus of this paper and it will be examined in terms of instructional technology for workforce training. While technology in training can be used for routine and administrative purposes, technology within training will be presented as "...a branch of knowledge based on the development and implementation of computers, software, and other technical tools, and the assessment and evaluation of students' educational outcomes resulting from their use of technology tools" (NCREL, 1995). Technology that is used in training and learning is typically identified as instructional technology. Seels and Richey (1994) stated the purpose of instructional technology is to affect and effect learning which is no different in the educational settings than the workplace setting. The Association for Educational Communications and Technology (AECT) defines instructional technology in terms of learning and performance as "the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources" (Association for Educational Communications and Technology, 2006). This definition goes on and adds the area of improving performance which can be translated in the workplace as results. When the learning takes place to meet the standards for jobs and improve performance of employees in an organization it is identified as HRD.

The fields of instructional technology and human resource development are distinct in nature but have overlapping goals of learning and improving performance. Rosenberg (1982) presented an historical background instructional technology and human resource development both with its beginnings in instructional media. In academia, the disciplines of business and education often view the areas human resource development and instructional technology from different unique perspectives. With that said, this paper will present both HRD and instructional technology from a blended approach that deals with learning and improving performance. Instructional technologies are one of the many tools to use to create solutions for HRD issues. Instructional technologies deal with learning and improving performance using a specific domain including by creating, using, and managing appropriate technological processes and resources. When instructional technology is used in HRD to unleash human expertise and improve performance in the workplace, it can be viewed as instructional technology for HRD.

Model of HRD

One of the most widely recognized models in human resource development is the Analysis for Improving Performance: Tool for Diagnosing Organizations & Documenting Workplace Expertise (See figure 1., Swanson, 1995). The model includes the five steps of analyzing, proposing, creating, implementing, and assessing.

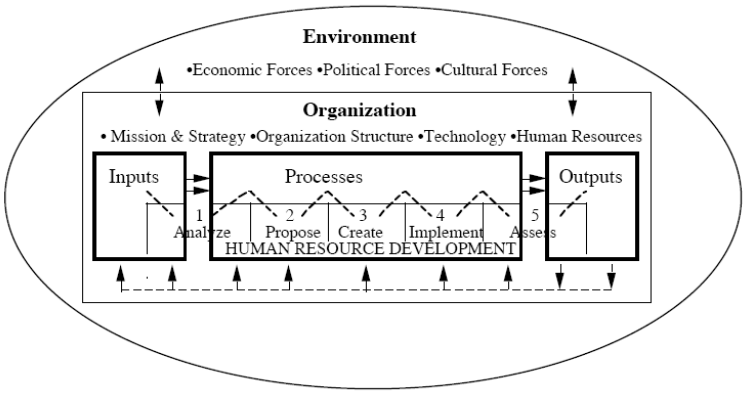


Figure 1. Swanson, R. A. (1995). Analysis for improving performance: Tools for diagnosing organizations & documenting workplace expertise. San Francisco: Berrett-Koehler (p.20).

This model focuses on improving performance through inputs, processes, and outputs. Within this model technology is viewed at the organization level. The model demonstrates that technology impacts human resource development in terms of the five steps and specifically in terms of inputs and processes. Instructional technology will be examined in terms of the five phases of human resource development model.

Instructional Technologies in the HRD Model Analyze, Propose Create

As demonstrated, the field of HRD has many different perspectives and backgrounds. Within this variety of perspectives, instructional technologies can be used in a number of manners. To explore instructional technologies in the HRD context each of the five phases (analyze, propose, create, implement, and assess) will be examined. While the HRD model presents a phase called analyze, within the area of multimedia instructional design Dick and Cary (1990) separate the analysis phase into two sections of needs assessment and front-end analysis. Within this type of model, the needs assessment phase examines the current business situation and the desired situation business situation. The front-end analysis examines how to eliminate the gap between the desired workplace performance and the actual workplace performance.

While the front-end analysis suggested by Lee and Owens (2000) relates directly to the multimedia instructional design process, others overlap with the more traditional analysis phase in HRD. For example, the audience analysis examining the target population, task analysis determining the requirements for the job, and situation analysis are all similar to steps in the HRD analysis phase. According to Lee and Owens (2000) for multimedia instructional design nine-front end analysis should be conducted examining the audience, technology, situation, task, critical incident, objective, media, extant data, and cost. The areas that impact instructional technologies are determining the technology available, technology considerations, and constraints for delivering training with technology. Additionally, the situation analysis determines environmental factors that can impact while delivering a solution; the media analysis determines which medium is best for delivering the solution; the extant data analysis which determines the materials currently available; and the audience analysis which determines the readiness of the target population. When using an instructional technology, the analysis phase needs to collect data on the relevant technology issues.

The propose phase in the HRD process is the phase in which the HRD professional proposes the solution to the client. While not all solutions involve instructional technologies, it is important when they do incorporate instructional technology to present the solution in a manner that shows how the technologies will benefit learning and performance. For example, if there is data that supports a certain instructional technology has been more effective in transfer of training for a certain topic, this phase should include that information. Furthermore, it would be useful to align the front-end analysis with the proposed solution to explain how the audience, technology, tasks, critical incidents, objectives, media, extant data, and cost align with the current instructional technology solution. Furthermore, it is essential to demonstrate how the solution aligns strategically in the organization.

The create stage in the HRD process is where the solution is developed. Since this paper focuses on instructional technologies, creating a training solution will be the focus in this area. For this type of solution it is important to follow one of the many instructional design models. A systematic approach to instructional design includes analyze, design, develop, implement, and evaluate. In the creation phase, the focus is on the design and development. The specifics of design and development would be different based on the technologies used. Two key factors to address in this creation phase are that design is based on a sound theoretical approach and the instructional technologies used support the design theory. For example, if a constructivist approach is taken in design, an instructional technology that is very linear in nature that does not allow students to explore and learn would not be appropriate. A deeper question is the effectiveness of traditional androgogy methods and learning in the new technological environment (Ahern & Repman, 1994). For example, Hochberg suggests that on online MBA would use global virtual teams as a form of pedagogy. This type of environment would emulate how workplaces operate in today's business world. While creating solutions can be an important role of the HRD professional, it has been suggested that the HRD professional must be able to select and evaluate solutions that implement instructional technologies.

Implementing Instructional Technologies

In HRD, implementing instructional technologies can occur in a variety of manners. While the majority of the paper discusses training, the implementation can be done in both formal and informal methods. While many of the instructional technologies could be used in both, the following provides examples of implementing instructional technologies in formal and informal situations to improve both learning and performance.

Formal Training

While all levels of education have been impacted by instructional technology, technology has specifically impacted how vocational, postsecondary, and higher education develops the workforce. While human resource development encompasses many areas including performance improvement, organizational analysis, employee relationship management, evaluation, leadership, and organizational change management; a large role of human resource development is viewed in terms of training and employee development. Within HRD, training and development has had the greatest impact from instructional technologies. According to Marsick and Watkins "Formal learning is typically institutionally sponsored, classroom-based, and highly structured" (p. 25). Formal learning can be mediated by technology and is becoming an ever increasingly used technique in the workplace (Benson, Johnson, and Kuchinke, 2002). This section will highlight web-based instructional technologies such as learning management software, synchronous learning tools, and asynchronous instructional technologies for formal training and employee development.

Much of the early instructional technology was on stand-alone workstations and was not highly interactive in nature. For example, a tutorial from a computer application program might be

delivered on a disc to teach the basics of the program. The earliest instructional technologies were very linear in nature and had limits due to the technology. Currently the majority of training that is developed uses instructional technology that implements web-based technology. If the training is on the Internet or even over the local company intranet, the instructional technologies allow for high-end graphics, some including video and sound, highly interactive real-time chats with typed text and voice, and additional features that allow the teacher and students to create highly effective learning environments. Boehle (2005) states that companies are seeking a "complete approach" to e-learning and seeking learning management software, content, authoring, collaboration tools, and assessment tools from one source that is cohesive in nature.

Learning Management Software. At the heart of an online training, is the learning management software. Bersin (2005) stated that not one single learning management software vendor has more than 15 percent of the market share. Learning management software is an application that be used for classroom administration, e-learning delivery, administration of compliance, hosting various content, assessment capabilities, and much more (Bersin, 2005). While many organizations implement instructional technology without the use of course management software, it does integrate an online course. Chapman (2005) defines learning management systems, as software that automates the administration of training events. The term describes software applications that track training, and include log-in, authoring, course management, chat, and discussion boards.

In academia, Blackboard and WebCt are two of the most widely recognized applications. In addition to these commercial applications, there are many platforms that are available to individuals that are open source. Open source software provides access to the source code. The distribution terms of open-source software must comply with the following criteria (1) free distributions, (2) include source code or easy access to source code, (3) derived works, (4) integrity of the author's source code, (5) no discrimination against persons or groups, (6) no discrimination against field of endeavor, (7) distribution of license, (8) licenses must not be specific to a product, (9) license must not restrict other software, and (10) license must be technology-neutral. A few examples of these open source programs that are available include Moodle (www.moodle.com), Sakai (www.sakaiproject.org), and Atutor (www.atutor.ca). These packages are very attractive to use in the creation of online or blended training for organizations. While there is no cost for the open source software, Young (2004) states "the time and effort required to install and modify the programs" (p. B12) is hard to estimate. The course management software will allow for the creation of a learning portal for an organization.

While there has been limited research on learning management software, at the Training Expo in New Orleans (2005) Bersin presented findings from "the industry's first objective analysis of the customer experience" (p. 30). The study found that those having the learning management software hosted externally were more satisfied than those who host internally. Additionally, those with smaller budgets were more satisfied no matter the size of the company. It was suggest that this finding is possible because organizations with smaller budgets might have to simplify the learning management software. Finally, federal sector organizations had higher levels of satisfaction with learning management software than corporate organizations. Highly rated support services for the learning management software related to overall satisfaction. This study also reported that the drivers of dissatisfaction include owning more than one learning management system, departmental or divisional learning management software, and internally developed systems. Additionally, very large populations that integrate the learning management software tend to report more dissatisfaction. Bersin (2005) also reported that there was dissatisfaction of *how* the learning management system integrates with the organizations enterprise resource planning and human resource systems.

Synchronous Learning Tools. Within the field of human resource development there are a number of synchronous instructional technologies used in training. Synchronous instructional

technologies allow for real-time interaction between trainers and trainees. Synchronous learning tools that will be presented include instant messaging, chat room, and real-time video conferencing.

Instant messaging can be a formal method of instructional technologies used in training. This technology is typically used when live interaction is needed by a small group of people. While much of the learning management software allows for small group functions, programs such as AOL Messenger (www.aim.com) and Yahoo Instant Messenger (www.yahoo.com/messenager) are both well suited technologies for communicating. Instant messaging is a great method for individuals to work on group projects, to share files, and to even communicate via voice. These tools can sometimes be more difficult for larger groups. One great use of instant messaging is to answer real-time questions. At the University of Illinois, the online HRD program uses instant messaging programs to respond in real-time to questions from their distance education students; which helps improve the satisfaction of the trainees.

There are many different types of programs that have a chat room feature that can be used in training. Chat rooms can provide an excellent way for trainers to provide material in a lecture format. Chat rooms can be used to deliver traditional lectures and provide an opportunity for interactions between the trainer and trainees. The chat rooms can also provide a time for students to ask questions or get clarification on topics. While chat rooms do have the drawback that to participate live everyone must be logged on at the same time, many offer a feature to archive the text from the chat for trainees to go back and review.

One example is the chat module from the open source learning management software called Moodle. The chat feature was used in an Essentials of Human Resource Management Training program offered at the University of South Carolina. This feature allowed the trainees and trainer to communicate in real-time live. A similar program offered through Cornell University implemented a program called WebEx to conduct live chats. WebEx allows trainees to visually see the trainer. This program has many features and can be explored in more detail online (www.webex.com). While there are many different applications that allow for chats, there are some features that make each unique. One unique feature on many of the current chat programs that are designed specifically for training is the ability to show the participants documents from the instructor's computer. It is possible with some of the chat programs to show the participants, in the chat room\classroom, the instructors screen and with some of the programs it is even possible to allow the participants to surf the web with the instructor. With this feature, the instructor can go to a web site, and the trainees computer will bring up the same web site. Polling is another feature on many of the chat programs that have been designed for training. This feature allows the trainer to ask questions and get feedback in a tallied format from the students. All of these features allow the facilitator to create an interactive chat room for trainees that mimics a traditional classroom.

Variations of a chat room have been developed to deliver online training. For example, Aragon and Bartlett (2003) presented *An Online Professional Development Program for Occupational and Academic Community College Faculty* at the Illinois Online Conference. This conference presentation was delivered from a distance and included live interaction with the participants in a virtual classroom. The 2006 Illinois Online Conference offered chat room sessions for live traditional text-based chat, audio poster sessions with pre-recorded audio and slides, audio blogs with messages posted via phone, web poster sessions with links to websites created from the conference, and virtual classrooms that offered live web audio and interaction. This type of conference provides access to many individuals and reduces the barriers to participate in human resource development such as time off work, travel budgets, and selecting a limited number of conferences. Instructional technology offers a cost efficient method for professional development. The instructional technology to support an online conference also allows for archiving of

presentations to be viewed at later dates. This is just one example of how a professional conference has implemented instructional technologies, a variation of a chat room, within human resource development.

A highly interactive form of synchronous technologies is video streaming. A drawback to live video streaming is the bandwidth needed. Two way interactive video is being used frequently in training. While many of the examples in business and industry are proprietary, organizations such as Two Way Interactive Connections in Education (TWICE) offer field trips, shared classes, and professional development through video conferencing. Indiana State University offers HRD and Career and Technical Education training through a two-way video conferencing system.

Another form of human resource development that has been offered by the National Center for Career and Technical Education (NCCTE) is in the form of Webcasts. Since 2001, the NCCTE has been conducting Webcasts with experts from the Ohio State University. These Webcasts cover a variety of topics in the career and technical education field. The Webcasts provide the profession access to the experts on specific topics. A traditional web browser, a multimedia computer, and a web address for the broadcast is all the participants need to receive the training. A typical Webcast starts with an introduction of the participants, the participants speak on the topic, and then a chance is provided for questions. While those in the audience at Ohio State University have a chance for questions, additionally the NCCTE staff has a moderator monitoring a live chat room that also fields questions for the experts. The moderator then asks the presenter the questions over the live Webcast. These Webcasts are then archived and available at a later date for viewing. Archives have been used in different professional development programs and are a great example of how instructional technologies can be used to develop human resources.

Boehle (2005) presented the next generation of e-learning as simulations. Interactive online simulations allow the simulation of business environments and create situations in which the participants work in teams and make decisions. Active learning in the online environment creates situations where the participants learn by doing. One strength of this type of learning is the ability for trainees to explore cause and effect relationships. The Gartner group predicted that simulations will be the largest experiential learning technique used online. Ray Vigil of Humana reported a 14 to 1 return on investment from using simulations to help executives make decisions!

Finlay, Desmet, and Evans (2004) stated that much of the literature finds that there is no significant difference between face-to-face instruction and online in terms of performance. McDonald and Bartlett (2000) found that there was no significant difference in face-to-face when compared to online instruction in terms of performance. However, the online group had a significant higher level of satisfaction. In both of these studies, the significant difference, an increase in satisfaction, was explained by the use of the technology. The synchronous technology allows for the mimicking of a traditional classroom. Yu (2003) also found that when students are working cooperatively, anonymity and decreased proximity made the students experience a higher satisfaction. While not much has been presented to document a difference in learning in terms of performance, there has been documented increases in student satisfaction.

Asynchronous Instructional Technologies. Asynchronous is defined as an event that is not coordinated in time. Asynchronous instructional technologies are then defined as instructional technologies that do not work require real-time interactions. The technology allows the participants to be at different locations and be online at different times. Examples of asynchronous technologies include announcements, email, blogs, discussion boards, and pre-recorded lectures.

While not the most eloquent technology to use as an asynchronous tool for training, e-mail is widely used to provide announcements, updates, and feedback. This allows the participants to ask questions and the facilitator does not have to be at the computer to answer. While this is not

typically thought of as an instructional technology, it is one of the most commonly used tools. By sending answers to all students in a class, when one student asks a question, is an effective technique. Many of the learning management software have similar features that allow facilitators to post announcements and send messages.

Discussion boards are another instructional technology used in training and development settings. The discussion boards can be used for specific course assignments and allow students to participate and interact with each other. The discussion boards can also be used to create a general discussion area for students to share information on topics that were not facilitated by the instructor sometime called common space. Discussion boards allows for the information to be archived and saved over time. When implementing the case study instructional strategy in a training course, discussion boards are a great tool. One advantage of a discussion board is that people can go back and view them at a later date. Organizations can take information from these types of sources and even create archives of frequently asked questions to share knowledge.

A new form of asynchronous communication that is being used in training are weblogs, more commonly known as blogs. A blog "refers to a personal web page, kept by the author in reverse chronological diary form (Wagner, 2003, p. 131). Wagner (2003) suggest the extension of the learning log concept (Baker, 2003) and allow students to create the log in the form of a blog. Additionally, blogs can be used to archive individuals learning and develop a personal diary of learning. While much of the software for blogs (Blogger, Blogspot, MyPHPblog) allows for quick publishing of traditional text based information and pictures, blogs do come in many different styles and formats. Traditional Blogs are in a text based format. Recently newer blogs have even been created that have video and audio capability.

Du and Wagner (2005) have used learning logs in an MBA course. The findings from their study suggested that the performance on the weblogs could be used to predict performance on exams. This was hypothesized since the weblogs appear to promote constructivist learning, provide reinforcement and provide accountability. Furthermore, with the open nature of blogs, it is suggested that researchers examine blogs for learning situations in both formal and informal settings.

Lectures, if recorded, are a form of asynchronous communications. Like many of the other instructional technology, there is a spectrum on which this technology exists. Lectures can come in the format of a traditional typed page in a PDF or traditional word processing format (RFT, DOC, TXT) and others provide lectures in a presentation format in a more traditional PowerPoint format. Lectures in PowerPoint can be in a format that includes audio which is commonly referred to as a voiceover. Additionally, programs such as OnCue by Impactica, RealPresenter, and others allow the facilitator to incorporate video, audio, PowerPoint, and text. A major advantage to these types of lectures is that they can be delivered in a variety of methods. It is possible to save this information to a DVD or CD and allow the participants to view it on their own time and be reviewed as needed. Additionally, these types of lectures can be delivered over the Internet with technologies such as plug-ins and/or java enhanced browsers. If saved in the correct format, these types of technologies allow for Webcasting. This allows participants flexibility in when and where they would be able to complete the training.

Another form of asynchronous technology that can be used in the delivery of training is self-introductions. The self-introductions can be done in a variety of manners. Much of the learning management software has an area that allows users to create a profile. In the profile typically the participant can share a photo, general information, and contact information if desired. This type of information is useful for training groups working in teams to share instant messenger and email addresses.

While not exhaustive, the formal training with instructional technology provides many examples of how HRD implements instructional technology. Both synchronous and asynchronous technology have advantages and disadvantages for use in HRD. It is important that the instructional technology matches the goals of the training. In additional to formal training, informal training implements instructional technologies.

Informal Training

Informal training is defined in contrast to formal learning. "Informal learning is usually intentional but not highly structured…When people learn incidentally, their learning may be taken for granted, tacit, or unconscious." (Marsick and Watkins, 2001, p. 25-26). Examples of informal learning can include "self-directed learning, networking, coaching, mentoring, and performance planning that includes opportunities to review learning needs" (Marsick and Watkins, 2001, p. 26)

Many of the technologies that have been described above for formal training can also be used in informal training settings. Having a course designed and available without an instructor present provides a setting that supports self-directed learning. Learning management software can be used to design this type of course and make it available to employees. Instant messenger can be used to help individuals in work teams learn in informal settings. This technology can be used to see answers to questions on an 'as needed' basis. An example of informal training using a Blog can be seen at the University of South Carolina. The Technology Support and Training Management Department implements a blog with their current students to share information on classes and special announcements. This type of forum can also be used in a formal business setting. Some executives are using blogs to share information with employees. While this might not be recognized a formal instructional technology, it can be viewed as the modern day water cooler for sharing information.

Coaching is one of the fastest growing techniques for human resource development. A 2005 Training and Development survey, conducted by the Chartered Institute for Personnel and Development in the U.K., reported that 88% of the organizations were using coaching as a technique in their organization for employee development. Rossett & Marino (2005) illustrate in an applied article that coaching is progressing to incorporate internet technologies such as instant messaging, discussion boards, and email. While much of the literature reports a lack of empirical studies in the area of coaching, Wang and Wentling reported in 2001 that providing distance based coaching did, in fact, positively impact transfer of training. Coaching practices are being implemented into a variety of business situations including managers seeking to improve the performance of employees, senior level successful executives attempting to mentor promising stars, or even team leaders seeking to develop high performing work teams.

Evaluating Instructional Technologies in HRD

Evaluation is important in all aspect of HRD, however it is extremely important when using new instructional technologies for training. Providing evidence of what is working is essential to ensure that money is not being spent unwisely in training. An effective and scientifically sound form of evaluation that could take place is the design of an experiment. Since this section does not have sufficient length to discuss all of the different formats for experimental design, a text such as *Experimental and Quasi Experimental Designs for Generalized Causal Inference* by Shadish, Cook, and Campbell (2002) is recommended as a reference tool. This section proposes an approach to evaluation of training based on Swanson's (1995) Results Assessment System. This approach includes three domains of assessment: performance results, learning results, and perception results. Additionally it incorporates an experimental design.

Figure 2 illustrates the Solomon Four Group design described by Campbell and Stanley (1963).

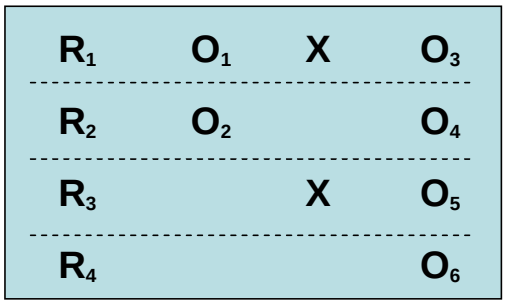


Figure 2. Solomon Four Group Design

R = random assignment to group O = Measure X = Training (Treatment)

R_1 = pre-test experimental group (received training) R_2 = pre-test control group (no training)

R_3 = no pre-test experimental group (received training) R_4 = no-pretest control group (no training)

----- = random assignment of group to treatment

O_1 & O_2 = Pre-tests O_3, O_4 O_5 & O_6 = Post-tests

The process first sets out to define the group that is being trained. If at all possible, it would be best to divide the group randomly into four sections. Then assign each of the four groups randomly to one of the four sections (experimental group with pre-test, experimental with post-test only, control group with pre-test, and control group with post-test only). If random assignment to groups and random assignment of groups to treatment is not possible, a quasi-experimental design can be implemented. The process sets out to first measure the individual's performance, perceptions, and knowledge to provide a baseline (pre-test score). However, to control for internal validity (the testing effect) only two of the groups will be given the pre-tests. Additionally, at this initial outset it is important examine barriers for transfer of the training to the workplace. If individual's measures (perceptions, knowledge, and performance) are high, no training intervention may be needed however, if the measures are low then training can be implemented to the experimental groups (groups identified in rows with an X in figure 1, R_1 and R_2). The training that implements instructional technologies should directly impact trainee in the areas of learning and perceptions. Additionally, learning and perceptions will impact on each other, barriers to transfer, and the results (workplace performance). After training is conducted, it is suggested that the trainees' perceptions, learning, and the results in terms of post-test scores be measured. Specific measures are based on the content of the topic for the areas of perceptions, learning, and results. If there is a significant difference in the measurements from the groups that received training than those that did not, it would then be beneficial to provide training to the control groups. A basic statistical test such as a t-test or an anova could be used to compare the scores of the groups.

While this method to examine the use of instructional technology appears complicated and time consuming, it is needed to provide a solid scientific data for evaluation. Since many times it is not possible to provide training to everyone in an organization at one time, this method can take advantage of that and offer a means to evaluate based on delivering training at different time periods. Additionally, if the training is not effective it would eliminate the possibility of delivering poor training to everyone in an organization at one time. This method controls for the threat of testing, history, maturation, instrumentation, mortality, regression to the mean, selection, and selection-interaction with the other threats. This method will help develop a literature base

for researchers and practitioners to share what works effectively in terms of instructional technology for HRD.

Changing Role of the HRD Professional

It has been quite obvious how instructional technologies have impacted the process of training and development. Furst-Bowe (1996) stated that the HRD professional does not need to concentrate on the development as much as the use and evaluation of instructional technologies. The changing technologies have offered a variety of methods to deliver training, reduce costs, and provide many options for training. How this impacted the HRD professional is not the question. The question is how much it has impacted the role of the HRD professional. First, technology is changing many of the solutions available for the HRD professional in the areas of learning and performance in addition to changing many of the traditional administrative tasks. However, the role of the HRD professional is still to help improve the organization and individual. The traditional trainer is identified as a coach or facilitator, not someone that stands up in front of classroom and delivers training. He or she needs to be skilled in instructional design, organizational change, and organizational behavior. Since HRD is defined broadly, the implementation of technology and the use of instructional technology is impacting the role of the HRD professional. While the overarching theories are similar and the models are still appropriate, the areas of design and develop have been impacted the most.

When moving training from a traditional setting to an online setting, adapting to changes are major concerns of many trainers. Yang (2004), states that online training is widely accepted as being student-centered whereas traditional training is viewed as instructor-centered. This shift has changed the roles of trainers from lecturers, in a traditional setting, to facilitators, in an online environment (Ascough, 2002, Volery, 2000, & Knowton, 2000). Trainers are concerned with facilitating well-considered discussion that will be thought provoking for trainees (Kettner-Polley, 1999), perceptions of trainees motivation and learning (Wu & Hiltz, 2004), changing roles of facilitators (Murihead, 2000), and becoming instructional designers (Zheng & Smaldino, 2003). Online instructors are further concerned with the responsibility to provide technical support to students (Murihead, 2000), shifting materials to online course management software, and interacting and connecting with trainees at a distance (Volery, 2000); all while maintaining other more traditional responsibilities.

Future Trends and Impact on HRD

The future of instructional technologies in HRD is hard to predict. It is apparent that HRD and instructional technology have grown out of the instructional media field (Rosenbeerg, 1982). The fields have begun to merge: while the instructional technology field focuses more on learning and the HRD focuses more on business and performance, both work jointly to improve performance.

With the increase in bandwidth when using Internet technology and the growing number of individuals with computer access, the possibilities are endless. With the push to open source learning management systems,it is possible for many organizations to afford instructional technologies for training. The use of strong evaluation to demonstrate what is working will provide a positive impact on HRD. HRD professionals collecting and providing evidence of success in terms of strategic business areas will additionally help the profession strengthen.

Instructional technologies are creating many opportunities for informal learning. Additionally, many of the instructional technologies mimic a business environment that is today calling for global collaboration, continuous learning, and knowledge management. If used strategically, the instructional technologies can be used to create a learning culture and help keep competitive advantage. This can help in the creation of an organization that has the ability to foster learning.

Conclusion

In conclusion, HRD initiatives are implementing instructional technology widely. While there is a great deal of literature on the use of instructional technology in human resource development, there is not as much research on the effectiveness of the instructional technology. More research is needed to evaluate the impact of instructional technology and specifically how the instructional technology impacts the strategic goals of organizations. Metrics are needed to assess the impact of instructional technology. Since instructional technology in HRD is used in such a wide variety of settings, providing scientific methods to view effectiveness would be useful. Additional research on informal learning would strengthen the case for its use in HRD.

Further development is needed in research and theoretical foundations in the area of HRD instructional technology use. Since instructional technologies are changing the role of the HRD professional, it would be useful to examine the traditional frameworks to see the impact of instructional technology. For example, does the traditional androgogy model fit with the use of instructional technology in HRD. Instructional technology will continue to be used in developing human resources in the workplace. A better understanding of how instructional technology and human resource development work together will improve the development of human expertise.

References

Ahern, T. & Repman, J. (1994). The effects of technology on online education. *Journal of Research on Computing in Education, 26*, 537- 546.

Aragon, S. R., & Bartlett, J. E., II. (2003, February). An online professional development program for occupational and academic community college faculty. Presented at the Illinois Online Conference.

Ascough, R.S. (2002). Designing for online distance education: Putting pedagogy before technology. *Teaching theology and religion, 5*(1), 17-29.

Association for Educational and Communications Technology. (2004). AECT Definition and Terminology Committee document #MM4.0. Available at http://www.indiana.edu/~molpage/Meanings%20of%20ET_4.0.pdf

Baker, J. (2003). The learning log. *Journal of Information Systems Education, 14*(1), 11-13.

Benson, A.D., Johnson, S.D., & Kuchinke, P. K. (2002). Information technology in the workplace: A framework for HRD. *Advances in Developing Human Resources, 4*(4), 392-404.

Bersin & Associates. (2005). An industry analysis of the customer experience with learning management systems. Available at http://store.bersinassociates.com/lms-custsat.html

Boehle, S. (2005). The State of the E-learning Market. *Training, 42*(9), 12-16.

Boehle, S. (2005). Simulations: The next generation of e-Learning. *Training, 42*(1), 22-31.

Campbell, D. & Stanley, J. (1963). Experimental and quasi-experimental designs for research. Chicago, IL: Rand McNally

Chapman, B. (2005). LMS knowledge-base 2005: In-depth profiles of 52 learning management systems with custom comparison across 200+ features. Available online at: http://www.brandonhall.com

Chartered Institute of Personnel and Development. (2005). Annual survey report 2005. Available at http://www.cipd.co.uk/NR/rdonlyres/271CD424-507C-4E4A-99B6-1FAD80573E4A/0/traindevtsurvrept05.pdf

Dick, W. and Cary, L. (1990). Systematic Design of Instruction (3rd ed.). Glenview, IL.: Scott Foresman.

Du, H. & Wagner, C. (2005). Learning with Weblogs: An Empirical Investigation. Proceedings of the 38th Hawaii International Conference on System Sciences. Hawaii.

Finlay, D., Christy, E. & Evans, L. (2004). Is It the Technology or the Teacher? A Comparison of Online and Traditional English Composition Classes. *Journal of Educational Computing Research, 31*(2) 163-80.

Furst-Bowe, J.A. (1996). An Analysis of the Competencies Needed by Trainers to Use Computer-Based Technologies and Distance Learning Systems. *Performance Improvement Quarterly*, *9*(4), 57-78.

Hochberg, J. (2006). Online MBA Programs: Emulating Global Business. Distance Education Report, 10(2), 2 7-8.

Illinois Online Conference. (2006). Illinois online conference for teaching and learning. Available at http://www.ilonlineconf.org/index.cfm.

Lee, W. & Owens, D. (2000). Multimedia-based instructional design. San Francisco: Jossey-Bass Pfeiffer.

Kettner-Polley, R.B. *(1999).* The Making of a Virtual Professor. *ALN Magazine*, *3*(1).

Knowlton, D. S. (2000). A theoretical framework for the online classroom: A defense and delineation of a student centered pedagogy. *New Directions for Teaching and Learning, 84*, 5-14.

Kuchinke, K. (2000). Debates over the nature of HRD: an institutional theory perspective. *Human Resource Development International, 3*(3). 279-283.

Kuchinke, K. (2001). Why HRD is not an academic discipline. *Human Resource Development International, 4*(2) 291-294.

Marsick, V. & Watkins, K. (2001). Informal and incidental learning. *New Directions For Adult and Continuing Education, 89*, 25-36.

McDonald, M., & Bartlett, J. E., II (2000). Comparison of web-based and traditional delivery methods in a business communications unit. *Delta Pi Epsilon Journal, 42*(2) 90-100.

Muirhead, W.D. (2000). Online education in school. *The International Journal of Educational Management, 14*(7), 315-324.

National Center for Educational Statistics (2000). Classification of Instructional Programs: 2000 Edition. Available at http://nces.ed.gov/pubs2002/cip2000/.

North Central Regional Educational Laboratory. (2006). Glossary of educational terms and acronyms. Available at http://www.ncrel.org/sdrs/areas/misc/glossary.htm.

National Dissemination Center for Research in Career and Technical Education. (2006). Professional development series speakers webcasts. Available at http://www.nccte.org/webcasts/index.asp.

Rosenberg, M. (1982). Our Instructional Media Roots. *Performance and Instruction, 21*(3), 12-15.

Rossett, A. & Marino, G. (2005). If coaching is good, then e-coaching is… *Training and Development, 59*(11), 46-53.

Seels, B. and Richey, R. (1994). Instructional technology. Bloomington, IN: Association for Educational Communications and Technology.

Shadish, W., Cook, T., & Campbell, D. (2002). Experimental and quasi-experimental designs for generalized causal inference. Boston: Houghton Mifflin.

Swanson, R. A. (1995). Analysis for improving performance: Tools for diagnosing organizations & documenting workplace expertise. San Francisco: Berrett-Koehler

Swanson, R.A. and Holton, E.F. (2001). Foundations of human resource development. San Francisco,CA: Berrett-Koehler.

TWICE. (2006). Two way interactive connections in education. Available at http://www.twice.cc/.

Volery, T. (2000). Critical success factors in online education. *The International Journal of Educational Management, 14*(5), 216-223.

Wagner, C. (2003). Put another (B)log on the wire: Publishing learning logs as weblogs. *Journal of Information Systems Education, 14*(2). 131-132.

Wang L. & Wentling, T. (2001). The relationship between distance coaching and transfer of training. Paper presented at the Academy of Human Resource Development Proceedings, Tulsa, OK.

Weinberger (1998). Commonly held theories of human resource development. *Human Resource Development International, 1*(1), 75-94.

Wu, D. & Hiltz, S. R. (2004). Predicting learning from asynchronous online discussions. *Journal of Asynchronous Learning Network, 8*(2), 139-152.

Yang, Y., Cornelious, L. (2004). Ensuring quality in online education instruction: What instructors should know? Association for Educational Communications and Technology, Washington, DC.; Association for Educational Communications and Technology, Chicago, IL, Oct 19-23, 2004

Young, J. (2004). Sakai project offers an alternative to commercial course-management programs. *Chronicle of Higher Education, 51*(5), B12.

Yu, F. (2003). The mediating effects of anonymity and proximity in an online synchronized competitive learning environment, *Journal of Educational Computing Research, 29*(2), 153-167.

Zheng, L. & Smaldino, S. (2003). Key instructional design elements for distance education. *The Quarterly Review of Distance Education, 4*(2), 153-166.

Key Terms and Definitions

Asynchronous Learning Tools – Learning tools to support the education of students at different times and different locations (e.g. discussion boards, e-mail, and message posting).

Blog –an individuals web page, that is kept in reverse chronological format similar to a diary. An online diary. The term blog was coined by John Barger in 1997 and stands for we(b) log.

Human Resource Development – Use of career development, organizational development, and training and development to improve individual, group, and organizational performance.

Informal education – Learning occurs outside of a structured learning experience.

Instructional Technology – "the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources" (AECT, 2004).

Learning Management Software – Typically a suite functions that is web-based, for online instruction. Core features includes threaded discussions, web pages for presentations, email, chat, synchronous collaboration tools, shared workspace, upload functions for submitting assignments, and functions to evaluate students.

Open Source Software - provides access to the source code and additionally the distribution terms of open-source software must comply with the following criteria (1) free distributions, (2) include source code or easy access to source code, (3) derived works, (4) integrity of the author's source code, (5) no discrimination against persons or groups, (6) no discrimination against field of endeavor, (7) distribution of license, (8) licenses must not be specific to a product, (9) license must not restrict other software, and (10) license must be technology-neutral.

Synchronous Learning Tools – Learning tools that support the process in which the instructor and students interact concurrently. This can take place in a virtual classroom through video conferencing, real time web-based broadcasting, or chat.

About the Author

James E. Bartlett, II, Ph.D.
University of South Carolina – Columbia
Department of Retailing
Carolina Coliseum
Columbia, SC 29208

803-777-6763

jbartii@sc.edu