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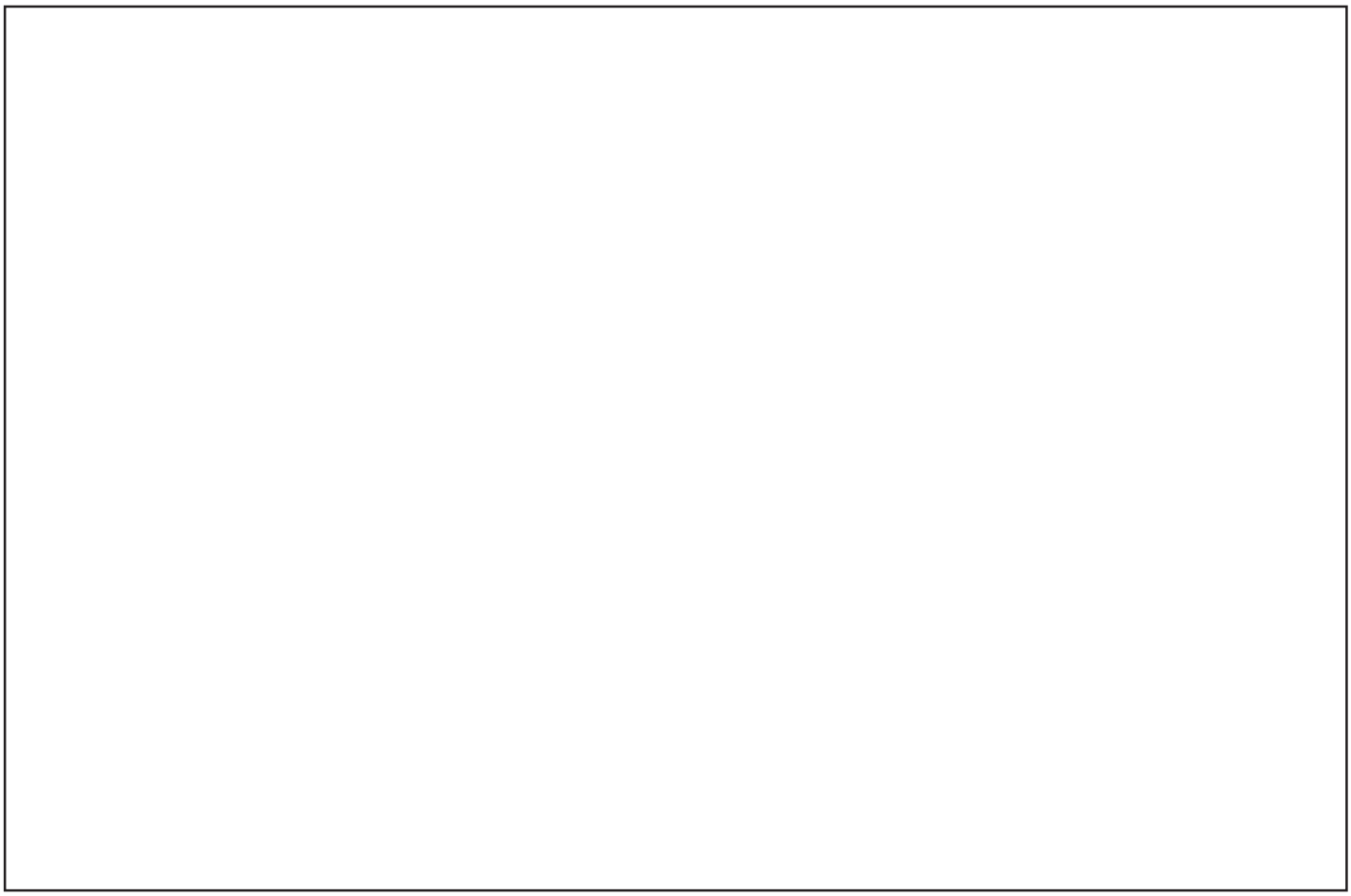

Teachers College, Ball State University

Special Issue—Internet in the Classroom

On the Cover

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Four copies of the manuscript should be submitted typed double-spaced (including quotations and references) on $8^1/_2$ x 11 paper. Only words to be italicized should be underlined. Abbreviations and acronyms should be spelled out when first mentioned. Pages should be numbered consecutively, beginning with the page after the title page. Manuscripts should be less than 20 pages long. An abstract of less than 100 words should accompany the manuscript.

The manuscript will receive blind review from at least two professionals with expertise in the area of the manuscript. The author's name, affiliation, mailing address, telephone number, e-mail address (if available), should appear on the title page only. Efforts will be made to keep the review process to less than four months. The editors reserve the right to make minor changes in order to produce a concise and clear article. The authors will be consulted if any major changes are necessary.

Manuscripts should be sent with a cover letter to:

Deborah L. Bainer, *MWER* Co-Editor
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Successful Implementation of Technology into the Educational Process

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If a university is to step successfully into the 21st century it must rely upon and use technology effectively. To do so the university must create an environment conducive to learning about technology by students, faculty, and staff. The day of the mainframe or the occasional desktop PC is no longer sufficient. This is especially true when one considers the level of understanding a graduate must have about technology when one is hired in almost any field. Today's requirements on a college campus include networked mainframes, PCs and Macs, peripheral tools that extend the functionality of the desk top or laptop computer and access to the Internet so that students and faculty can benefit from the power of the computer as well as the increased connectivity the system provides.

Like many campuses, the introduction of the computer and initial networking involved mainframe technology. Little attention was given to the academic side of the institution and its use of networked systems. However, with the advent of the microcomputer, utility, functionality, and usefulness of networks became a mainstay of academic life. The problem facing the university then and now is how to finance a necessity which experiences a half life that is the anathema of every budget planner trying to create a learning environment for students who will be faced with using computer technology upon graduation.

The initial step was to introduce computer technology and its capabilities to faculty. The agenda was not to force faculty to use the technology, but to make it available to those who were interested, to provide workshops on how to effectively use it, to provide technical support for answering questions, and to repair equipment. As faculty became aware of the potential associated with the technology, there was an increasing use of computers in research and with students. Increased student use led to the development of campus computer labs reserved for students.

As faculty and students have become more accustomed to using multimedia and as commercial products that enhance the learning process have become available, there has been a growing interest in being able to use multimedia to an even greater degree in the classroom. Ball State created the Teleplex to provide multimedia development capabilities for faculty on campus and for those who are teaching via television to distant sites across the state and country. This semester, there are 117 hours of weekly programming for distance education using one-way video and two-way audio, with students present in the classroom as well as at the distant sites. Although this is a very effective means of providing education to students who cannot attend classes on campus, there are still concerns about the effectiveness of the learning environment.

One specific problem, recognized by Dr. Jay Thompson, was the fact that there was not sufficient student interaction in the distance education classes, even though the two-way audio attempted to resolve the issue. He proposed using the Internet in conjunction with the way the distance education courses are typically taught. Due to the complexity of Dr. Thompson's proposal, and because of his self-professed lack of knowledge about this technology, a team was formed from a number of areas across campus to assess the situation. What resulted from this team effort was the "Class Page".

Project "Class Page" was initially devised as a supplement to the televised distance education course for the purpose of increasing interaction among students and with the professor. However, it quickly evolved into a more integrated package which allowed the professor to place all course materials on an Internet accessible server, use e-mail between students as well as between the professor and students, have threaded discussions, utilize bulletin boards for sharing student work and ideas, explore hot links to Web sites with particular relevance to the class, and conduct electronic quizzes, exams, and surveys.

To assure ease of use, templates were created so professors would not have to learn HTML, but could simply select the menu features desired and add the appropriate content to the various sections selected. The tools supporting the "Class Page" were entirely Web-based. Configuration difficulties typically associated with software were kept to a minimum to maintain the focus on learning. As the "Class Page" evolved, it achieved the objective of increasing student interactivity in televised distance education, and it supplemented on-campus courses and established the groundwork for entirely Web-based courses. The following articles document the processes, issues and concerns this team faced to deliver more effective instruction. As a result of these efforts, instruction and learning on the Ball State University campus have been impacted in positive ways.

Since the beginning of the "Class Page" project, over 200 Ball State faculty have attended workshops to learn how to use the "Class Page" format for on-campus and distance education courses. Electronic, as well as individual, networking has created an environment that truly promotes learning. To facilitate such successes a university must provide the infrastructure, personnel support and the tools needed by faculty and students. Encouragement, incentives and direction, followed by stepping out of the way and letting instructional opportunities flourish, provides a recipe for successful integration of technology on campus.

Enhancing Classroom Interaction in Distance Education Utilizing the World Wide Web

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Abstract

This study utilized the World Wide Web and a "Class Page" to evaluate interaction strategies in a distance education setting. Participants were primarily elementary school teachers (n= 47 graduate students) who completed survey instruments concerning their participation on the "Class Page", interactions with both the instructor and other students, and utilization of linked Web resources. An initial survey regarding students' computer literacy skills and usage proficiencies was followed by seven additional surveys which focused upon "Page" use and interaction patterns. Among the findings were: student views regarding the value of getting to know fellow classmates shifted from zero percent (Week 2) to 88 percent (Week 15); students judging they were able freely to express their views went from 11 percent (Week 2) to 91 percent (Week 15). Increases were also noted concerning student out-of-class participation, enjoyment using the Internet, use of e-mail, and appreciation of the distance environment tools for encouraging involvement and interaction. Although many students questioned the usefulness of the "Page" at the beginning of the semester, the final survey found all students viewed the "Page" as beneficial. Analysis of the data found both interaction and class involvement were greatly enhanced through the "Class Page" and the Web based tools which supported the "Page" in this distance education environment.

Introduction

The Internet, specifically the World Wide Web, has the potential to reinforce and enhance university teaching and learning. It is beginning to have a massive impact upon faculty and students on many college campuses. Jeffrey R. Young reported in the *Chronicle of Higher Education* that UCLA "will provide a Web page for every course in its largest unit, the College of Letters and Science", by the beginning of the upcoming Fall 1997 Semester. This promise "amounts to a revolution in the way the university views the Internet" (*Chronicle of Higher Education*, August 1, 1997).

Much of the hype behind this clamor has been based upon reported early successes of Web class pages. As a result, some colleges and administrators have concluded such pages should become universal because the utilization benefits of this powerful communication strategy have been so obvious. The easy access to information and learning activities provided through the Web create a newly defined learning environment. The dynamic and pervasive nature of Web technologies make the prospect of gaining access to information, communication, and learning through this format an educational transformation that is just beginning to emerge.

The example from UCLA is common at many universities; however, these developments raise questions such as: What data have been collected regarding both learning effectiveness and student experiences utilizing Web based technologies? What strategies are planned to assist technophobic faculty in developing the requisite skills to develop learner focused Web pages? What type of technical support is needed to develop dynamic interactive uses of the Web? Does the Internet provide the educational promise that seems so real? Will this technology stimulate faculty and students to teach and learn in different ways? Can learning communities be developed and sustained utilizing this technology?

Purpose and Methodology

Educational theorists have long claimed that effective learning is enhanced by the active involvement of the learner (see: Rotter, 1954; Rogers, 1969; Astin, 1984; Holmberg, 1989; and Johnson & Johnson, 1994). If learning requires interaction among learners, then educators need to develop and assess strategies that encourage interaction in the educational setting. It is critical to plan for interactivity in a distance education setting in which one way video with two way audio is utilized as the delivery system, as was the case in this study environment. The specific focus of this study was a distance education classroom that utilized the World Wide Web and a "Class Page" designed and developed for a specific graduate level course in Curriculum.

The purpose of the study was to collect data regarding the impact of utilizing an asynchronous "Class Page" to en-

hance: (1) interaction between the instructor and students, (2) interaction between students and peers at different sites, and (3) student utilization of Web resources provided through the "Class Page".

The participants were primarily elementary school teachers (47 graduate students) enrolled in a television course entitled "Elementary School Curriculum" (EdCur 610) during the Spring Semester, 1997. Data were collected through the use of survey instruments developed to determine participants' perceptions and actions regarding the "Class Page" and their interactions with both the instructor and other students enrolled in the class. An electronic Web compatible survey software, "**inQsit**", developed by the University Computing Services at Ball State University, was utilized to collect data through the "Class Page" itself. This resource provided a wide array of survey and questionnaire options: Instruments using Likert type scales, semantic differential formats, single word responses, short answer responses, and essay responses were used to collect the data.

A series of time dated surveys (eight totally) were administered during the semester. Data collected from these surveys were compiled and reported in raw numbers and percentages rounded to the nearest whole number. The resulting frequency and interaction patterns were used to interpret the responses and activities attributed to the "Class Page".

Why Create a "Class Page"?

The "Class Page" was designed and developed to increase student interaction in a typical distance learning environment. The development process was a team effort which involved multiple campus units: the University Computing Services, the Teleplex, the University Library, and the Department of Educational Leadership. The individuals from these units who worked on this team possessed varied and unique skills that were essential to the creation and utilization of an interactive "Class Page".

As consumers of television most adults have learned to be passive in response to this medium, i.e. we view and do not expect to be engaged in dialogue with either the presenter or the topic. To combat this existing learned behavior, the "Page" was designed to promote active student involvement in the learning process both prior to coming to the class and during the live broadcast itself.

Students taking classes at off-campus sites do not have the resource advantages of those on campus. To minimize this problem, a multitude of instructional resources was provided on the "Class Page". For example, the University Library was on the Web and electronically linked to every college and university library in the state. Adding this link made access feasible for each distance site student to any higher education library in the state. Several other library links such as the Library of Congress, a virtual reference library, and several Internet libraries were established to promote accessibility and minimize travel time for securing resources. Numerous Web links were added to promote additional resource opportunities for students, e.g. sites of on-line journals and magazines, specific content areas, state and federal government education agencies, museums, professional organizations, children's resources, teacher resources, and multiple search engines were linked for students to explore and to utilize in preparing for class.

A specific goal of the "Class Page" was to establish a forum for students to exchange ideas, experiences, and successes. This was accomplished through the creation of user friendly pages that enabled the students to post ideas directly on the Web by providing information on a brief form, typing messages, and clicking the "post" button. Three pages utilized this process: (1) "Motivation Ideas," a page where students posted ideas found to be valuable learning activities for elementary students, i.e. classroom successes; (2) "Projects," a page where students posted their work on a project where peers could develop knowledge, provide assistance, and share experiences as the individual or group worked on the activity; and (3) "Discussion Area," a modified newsgroup format where students could discuss class topics and respond to the views of their classmates prior to the class meeting when the topic was discussed. Students could post questions or follow-up discussion items following the class. Each of these public areas was put on the Web for consumption by the instructor, graduate assistants, and class members.

A private forum was needed for student exchanges with the instructor, graduate assistants, and class peers as well as with working class groups. A post office was established with e-mail addresses which linked class members to each other privately. To personalize the post office, a small individual photo icon was added to individual e-mail links. This aspect of the "Class Page" was not monitored by the instructor; however, feedback from many students indicated that this was a valuable aspect of the communication process and one that was used extensively in dialogue with peers, instructor and graduate assistants. The instructor typically received e-mail from two-thirds of the class members weekly. During the semester all distant site students communicated with the instructor through this process.

The instructor prepared a "Class Questions" page as a way of stimulating student thought about specific topics prior to class. This also encouraged and assisted the students in their class preparation. Students were encouraged to dialogue with other students in the "Discussion Area" before the class regarding their experiences and thoughts on the topic. The instructor also provided a "Class Handouts" page. This page included links to Web sites and resources that pertained to the topic and handouts which were scanned and put on the Web site for student use. These were designed to assist the student in locating resources on the topic. They could also be used for the weekly written critiques regarding the topic or area being discussed. Both the "questions " and the "handouts" were designed to enhance class preparation and to make time spent in class more interesting and valuable.

One of the planned purposes of this teaching / learning experience was to model instructional technology and its uses for teachers and schools. Dr. Albert Schweitzer eloquently expressed this concept several years ago when he stated: "Modeling isn't the best way to teach. It is the only way to teach." Classroom teachers and elementary schools need to be exposed to alternative teaching and learning styles. It is essential these be modeled in the university distance learning environment. The old adage "we teach as we were taught" may be all too accurate; however, we need not perpetuate the "talking head" syndrome in distance education. To establish a learning community in the distance education environment it is essential to think about the models utilized in presenting the course content.

The "Class Page" was created to accomplish the following goals:

- to increase classroom interaction
- to provide instructional resources
- to establish a communication forum
- to supplement class preparation
- to create a user friendly site, and
- to model instructional technology

The overarching goal in the developmental process was simple. The instructor wanted what every teacher wants—student involvement and engagement in learning! The challenge was to create a dynamic, interactive learning community in a distance education environment.

Data Relative to the Utilization of the "Class Page"

At the beginning of the semester students were surveyed regarding their computer literacy skills and usage patterns. These data were critical to the success of the project since computer skills were essential to the effective use of Web based technologies. Initially 70% of the population reported they had a personal computer in their home; 92% had a computer available at work. Both were used primarily in word processing tasks. However, only 57% of the available computers had Internet access. The prime Internet provider was America On-line (19% of the total population); these data were of value later because during the semester the only provider that consistently had problems in actively enabling students to use the sites and post ideas to the class Web site were students using the AOL service. This could be explained in part due to the heavy traffic found on this provider's service, but the system interfaces and early software did not support the interactivity available through the "Class Page". Only 54% of the students had previously used electronic mail. Eight percent (8%) of the students enrolled in the class used the Internet on a regular basis; yet, only one in three students had used the Internet more than once prior to this class. Fifty-seven per cent (57%) had never performed any function on the Internet. The overwhelming majority of those enrolled did not have familiarity with newsgroups, chat rooms, or search engines. Only 5% of the population described themselves as being "very skilled" in using this resource. When asked if computer training would be helpful, 72% responded in the affirmative; and 86% requested help in using the Internet. When asked "which computer-related area(s) do you anticipate will be a challenge": 27% indicated finding an available Internet-linked computer; 14% thought personal lack of computer skills would be a problem; 22% expressed discomfort with computer use; 43% expressed concern about getting help with computer related problems; and 30% did not anticipate the above areas would be a challenge.

The above data, combined with additional data not reported here, confirmed an erroneous assumption; we had over-assumed both skill levels and experiences in our population. This challenge was perceived as an opportunity to provide valuable experiences and skills to a group of professional educators and thereby enhance their classroom effectiveness.

The survey administered following the first two weeks of class confirmed our optimism regarding the student perspective of viewing this as an opportunity. Using a five point scale from "strongly disagree" to " strongly agree", 85% of the students agreed or strongly agreed they would learn new computer skills using the "Class Page". Almost four of every five students (79%) indicated they enjoyed exploring the resources available on the "Class Page". Seventy-one per cent (71%) strongly agreed exploring the Internet was an enjoyable new experience.

Frustration was also expressed with the new expectation associated with using this resource. Students did not see the "Class Page" as a way to get to know fellow classmates (no one "agreed" or "strongly agreed" with this statement), and few saw the "Page" as a vehicle to discuss class content (29% "agreed" or "strongly agreed"). Only 11% "agreed" it was a vehicle to express their views. This early feedback indicated we desperately needed to teach the students to utilize the "Page" as a learning and communicating resource. In spite of these frustrations 83% of the students provided specific examples of content or ideas that were helpful to them in the initial classes. In other words, class meeting time was conforming to or exceeding their expectations. This was not a surprise as this was familiar territory for the students based upon their previous class experiences.

Initial attempts by students to utilize the Web technologies pointed out specific problem areas. An early determination was made to avoid as many frustration areas with the "Page" as possible for the students. The first attempt to use e-mail was only marginally successful, as most students at the distance sites did not know the personal password for their VAX account through the University computing system to access e-mail. In fact, most of these students had not previously used the campus computing system. The "Discussion Area" was originally an external newsreader program and students without previous experience using such technologies struggled. Rather than spend time trying to

make what had been proposed work, new solutions were created; early technical failures were rapidly discontinued. The University Computing Services personnel contributed many hours of work to make needed changes and to create user-friendly applications. Ultimately Web based e-mail was developed to correct the first problem, the second problem was changed by developing a Web based newsreader. These early frustrations were intimidating for some students and probably slowed their willingness to engage in interaction through the "Page".

As the semester progressed, more students engaged in utilizing the "Class Page" as a learning resource. At six weeks, 58% of the students indicated they were secure in their use of the "Page"; 62% acknowledged it encouraged out-of-class participation; and two of three students reported they enjoyed exploring the Internet through the "Page". Half of the students reported they found additional class resources through the web sites posted on the "Page", and 77% reported they were using e-mail to correspond with fellow students.

By the 10th and 11th week the feedback on the utilization of the "Page" was becoming increasingly positive. Three of every five students reported the distance learning setting encouraged class involvement. Over three of four students (76%) indicated the "Discussion Area" on the "Page" was encouraging the examination of important topics; 83% of the respondents stated they were gaining important computer competencies; 86% reported the "Page" was user friendly. Regarding the earlier reported fear of personal technical problems, 91% reported they thought the University support provided was very good or excellent. Other aspects of the "Page" were designed to encourage interactivity, and respondents reported course "handouts" as very good or excellent (72%); "class questions" were stimulating for thought and discussion (78%); the notice board was keeping them informed (84%); the linked Web sites were providing valuable educational resources (81%); and the usefulness of the "Page" was judged as valuable (80%). More than four of every five students (83%) gave examples of actions they had taken to make the "Page" valuable to them in out-of-class activities.

A survey administered during the 13th week of the semester found that 66% of the students were regularly using the "Page" to interact with classmates. Only 6% reported they "strongly agreed" with the statement "I am frustrated when using the 'Class Page'." When asked about concerns, two students expressed continuing frustrations with established class expectations, and five described concerns that would be analyzed as positive; e.g., "I have enjoyed this class. Sorry for the delay in the submission of . . .", and "I am always concerned with keeping up with class assignments, but so far it hasn't been a big problem." Seventy-two per cent (72%) of the respondents provided specific examples of concepts or ideas they found helpful from using the "Page" and attending class during the previous week.

The final class survey, a required Faculty / Course Assessment Form, was administered during the 15th week of the semester. Several questions were repeated on this Form to determine if changes had occurred in student perceptions regarding the "Class Page" and the way it was used. The respondents (62%) reported that interactions on the "Page" stimulated critical thinking. Eighty-five per cent (85%) deemed the resources on the "Class Page" to be relevant to course objectives and their learning; and 77% judged the "Page" helped achieve course purposes. When judging the expectations of students using the "Page" 82% reported this was appropriate to their current level of development. Over nine of every ten students (91%) indicated they felt free to express "ideas, judgments, and questions".

The fundamental purpose behind the development of this technology was to increase interaction. Eighty-eight per cent (88%) of the students reported interactions with other students as very helpful in mastering course concepts and competencies. One hundred per cent (100%) indicated peer interaction was very helpful. However, when asked what role the "Page" played in the process of increasing interaction only 50% judged it to be very helpful. One third of the respondents were undecided or had no opinion on this. One can only speculate how individuals at varied sites would interact with individuals at other sites without the technologies provided through the "Page". One additional item asked if "Page" participation encouraged the student to apply concepts and competencies beyond the context of the distance education classroom; 86% reported this indeed was the case. Analysis of written responses to open ended questions found that only one respondent failed to give examples regarding the value of using the "Page" during the semester.

Summary

In the distance education environment it is critical for the instructor to focus upon pre-planned interaction strategy components to enhance involvement and learning. The absence of such planned learner engagement will potentially result in the one way delivery of instructor lecture information with little student interaction with either the instructor or other students. One of the persistent criticisms of distance education has been that the instructional approach used too often has involved what has been called the "talking head" syndrome approach, i.e. information is provided with very little exchange between students and instructor. An alternative to address this concern must consider ways to increase learner efficacy through greater student involvement (Bates, 1995; Sayers, 1996).

This study involved the use of current Web technologies combined with the creation of a user-friendly set of tools to enable the distance education classroom to become more interactive. The course was designed and delivered with the goal of enhancing interaction through the utilization of a "Class Page" accessed on the World Wide Web. This "Page" was developed to promote numerous opportunities for stu-

dents to become actively involved in both course content and interaction with the instructor and class peers.

Data were collected during the course of the semester to develop understandings regarding the potential impact and use of the developed "Page" upon both involvement and interaction on the part of the students. The evidence collected regarding student behavioral changes relative to interaction during the semester was dramatic. The impact of the "Page" upon both interaction and learning was substantiated. Multiple items can be used for illustrative purposes. When students were asked about their views regarding the value of getting to know fellow classmates, perceptions shifted from 0% (Week 2 survey) to 88% (Week 15 survey). An increasing number of students judged they were freely able to express their views (11% Week 2, to 91% Week 15). Increases were also noted across the semester in questions about out of class participation, enjoyment using the Internet, use of e-mail, and perceptions regarding the distance environment tools encouraging involvement and interaction.

At the beginning of the term many of the students had questions or concerns about the potential usefulness of the "Page"; the final survey found that all (100%) viewed the "Page" as useful. The electronic monitoring of the "Page" use found continued increase in use through the fifth week of class, and maintained consistent use on the part of students from the sixth week of the term through the end of the semester. Following completion of the class, over half of the enrolled students requested they be permitted to continue using the resources on the "Page"; this indeed was gratifying remembering the concerns, fears, and minimal Internet skills which existed at the beginning of the semester. The only aspect of the "Page" which was not made available following the end of semester was the e-mail post office as this area needed to be reestablished for subsequent students entering the class the following semester.

The "Class Page" was developed and used to create a valuable connecting bridge that linked instruction with technology. The utilization of this resource greatly enhanced interaction and contributed to the successful learning results which emerged from this distance education classroom. The successes which resulted were based upon the team support provided through the collaboration of dedicated University Computing Services personnel, supportive University Teleplex personnel, and exceptional graduate assistants. As a result, students enrolled in the distance education class, those collaborating to make the technology and instruction effective, and the University community benefitted. The initial goal to enhance distance education classroom interaction utilizing the Web was realized. This learning experience produced a positive impact not only in the distance education classroom, but also in the broader context of an emerging University focus upon technological tools and opportunities to assist instructional delivery.

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Student Perspectives: Responses to Internet Opportunities in a Distance Learning Environment

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Abstract

This qualitative study examined student responses toward an interactive Internet site supplementing a multimedia graduate level distance learning course at Ball State University. The course, "Elementary School Curriculum," was taught in a studio classroom and transmitted to five distant sites in Indiana. Technology included two-way audio signals and one-way video signals for in-class interaction and an Internet World Wide Web site for out-of-class interaction. Qualitative evidence collection techniques included focus group interviews, telephone interviews, and eight survey instruments. Analysis of students' responses to the Internet site focused on coping strategies developed by students to manage the stresses and benefits of their computer involvement. Students reported strategies for managing personal resources, the computer environment, self, and others. Predominant themes in student reactions included concerns associated with communication issues, with computer involvement, and with computer and Internet access. Benefits most frequently identified were the sense of empowerment and the satisfaction of sharing a space with fellow classmates. Implications drawn include the value of moderator leadership, the importance of a face-to-face encounter, the challenge of the on-line text-based medium, the influence of learning and temperament styles, and the development of computer-supported collaborative learning opportunities.

Introduction

The distance learning environment has long been a challenge and a concern for educators who base their practices upon the learning theories of Piaget, Rotter and Vygotsky. Tension between practice and theory results from the lack of interactivity characteristic of the distance learning setting. Interactivity describes the manner in which the learner dialogues with the self, with the course material, and with others during a learning activity (Baker-Albaugh, 1993). It is the interpersonal dialogue with others so critical for productive learning that is typically absent in the distance learning classroom. The benefits of this interactivity among learners include increases in learning effectiveness (Bates, 1993), higher levels of cognitive processing (Garrison, 1993), and development of collaborative and cooperative learning skills (Berge, 1995). Recognition of these student-related benefits resulting from interpersonal interaction has stimulated the development and application of interactive technologies in the field of distance learning.

Emerging computer technologies are capable of facilitating an interpersonal dimension within the distance learning environment. Currently, computers are a technological application widely used for distance course delivery (Wells, 1992). Computers are not commonly used as a means for providing interactive, interpersonal communication within distance learning courses carried by other media (Mason and Kaye, 1989). Harasim (1992) stated computers can potentially "contribute to a sense of community within the group, forging a social bond that can offer important motivational and cognitive benefits with the learning activities" (p. iii). To achieve these motivational and cognitive benefits, distance educators today must design, develop, and deliver interactive learning opportunities using computer technologies. The use of computer technologies, when combined with other complimenting media, can provide the distance learner with a balanced, productive, and interactive learning environment (Bates, 1995; Eastmond, 1995; Nipper, 1989) and facilitate flexible interpersonal communication among learners independent of time and space (Paulsen, 1992).

A recognized authority on distance education, Anthony Bates has stated: "Interaction between the learner and other learners ... is possibly the most important form of interaction for many learners, but it has tended to be neglected in distance education" (1990, p. 6). Recognition of this neglect has prompted distance educators to find new ways to provide for the social and intellectual needs of their students. In this study, student responses toward one such attempt to provide for the interactive, interpersonal needs of learners in a distance classroom were examined. The purpose of this study was to describe student attitudes toward the social and intellectual interaction with class members on an Internet site designed to supplement a multimedia distance learning experience.

Methodology and Theoretical Framework

The purpose of qualitative descriptive research is to observe, describe, and explain events or phenomena. The pur-

pose of this study was to describe a specific phenomenon within a specific situation. The phenomenon was the computer-mediated communication among students; the situation was the interactive computer environment of a distance learning setting. Because this research was qualitative, phenomenon-centered, and situation-specific it is a case study (Merriam, 1988). Therefore, the research design incorporates case study assumptions and methodology.

The goal of a qualitative case study is to understand the meaning of observed experiences. From a constructivist viewpoint, the qualitative researcher assumes the existence of multiple realities that result from personal interactions and perceptions. The researcher seeks to understand the subjective phenomenon of perceptions through an inductive process of building concepts, propositions and theories (Denzin & Lincoln, 1994). The purpose of this case study was inductively to understand and describe student attitudes toward the social and intellectual interaction with class members on an Internet site. In doing so, the researcher was the primary instrument, able to respond to the context, adapt techniques to the circumstances, and process, clarify, and summarize evidence as it was collected (Guba & Lincoln, 1981).

Within the constructivist perspective, this study was based upon a theoretical foundation of Piaget, Rotter, and Vygotsky. A fundamental assumption of Piaget's cognitive theory is that the learner is necessarily active (Crook, 1996). Building upon that concept, Julian Rotter (1954), in his *Social Learning Theory*, established the assumption that meaningful learning occurs in a social environment, through social interactions with other people. In 1978, cultural theorist Vygotsky proposed that all cognitive functions are first experienced in the public forum of social interaction. He stated: "All higher functions originate as actual relationships between human individuals" (Vygotsky, 1978, p. 57).

Upon this theoretical foundation, collaborative learning theories are based. The collaborative learning theories of Johnson and Johnson (1975) and Slavin (1989) provided the theoretical rationale for this study. Collaborative learning requires the dynamic participation of individuals working together to construct knowledge. Knowledge construction occurs through social and intellectual interaction with peers and experts. Howard Gardner, et al. (1996) stated that, because of the distributed nature of intelligence, productive learning occurs only in conjunction with other humans and objects. "Most productive human work takes place when individuals are engaged in meaningful and relatively complex projects which ... involve interaction with other persons: mentors and teachers, ... peers and experts, ... teams of collaborators"(p. 224). The interactive Internet site included in this distance learning environment was developed to enable and support the active and collaborative engagement of learners in a meaningful and complex learning environment.

The setting for this study was a distance learning graduate level course offered by the Educational Leadership Department of Ball State University, Muncie, Indiana. The course, "Elementary School Curriculum," was offered Spring semester of 1997 and taught in a studio classroom in the Ball Communications Building. The course was transmitted via the Indiana Higher Education Telecommunications System to five distant sites in Indiana. Class participants included 13 in-studio students, 24 off-site students, two graduate assistants and a professor. The technology supporting the course included two-way audio signals and one-way video signals in-class instruction and interaction, and an Internet-based World Wide Web site for out-of-class interaction.

The World Wide Web site, created specifically for this course, was housed on the Ball State University server and was accessible through any Internet-linked personal computer. This "Class Page" offered the following services and interactive learning opportunities:

- an e-mail Post Office, with photographs of, and links to, all class members, instructors, and technical support personnel;
- a Discussion Area, for out-of-class discussion among students on topics relating to course material and assignments;
- Project Reports and Motivational Ideas—sections that required students to post course assignments for the mutual benefit of class members;
- Cool Class Web Sites—a resource section for educators, linking the "Class Page" to hundreds of educational Web sites;
- BSU Resource Links—a resource section for class participants linking the "Class Page" to Ball State University Web sites;
- a Notice Board, for posting weekly announcements of campus and class events, and reminders of class assignments and schedules;
- a Class Survey section, hosting a biweekly class participant survey;
- a Class Handouts section for delivering course materials and providing links to Web sites especially relevant to the week's topic;
- a Class Questions section, providing questions for out-of-class reflection and discussion regarding the course's topic for the week; and
- general class information sections: "Class Page" Introduction, Syllabus, Technical Tips, Professor Profile, Graduate Assistant Profiles, Visiting Scholar Profile, and Support Crew Member Profiles.

Because the "Class Page" was created to facilitate interaction among class members of "Elementary School Curriculum," participation on this Web site was required. Expectations for participation were clearly stated at the onset of the course.

In this descriptive study, a number of qualitative evidence collection techniques were employed. Focus group interviews were conducted with class members mid-semester. Telephone interviews were conducted with class members one week after

the semester's end. Eight survey instruments were administered, and included the following: a pre-course short answer self-assessment of computer skills; six Likert scale and short answer surveys housed on the "Class Page;" and an overall course evaluation administered during the last class. This evidence was then analyzed and conclusions were drawn.

Findings

To help describe the population of this study, a survey—"Self-Assessment of Computer Skills"—was administered to students attending the first full class of the graduate level course, "Elementary School Curriculum." This self-assessment revealed students' attitudes toward, and frequency of, computer use that importantly impacted this study. For example, whereas 70 percent of the students in the course owned a computer and 92 percent had access to a computer at their workplace, only 30 percent reported feeling comfortable using a computer. Also, although 57 percent of the students had computers with Internet access, 70 percent reported having never, or only once, used the Internet. Three students, of the 37 enrolled, reported feeling comfortable using the Internet and only two students reported feeling competent to obtain Internet resources. Less than 30 percent of the students reported feeling somewhat skilled using a windows environment and, thankfully, 95 percent reported feeling at least somewhat skilled at word processing.

The evidence in this study was collected from interviews and surveys over a period of sixteen weeks. Students enrolled in "Elementary School Curriculum" were required to complete a computer-based survey during the second, fourth, sixth, eighth, tenth, and twelfth week of the course. Focus group interviews were conducted during week eight; telephone interviews were conducted during week sixteen. An end-of-semester course evaluation was completed by students during the last class session.

The evidence collected was categorized into cognitive and affective strategies used by students to manage the course requirement of participation in the Internet-based "Class Page." The cognitive strategies included management of personal resources, such as time, effort and money, and management of the computer environment, such as text-based communication and Internet information overload. The affective strategies included the management of self, such as self-confidence, self-direction and self-efficacy, and the management of others, such as interpersonal networking, and giving and receiving emotional support.

The cognitive strategy of personal resource management was evident as students chose how best to spend their limited resources of time, effort, and money to meet the course requirement of "Class Page" participation. The limitations of time were often mentioned by students in this course. The amount of time spent in locating an Internet-linked computer, accessing and exploring the "Class Page" environment, and fulfilling the "Class Page" course requirements was a constant concern for most class participants. One student admitted, "I'll be honest. If I had known how much time this computer stuff was going to take, I would have picked another class. I don't have time to be running around looking for a computer, then trying to figure all this stuff out." At week ten, 63 percent of the students reported continuing difficulties coping with lack of time and computer availability. Nevertheless, many students developed coping strategies for managing their time. One student shared, "I simply told myself—Tami, you have one hour to do everything you need to do on the "Class Page" before class tomorrow. Get with it." Another student remarked, "I don't see what the big deal is. So, you block out time and tell your family, 'I'm not here. I am in cyberspace.' You close the door and log on."

Learners' efforts also needed to be managed. By week fifteen, 76 percent of the students reported feeling the effort invested in the "Class Page" had enabled them to achieve the course's purpose, had stimulated critical thinking, and had encouraged them to apply course concepts beyond the classroom. One student stated, "You know, you get out of a class what you put into it. When I saw the 'Class Page' requirement I told myself that this was a course I needed. I was really willing to put in the effort to learn about computers and the Internet."

Students reported a number of strategies for managing their effort. One student approached effort management by clarifying basic course requirements and the effort investment of classmates. She shared, "Well, my friends and I got onto the Discussion Area together after a few weeks of class to see if anyone else had posted stuff. We looked at the names and it was the same five names, so we thought—Okay, we're in the majority of people. So we didn't feel a big urge to get into the Discussion Area. We figured we had enough to do. I'll be honest, I'm not making the effort unless I have to." Another student was less successful: "I just get overwhelmed and stay on-line for hours hardly knowing where to turn next. I want to do my best, but I don't know how to do that. I mean, how much does he want? How much effort do I need to invest to get an A?"

A number of students chose to invest financial resources in computer equipment and Internet access to save time and effort. One student enthused, "I am so computer challenged! This course forced me to get with it. I mean, I went out and bought everything I needed—computer, modem, access—the whole shot. Now I am poor, but it was worth every penny. It has saved me hours of travel, of waiting, of fooling around on strange computers. My whole family has benefited!" By contrast, one student complained, "I resent having to buy Internet access for $25 a month when I'm already paying for this class. And just because I can't find a computer that isn't already busy with someone else playing on the Internet. So, now I have a connection, but it's going as soon as the class is over!" By week ten, 25 percent of the students reported a continuing concern with computer costs.

The personal resources of time, effort and money were guarded, examined and spent by students to meet the requirements of this course. Management of these personal resources was one cognitive strategy reported by the students of "Elementary School Curriculum."

A second cognitive strategy, that of computer environment management, was evident as students were challenged to communicate in a text-only context and to handle the task of navigating the Internet. Student responses at week two illustrate the extent of this management challenge: 79 percent of the enrolled students said that Internet exploration would be a new experience for them, and 92 percent expected to learn new computer skills through "Class Page" participation.

The text-based nature of the "Class Page" offered some students the opportunity to improve writing skills. One student shared, "Internet communicating was easy! I put a couple of ideas out on the Discussion Area. You know, it is rather intimidating to put a thought out there on the Internet for the whole world to see and to know that my sentences sound awful and I'm probably misspelling a bunch of words. But I decided—too bad! I was going to do it! I knew the embarrassment would force me to write better. Ha!" Another student said, "You know, I would read my writing after I sent it and it would always sound so stupid to me. But then, I would screw up my courage and try writing something again. This time I would work harder at my writing. I actually think I'm better at writing now."

Other students were more intimidated. One student confided, "I just can't write. I like to read what others write. But I can't do it myself. I mean—what are the readers thinking? What is their expression when they read my idea?" Another student responded, "The 'Class Page' is okay for those people who like to stick their necks out, who talk in class and always have an opinion. They are just that way. But I'm not. I'm not going to write anything down that I'm not forced to." By week eight, while 66 percent of the students reported gaining computer competencies from "Class Page" participation, only 31 percent agreed that writing competencies had been gained. 51 percent of the students stated that the "Class Page" experience had not helped them learn to write important concepts.

The wealth of resources available on the Internet also required management. This management task was expedited by the Internet links provided in "Cool Class Web Sites." Seventy-seven percent of the students reported that a major advantage of the "Class Page" was its Internet resource links. As one student stated, "Without the Cool Class Web Sites I would have been lost. I spent many happy hours exploring links from the "Class Page" and beyond. It was so helpful to have a starting place. Of course I did have to manage to make my way around the net after leaving the "Class Page." But, little by little, I learned. It just took time." By week four, students were actively exploring the "Class Page," with 88 percent of the students completing the survey, and 70 percent posting assignments. By week fifteen, 90 percent of the students reported using Internet resources other than those on the "Class Page." One student shared, "I managed the infoglut by bookmarking cool sites, printing worthwhile articles to share with classmates, keeping my eye on the time, and keeping control of my curiosity. You know, without control, you can go crazy on the Internet and never leave it!" Another student stated, "At the beginning I was really serious about the whole thing and spent a lot of time on it. But lately I've only done things that are helpful to me. I've learned to manage the 'Class Page' and the Internet for my benefit and convenience."

By week ten, 44 percent of the students considered the "Class Page" a worthwhile supplement to "Elementary School Curriculum." By week fifteen, 95 percent stated that "Class Page" activities were relevant to the stated objectives of the course. As one student commented, "At first I was grousing around, complaining that I didn't have the time or energy to bother with computer stuff. Then my husband took me in hand. He said—'Look, you're a teacher. So, what's more important to teach....The Spanish Civil War or computer skills? And how are you going to teach computer skills if you don't have them yourself?' So he bought a computer and hooked us up to the Internet. It hasn't been easy, but it has been fun! I mean, what a resource! And how to manage it? Wow, I'm still working on that!"

Students' cognitive strategies for coping with the course requirement of "Class Page" participation included management of both personal resources and the computer environment. Most students became successful managers; some did not. Computer comfort and competency influenced students' success in the "Class Page" context.

The affective strategy of self-management included controlling self-confidence, encouraging self-direction and recognizing self-efficacy. Students spoke much about their feelings related to the "Class Page." At week two of the course, 63 percent of the students reported feelings of anxiety concerning their computer competency. At the same time, 79 percent expected to enjoy using the "Class Page." Thus, at the onset of the course, students were tempering their feelings of inadequacy with positive expectations. As one student shared, "I knew I was in big trouble. What did I know about computers? Nothing. But I've been in pickles before and I'd seen my way out. I knew that, with hard work and a little luck, I could figure out what I was doing before anyone realized how little I knew!"

By week ten, 44 percent of the students were still concerned with their computer competency, 53 percent wanted classmate support, and 47 percent needed instructor encouragement. Nevertheless, only 13 percent of the students were now frustrated with the "Class Page," 55 percent felt secure while on the "Class Page," and 81 percent felt free to express their personal opinions on the "Class Page." Comments such as "I'm over my computerphobia!" and "The fear is gone!" and "My computer anxiety has eased a bit!" describe students who coped with a threatening environment by managing their self-confidence. One student shared, "I have never been on a computer. I have never been on the Internet. All my life I have been totally intimidated by it. Now I can actually click on something and get it! I told myself I could do it, and I did!"

Not all students were so successful managing their self-confidence. One student confided, "I have never been on the Internet before and I was really scared of going on it. So, I haven't. I just can't do it, so I get my friends to do my surveys and collect class questions and post things for me. I just can't." Another complained, "I'm really upset. If I had known that I would have to do computers I wouldn't have signed on. My

friends said they would help me but they haven't. So what am I supposed to do?" Thus, self-confidence was both a condition and an approach that could be managed. Some students were more adept at developing and applying self-confidence than others.

Management of self-direction was another affective strategy used by many students. Self-direction was illustrated by students' willingness and ability to make choices that led to their successful course completion. For example, one student commented, "This is my life. This is my degree. If I take a course that requires that I stretch and learn new things, then I need to meet that head on. Whining about it is degrading. I can choose to learn. My fear does not need to dictate my actions." By week eight, 83 percent of the students had found the university's technical computer assistance an excellent resource. Seventy-seven percent rated the "Class Page" Notice Board and Class Questions as excellent for keeping them informed and for stimulating thought. Thus, students were choosing to become actively involved with the "Class Page" in order to meet both in-class and out-of-class participation requirements.

The affective strategy of self-management included managing self-efficacy—the sense of personal control over one's environment. As students moved from week one through week fifteen of "Elementary School Curriculum," a sense of increasing control was evident in student responses. Whereas at week two, 63 percent of the students reported feeling anxious about the "Class Page," by week ten 55 percent reported feeling secure and 71 percent reported successfully using the "Class Page" on a consistent basis. By week fifteen, 95 percent of the students felt the challenges presented in the course, including participation on the "Class Page," were appropriate to their level of development. As one student explained, "It's an issue of control, isn't it? When you feel like the master of your own work, you feel successful, empowered. At first the "Class Page" scared me. Now that I have struggled with it and mastered it, I feel terrific—like I can take on the world!" This sense of control inspired one student to comment, "I have really liked this class. What a challenge. What an accomplishment. I'd recommend it to anyone!" By week twelve, 75 percent of the students stated they would recommend this class to friends and co-workers, 89 percent concluded they had enjoyed the class, and 64 percent felt secure in their use of the "Class Page."

Not every student developed a sense of self-efficacy. One student shared, "I can't cope. I know I'm supposed to be the boss. I mean, I can always pull the plug, turn the computer off. But it scares me. So I stay away. My friends do my surveys and post my ideas. I can't." Another student confessed, "When I sit at a computer I'm at its mercy." Thus, whereas some students assertively took control of the computer environment, others were controlled by it.

With each self-management strategy—self-confidence, self-direction, and self-efficacy—assertiveness and a sense of purpose produced more positive results. One student summed it up by saying, "I just take myself in hand. I tell myself—stop whining and start working. Self-defeating talk is a dead-end road."

A second affective strategy described by students for coping with the "Class Page" participation requirement was the management of others. This management approach included interpersonal networking and the giving and receiving of emotional support. The "Class Page" was specifically designed to support the interpersonal dimension of the distance learning environment. Interestingly, the majority of students did not view the "Class Page" as a vehicle for developing relationships among fellow classmates. At week four, 53 percent of the students strongly disagreed with the statement that the "Class Page" was useful to get to know fellow classmates and 47 percent were undecided. By week six, only 21 percent of the students had participated in a discussion on the "Class Page." By week eight, 49 percent of the students strongly disagreed that, through the "Class Page," students had become acquainted with a fellow classmate, and by week twelve, 79 percent still had not participated in a "Class Page" group discussion. By the end of class, although 90 percent of the students felt free to express their ideas and opinions on the "Class Page," only a handful had done so in the discussion area.

Despite this low participation rate, the "Class Page" importantly contributed to the interpersonal networking among the class participants. Comments such as "Oh, I tackled that 'Class Page' problem with Janet. It's so much more fun with two!" and "My friends from our site ordered pizza and went to Laurie's house after class. We wanted to try to figure out the 'Class Page' assignment!" were common. Although interpersonal interactions on the "Class Page" were not highly valued, the relationships that developed as a result of the "Class Page" participation requirement were. As one student disclosed, "Well, I felt kind of guilty, but I went over to Dawn's to get help posting my project. When I got there, there was Jennifer and Kathy. They needed help, too! So we had a computer party and got all our work done!" Another student explained, "The guys at my site didn't bother with the Discussion Area on the 'Class Page.' We just discussed among ourselves, and enjoyed that a lot. We did post our assignments, we shared information off the Web, and we spent a lot of time together in class and on our computers. In fact, I email them all the time."

The giving and receiving of emotional support among class participants was a second strategy in the management of others. This emotional support has been illustrated by many of the comments already quoted. Student responses were peppered with expressions of appreciation for the care and encouragement of fellow classmates. As one student exclaimed, " I don't know what I would have done without Jane! She was so encouraging!" Another shared, "I feel lucky to have been at a site with such nice people. They took the time to care about each other. When I was so afraid of the computer, they talked me through it. We grew very close."

Although at week eight interactions among class members on the "Class Page" were rated poor by 31 percent of class participants and good by only 29 percent, student comments illustrated that the "Class Page" provided the impetus for developing supportive interpersonal relationships among class members. The two affective strategies used by students to handle

the "Class Page" environment—the management of self and the management of others—enabled interpersonal growth, which was, in turn, enabled by the "Class Page" environment. These affective strategies, in combination with the cognitive strategies described, enabled students to successfully complete the "Elementary School Curriculum" course requirements.

Reflections on the Findings

A number of cognitive and affective strategies were applied by graduate students enrolled in the distance learning course, "Elementary School Curriculum," to cope with the course requirement of participation on an Internet-based "Class Page." These strategies included management of personal resources, management of the computer environment, management of self, and management of others.

Imbedded in these strategies were a number of common themes. The predominant themes included three stressors and two benefits. The stressors most frequently alluded to were concerns associated with communication issues, with computer involvement, and with computer and Internet access. The benefits most frequently referred to were the sense of empowerment and the satisfaction of having a shared space, a common ground, with fellow classmates.

These five themes, both stressors and benefits, were referred to by students who had successfully managed the "Class Page" participation requirement, as well as those students who had opted out of "Class Page" interaction. Because of their centrality to the findings, the five themes provide a framework for the following discussion.

Discussion

Five themes that warrant further discussion and consideration include three stressors and two benefits. The stressors most frequently alluded to were the anxiety over communication issues, the stress associated with computer involvement, and stresses relating to computer and Internet access. The benefits most frequently referred to were the sense of empowerment and the satisfaction of having a shared space, a common ground, with fellow classmates.

The context for this study was a distance learning experience which included an Internet-based "Class Page" to increase the probability of student-student interaction. Because of this on-line component of the course, students were given the opportunity to interact whenever, wherever and with whomever they chose. The theoretical rationale for designing the on-line course component was based on the collaborative learning theories of Johnson and Johnson (1975) and Slavin (1989). These theories, and supporting research, contend that peer interaction within an educational setting is a critical variable for cognitive development. Peer interaction includes supporting one another in knowledge building, information sharing, social communication, and problem solving. To provide peer interaction within the distance learning setting, theorist Keegan (1986) stressed that distance educators must provide means for overcoming the limitations of the text-based environment, the difficulties of no heard or seen language, and the absence of immediate feedback. These challenges were associated with student-felt anxiety over computer-based communication issues.

The on-line environment can facilitate the sharing of ideas and reflections, the building of understandings, and a common, archived transcript of discussions. While many students thrive within the on-line environment, others shrink from it in fear. This writing apprehension (Velayo, 1994) or communication anxiety (Harasim, 1990) was evident in this study, as students remarked that the feeling of speaking to empty space when writing on-line prevented them from speaking at all. The opportunity to see the work of others and to compare their ideas to those of their classmates caused them great anxiety. The personal risk of sharing an idea with no guarantee of response was often beyond their coping capacity. Students overwhelmed by communication anxiety chose non-participation. Students' effectiveness in the use of self-management strategies impacted their degree of communication anxiety.

Communication anxiety was not uncommon (Feenberg, 1989; Walther and Burgoon, 1992). The text-based nature of the medium placed a premium on skills of written expression and analysis, advantaging the highly motivated, often educationally privileged learner (Nipper, 1989). The benefits of the medium included a reduction of discriminatory communication patterns based on race, gender and physical features (Walther, 1992), a less authoritarian approach to learning and teaching (Nipper, 1989), and more available time for, and control over, communication (Harasim, 1989). Disadvantages of this text-dependent environment included a dependency upon a peer response in an asynchronous context (Feenberg, 1989) and the need to express oneself clearly and analytically only through written messages.

There are means to minimize the communication anxiety caused by using a text-based medium. A moderator can become involved in student interactions, shaping a positive, supportive social environment, and responding to each contribution with sensitivity (Harasim, Hiltz, Teles and Turoff, 1995). The course instructor can acknowledge each participant and recognize student growth (Berge, 1995). Use of humor, wise questioning, and group management (Davie, 1989) can be used to establish a non-threatening environment. The effort required to include all class participants is often rewarded by group cohesiveness and individual learner growth.

The "Class Page" Web site in this study was developed to overcome the social distance between students. Although technology cannot substitute for instructors, technical tools can be used to facilitate learning. How much learning takes place depends upon the willingness of the student to actively participate in the learning process. Successful learning in this context required that students take initiative for their own learning and growth by developing computer skills needed to interact on the course's Internet-based Web site. Because of stress related to computer use, some students in this study were unable or unwilling take this initiative.

The condition of being or feeling computerphobic (Rosen and Maguire, 1990), technostressed (Hedberg and McNamara, 1989), or technophobic (Kinzie, Delacourt and Powers, 1994) was described as a stressor by some study participants as inhibiting, and occasionally prohibiting, their "Class Page" activities. This stress was bound to students' effectiveness in managing self, others, and the computer environment.

Computerphobia has been described as making people feel "uncomfortable, self-conscious, and inefficient" (DeLoughry, 1993, p. A25) when they encounter computers. Through a meta-analysis, Rosen and Maguire (1990) found that writers in empirical literature have predicted that "between one-fourth and one-half of all college students, business people, and school students may be 'computerphobic'" (p. 184). Recent researchers have found computer anxiety can be tempered by educational experiences with computers (Kinzie, et al., 1994) and such experiences contribute to student competence and confidence with computers (Delcourt and Kinzie, 1993). Marcoulides (1988) and Rosen, Sears and Weil (1987) have demonstrated computer experience as one of the best predictors of computer anxiety.

A number of educational approaches have been suggested for overcoming debilitating attitudes toward computer participation. Thorough training and continuing support in computer use (Velayo, 1994), emotionally supportive leadership within the computer environment (Kerr, 1986), and developing relationships through face-to-face meetings (Waggoner, 1992) are strategies suggested in the literature. In this study, all three of these strategies were used. The Assistant Director for University Computing Services, Ball State University, dialogued with class participants during weekly class sessions for the first six weeks of the course. He was available via email 24 hours a day and was perceived as competent and helpful. Supportive leadership within the computer environment was provided by the course professor and two graduate assistants. Two day-long face-to-face class sessions were included in the course schedule. In spite of these strategies, some students remained anxious and were unwilling to participate on the "Class Page."

Access issues created stress for many class participants in "Elementary School Curriculum." Over 30 percent of the students mentioned lack of computer or Internet accessibility as roadblocks to full participation on the "Class Page." Time limitations aggravated the issue of computer accessibility. Students reported having little time to search out an Internet-linked computer, to travel to the located computer, and to actively participate on the "Class Page." Both Burge (1994) and Kearsely, Lynch and Wiser (1995) reported similar results. McConnell (1990) found students felt they had wasted time and experienced unreasonable frustrations when seeking out and communicating through computers.

A number of researchers have reported that peripheral members of organizations have more access to work and social activities through the use of computer technologies (Harasim, 1990; Hartman, Neuwirth, Kiesler, Sproull, Cochran, Palmquist and Zubrow, 1995; Huff, Sproull, and Kiesler, 1989). In contrast, students in this study reported feeling like "outsiders" due to their lack of "Class Page" participation. They perceived that lack of accessibility pushed them to the periphery of class activities. Rumble (1989) found that personal computers have become commonplace in our society. Even so, Olson (1988) cautioned that, if we are to develop the computer as a wide-ranging resource for learners, we must be cautious that their use does not amplify patterns of disadvantage. The value of mediating access difficulties by providing course content via a variety of media and by including opportunities for face-to-face interaction in the distance learning setting should not be overlooked (Eastmond, 1995; Nipper, 1989).

If learning is viewed as a social process, then provision of interactive communication technologies is critical for the productive distance learner. In the distance learning environment, the process of developing a community of scholars is dependent upon open access to the provided interactive technologies. The technology provided in this study was an interactive, Internet-based Web site available to all students through Internet-connected personal computers. This "Class Page" was available 24 hours a day, seven days a week. It provided access to peers and experts at any time and any place. Unfortunately, the convenience of the "Class Page" was irrelevant to a number of students. Due to restraints of work, family, and limited personal resources, some students found the lack of computer accessibility a major source of stress.

Empowerment was a theme which threaded through student experiences and attitudes in this study. The productive use of all four coping strategies reported in the findings resulted in feelings of empowerment and control. Collaborative learning theories emphasize student responsibility for learning. The on-line "Class Page" environment offered students opportunities for active thought and analysis, and required that students take the initiative for their own learning and growth.

In a study of learners' perceptions of computer conferencing, Burge (1994) concluded that students felt empowered in a computer climate that was emotionally supportive, intellectually challenging, information-rich, and interactive with peers and experts. Hiltz (1993) found that, within a computer context, students excelled who were in control of their effort and their learning environment. Harasim (1989) observed that the asynchronous nature of the on-line environment facilitated self-directed learning and expanded learner control over the interactive environment, contributing to learner effectiveness (see also Mason and Kaye, 1990). Class participants reported feeling empowered by the increase of learner responsibility and control in the on-line environment of the "Class Page."

A sense of participating in a shared space in which learners contributed and received support, resources, and information was described as a "Class Page" benefit by many students. Comments such as "We're on a level playing field" and "It's a common ground where we can meet as equals" and "All the resources are available to all of us" expressed the appreciation felt for the democratic nature of the "Class Page." Participat-

ing in this shared context where resources were equally available to all learners increased students' commitment to the "Class Page" and strengthened their social bonds to one another. This shared space provided a context for collective thinking, for resource access, and for social and intellectual exchanges.

This concept of shared space did not guarantee equal participation and interaction. It was found that only students who effectively employed the coping strategies of management of self, of others, and of the computer environment viewed the "Class Page" as shared space or common ground. Active participation on the "Class Page" developed a sense of membership in a community of scholars.

Both Hiltz (1993) and Harasim (1987) found participation rates in an on-line classroom increasing as students became more involved with each other and with the course material; Nipper (1989) and Eastmond (1995) did not. To encourage on-line participation and the development of a shared space, Eastmond (1995) recommended the provision of strong moderator leadership. Nipper (1989) cautioned that, in order to maintain a focus on educational issues, on-line participation within the shared space required daily instructor attention. The on-line "Class Page" environment in this study was intentionally designed to encourage participation and the perception of a shared space. Strong leadership was provided and the educational focus was maintained. Those students who found the "Class Page" a common meeting ground, where equal standing was credited to all, were successfully managing the on-line environment.

Five themes intertwined through the cognitive and affective strategies employed by students to cope with the Internet-based "Class Page" participation requirement of the "Elementary School Curriculum" course. Of these five themes, three were described as stressors: anxiety over communication issues, the stress associated with computer involvement, and stresses relating to computer and Internet access. Two themes were described as benefits: the sense of empowerment and the satisfaction of having a shared space for social and intellectual interaction. The distance learning context of this study included an Internet-based "Class Page," designed to increase the probability of interaction among students. The effectiveness of the coping strategies developed and employed by students within this learning context importantly impacted their overall satisfaction with, and success in, the "Class Page" environment.

Implications for Practice and Research

Highlighted briefly are five implications for practice and research: the value of moderator leadership, the importance of a face-to-face encounter, the challenges of the on-line text-based medium, the influence of learning and temperament styles, and the development of computer-supported collaborative learning opportunities. To meet the goal of student-student interaction in an on-line environment, the involvement of a discussion area moderator is recommended. The primary role of the moderator is to create and support a positive intellectual and emotional climate for the interactive learning environment.

Moderating computer discussions requires skill, sensitivity, and persistence. Feenberg (1989) recommended using weaving comments to summarize a discussion's main themes, giving credit to those contributing original thoughts. Davie (1989) drew attention to the use of leading and refocusing questions. Hiltz (1993) suggested that requiring student participation may be the only option for maintaining active dialogue. Moderating discussions involves the management of participant identity, the environment's social tone and attitude, and the development of student text-based communication skills. The challenge of moderating the social dynamics of on-line discussions was highlighted by Feenberg, who cautioned, "Failures and breakdowns occur at the social level far more often than at the strictly technical level" (1989, p. 28).

Although often awkward to provide, as well as to attend, the face-to-face encounter for distance learning classmates has been found to enhance the participant's overall learning experience (Fernback and Thompson, 1995; Rheingold, 1993). The face-to-face opportunity places the distance learning classroom in context, clarifies expectations, and initiates learning activities. During face-to-face discussions, class members can learn about network design, initiate relationships, and practice their technical skills. The instructor has the opportunity to develop personal contacts with class participants that are helpful later, when on-line reassurance and advice is required. Learners who have had face-to-face encounters are more likely to communicate effectively on-line because the personal meeting "has provided a number of contextualizing cues that would otherwise be absent from discussions held exclusively within the framework of a computer conference" (Mason and Kaye, 1989, p. 20).

The text-based nature of the on-line environment has been described as impersonal, limiting, and sterile (Feenberg, 1989), as well as reflective, explicit, and information-rich (Harasim, 1989). For educators to effectively improve an educational experience by including a text-based on-line environment, the computer context must be carefully designed.

One of the primary cognitive benefits of text-based interaction is the opportunity for reflective communication. The computer environment can support the "process of articulating thoughts into written speech [involving] deliberate analytical action" (Vygotsky, 1962, p. 99). It offers the student the option to reflect upon and edit one's on-line discussion response. Reflection influences attentiveness, not only to the content, but to the quality of the written message. The educational opportunities provided by this on-line characteristic should not be overlooked by distance educators.

The information-rich medium of the on-line environment is both a boon and a bane. The boon to students is the wealth of information available on the Internet. Although this information-rich source must be managed, its potential for providing learner resources is tremendous. The bane to students is that this rich resource is combined with archived transcripts of every discussion, conversation, and interaction held within the

class context. If expectations are not carefully managed for the on-line classroom, this information-rich resource can fast become incomprehensible and overwhelming. Proactive resource management strategies are required to control the on-line distance learning environment.

The influence of learning styles and temperaments upon the distance learner's educational experience is fertile ground for further research. Most research done to date has focused on the psychological factors affecting learners in traditional settings. Few studies have been found that describe or test the affect of psychological factors upon the distance learner. Atman (1988), in a study of the relationship between psychological type and goal accomplishment among distance learners, suggested a theoretical advantage for distance learners classified as extroverts, intuitives, thinkers, and judgers by the Myers Briggs Type Indicator. Ehrman (1990) discussed major learning style models and speculated upon the applicability to distance education research. Distance education is an expanding educational context that offers a number of unique research opportunities. The relationship between learner characteristics and the distance learning environment is one such opportunity.

Development of computer-supported collaborative learning opportunities should continue as a research priority for distance learning providers. During the 1990s, progress toward providing accessible interpersonal interaction on-line has moved rapidly. Interactive on-line systems have been developed, tested and marketed. This trend must continue to receive institutional support in order to provide distance learners with interpersonal opportunities for growth and development. Harasim, et al. stated that on-line education "based on global interactivity, collaborative learning, and lifelong access to educational activities and resources ... engenders new ways of working, studying, and problem-solving" (1995, p. 278). Access to such an education will enable learners to meet the challenges of the information age in the twenty-first century.

Conclusion

Distance educators are challenged to provide interactive opportunities for students within the distance learning context. Active, collaborative participation in the educational environment is a critical component of the learning process. In this study, social and intellectual interaction among distance learners was supported by an Internet-based "Class Page," which supplemented the course's audio and video delivery system.

Students developed affective and cognitive strategies for coping with this interactive on-line "Class Page" environment. These strategies included management of self and others, management of personal resources, and management of the computer environment. Three stressors and two benefits were identified by class participants as influencing their "Class Page" experience. The stressors were communication anxiety, computer anxiety and access issues. The benefits included a sense of empowerment and involvement in an on-line shared space.

Recommendations for improvement of practice included the suggestion that strong moderator leadership be provided for the interactive discussion area of the "Class Page." The value of an initial face-to-face encounter for distance classmates was discussed and the educational benefits of the text-based on-line environment were examined. Suggestions for future research included the need for studying the impact of student learning styles and temperaments in distance learning environments and the continuing need for innovative computer-supported collaborative learning opportunities.

Educators today are being challenged to appropriate and adapt emerging communication technologies to enrich our distance learning environments. By designing and implementing an interactive, interpersonal dimension for the distance learning environment, educators provide an equitable and potent educational opportunity for learners at a distance.

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Appropriate Educational Applications of the World Wide Web Today

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Abstract

Although the majority of web based educational tools of today are unremarkable, are sometimes difficult to access and are not completely reliable, there is a mounting push for students and faculty to use these tools. The formidable technical challenges that confront students and faculty attempting to implement these technologies often quickly overshadows the more fundamental question—how should existing and future technologies be used in the teaching and learning process? Assuming, for example, that a given piece of technology could be implemented universally without difficulty and perform exactly as expected, what is the impact? Having made fair and unbiased evaluations concerning a given technology, important questions regarding implementation remain. For those that have resigned themselves to providing course material via the web, a common question for both educational institutions as well as individual faculty is if now is the best time to begin. One workable, logical progression path involves using a four-step process. The foundation of this process begins with experimentation, moves to deployment from templates, then to redeveloping pages based on need and student feedback, and finally to using this experience in innovation specifically tailored to the class needs.

Introduction

For many educators, the prospect of integrating technologies such as the World Wide Web into the educational process is likely reminiscent of their early experiences with classroom filmstrip projectors: setup was often awkward and difficult, there were always elusive technical problems with audio or video, content was sometimes less than remarkable, and students' attentions were typically less than undivided. In a like manner, the often-heard criticisms of yesterday's filmstrip could well be made against today's most frequently seen educational Web implementations. Yet, the broad and evolving success of the Web in education shows no signs of slowing. Although haunting images of melting celluloid and exploding projector bulbs no doubt remain, the siren song of the Web continues to grow louder from every direction. The push to create Web-based educational tools from university administrators, technologically aware students, the mass media, and competing institutions has become one that can no longer be set aside.

When Web technologies were first beginning to emerge, speculation abounded over the tremendous implications these held for distance education. As the veil was pulled away however, formable issues concerning real-world feasibility and actual student enrichment through this high technology begin to emerge. Roadblocks such as prohibitive cost, inadequate human resources, and a steep technical learning curve have been, and often continue to remain, barriers to serious educational Web development.

Preceding the more practical (or tactical) issues facing the development of Web technologies in education, there are more fundamental questions concerning if, when, and how these technologies *should* be used in distance education or in any formal teaching and learning model. Before choosing between moderated and open newsgroups for example, it may be necessary to ask what effect newsgroup technology itself has on the social aspects of the learning process. Asked another way: presuming all the technology works exactly as intended, is the learning process being enhanced as a result of the technology use in ways that are meaningful and significant?

Examining the practical roadblocks commonly faced in educational technology integration in the light of fundamental philosophical issues provides a methodology for determining appropriate educational applications of the World Wide Web in today's teaching and learning environment. We are then drawn to ask: Do electronic discussion forums provide students with an enhanced level of communication that contributes significantly to the learning experience? Are moderated or open discussions better suited for classroom discussion? Is creating a class Web page useful or even appropriate when it is known that not all students will have a reasonable level of access? How will students with disabilities, such as visual impairments, access the electronic resources made available to other students?

Is Now the Appropriate Time to Begin Focusing on Web Development?

The growing tide of technological development in education has left little doubt as to whether institutions as a whole (and hence the instructors teaching for them) can avoid integration of the Internet into their curriculum. Yet presently the total ratio of classes on the Web is small when compared to the total number of classes offered, suggesting that while some institutions have rapidly embraced Web development, many others have delayed resource commitment. A wide array of reasons, sometimes compelling, are advanced as a rationale for delaying the investment in or development of Web pages and their related technologies:

- Developing resources on the Web may be an important task, however there are other compelling demands for an instructor's time. Realistically, even an extraordinary amount of effort expended on Web development may not bear fruit for some time.
- Past advances in technology have resulted in improved Web development tools that do in only a few hours what would have taken weeks or months just a short time ago. As technology is constantly moving ahead, similar future advances in the tools of tomorrow will again likely reduce the amount of time it takes to create pages and similarly increase the quality of the work product created.
- No central Web publishing site is available. Without a central publishing site, faculty find it nearly impossible to publish a Web page because of the problems inherent to hosting a Web server.
- Neither appropriate funding nor trained support staff are presently available to assist with new web development technologies. Delaying development may allow a funding window to become available and permit training for support staff.
- Those who wait to develop their sites will be able to build upon the successes and learn from the mistakes of early-adopters investing large amounts of time and other resources in today's Web development.
- Students do not yet have Internet access. This creates an unfair advantage for those who do presently have access as well as unfairly excluding those who do not.

While the above listed reasons could be cited in a wide variety of circumstances, there are good reasons for individual faculty and for the institution as a whole to look past them and move forward with Web development. Administrative perceptions regarding early development of Web pages for education must be realistic and carefully managed for a successful initial implementation. Rewarding early technology adopters, remaining open to alternate directions in the face of short term successes or failures, discontinuing fast-failures of dead-end technology, and providing funding for low-cost trial runs are examples of administrative support that can save an initial Web development effort. Faculty participation in this initial stage of development is crucial; administrators that fail to involve faculty at the beginning will have difficulty procuring enthusiastic support later when buy-in is essential. Even where there are seemingly compelling reasons to delay Web development, there are advantages to moving forward even if on a reduced scale. Some important reasons for moving ahead with development include:

- The Web can be an exciting and challenging area for both students and instructors. Any creative work takes time, and many instructors find great personal and professional reward from the time they invest in Web and related technological development.
- The fact that technology continues to advance and that today's Web-publishing procedures seem tedious and perhaps even arcane serves to suggest that eventual replacement is likely. Technology will *always* be advancing, however delaying development may only result in having to deal with a similar set of problems later.
- Until very recently, an absolute prerequisite of Web page development was the setup of a large, centralized institutional Web server where faculty could publish their pages. Without access to a centralized Web server, a faculty member had no way to publish Web pages or otherwise share them with students. While the centralized Web server remains the generally *preferred* method of publishing instructional Web pages, it is now feasible to host a Web page without access to such resources. Today, the faculty member's personal computer is generally sufficient, provided it connects to the Internet and has reasonable computing power.
- If there is very little money available at an institution-wide level today, there is an even smaller likelihood that sidestepping technologies such as the Web will later result in greater availability of funds. Technologies have evolved to the point that the large investments once needed to get started with Web page hosting and development are no longer necessary. Building a small site using only an existing personal computer connected to the Internet requires an investment as small as fifty dollars. Such low-cost solutions include PC Web server software and page editing tools for Web creation, publishing, and ongoing site maintenance.
- No matter when a person decides to learn about technology, there will be a learning curve and mistakes are probable before polished results come together. Waiting for another person to make all the mistakes only delays valuable learning experiences that will have to be faced in one form or another at some point. There are no substitutes for personal experience with technology.
- All students, including students with disabilities, must have adequate access for the technology to be feasible. Most institutions have on-site public computer labs,

which are available to enrolled students without additional cost. Students in distance education programs are generally required to have access to a computer for electronic access prior to enrollment.

- Today's students do not have the luxury of waiting months or years for Web technologies to become more convenient for their schools, their instructors, or for themselves. Learning to use today's available technology is as much a part of the learning process as the subject matter the underlying pages are intended to promote. Even when considering the rapid rate of change, learning about the technologies currently available can only help prepare the student and the instructor for the technologies yet to come. Software developers know that their products can be complex, and attempt to build upon previous releases so that the client's knowledge of the previous version may be directly applied.

It would be impossible to consider all of the reasons why universities and faculty members either start or delay Web development. After carefully considering the factors unique to each situation, decisions about how to use these technologies in course development must ultimately rest with the individual course instructor. It will be the faculty member who will be primarily responsible for the creation, focus, content, design, and upkeep of the class Web page. Once the decision to move forward with a Web page is made, an appropriate starting point for development must be identified.

Logical Progression Paths for Educational Web Development

A typically recurring theme for initial Web page development is that instructors should start very small with a basic design that may be quickly completed. Small group or individualized instruction with good follow-up and quick, demonstrable results are crucial during this initial stage. For example, many course page design workshops being done for faculty emphasize initial page design, creation and publication during a one or two hour session. A second course, offered perhaps a few days later, then builds upon the first session by providing additional instruction to create easily enhanced functionality.

During and after the initial training, instructors need to have continued access to the same level of software and hardware initially used during training. Ongoing support should include access to personal computers that are properly connected and configured with a standard set of utilities supported by the institution. A non-public practice environment, and ongoing access to technical support staff who are able to resolve technical issues that will inevitably arise, are also crucial. Once instructors begin to develop web building skills using the training that they have received, defining a longer-term logical progression path will help faculty move toward independent development.

Planned phases of Web development extrapolated from naturally progressive steps of learning are familiar to the instructor's environment and will provide the most comfortable, creative, and productive development atmosphere. For example, rather than extending the process of initial development through an entire semester to develop a comprehensive set of Web pages, developing an initial brief page in the month before the target class begins may be more beneficial. A small low-cost initial page provides the instructor with an initial test-bed to accept peer and student feedback, while keeping the initial focus on a page that can be easily changed as well as fundamentally redesigned. While the actual phases of development are often heavily dependent on the instructor's individual environment and supported development tools, a useful model for logical progression might include the following steps:

Phase One: Experimentation

Phase Two: Template

Phase Three: Redevelopment

Phase Four: Innovation

These phases could be set out formally set out as part of a structured training program, or informally as an on-line series of tutorials. Whether these phases implemented as part of a structured training program or as general guidelines, their function is essentially the same. Each of these phases brings the instructor closer to the goal of a Web page that serves needs of the students in the class in an informative, interesting, and professional manner.

Experimentation

In the initial stage of Web page development, experimentation is of primary importance. Page authors must feel free to investigate the tools they are using without fear of harming production data, their machines, the central server, or any other component in this environment. This phase of initial experimentation and discovery also should be offered in an private environment in order to prevent the anxiety that initially exists when Web pages are published for the world to see.

Experimentation is also very important because today's advanced, feature-rich Web development tools require a considerable amount of open investigation before the power of their functions becomes readily apparent and can be used with skill. Once instructors have become confident with the technology, the next step, using templates in Web development, can begin.

Template Development

One of the apparent problems instructors have designing Web pages is getting started with an initial design from a blank screen. What is the theme of the page? How is information organized for easy navigation? What kind of information is displayed or collected? How do other instructors use the Web to teach their classes? Fortunately, using the course template as a starting point resolves each of these

issues. The course template usually involves a predefined skeleton or "shell" which the instructor can modify provided the content meets established university guidelines. Selection of specific starting templates may vary by department, course, or individual instructor.

Course templates often are designed in a degree of levels, starting with simple text and graphics and progressing in complexity through demonstrations of some of the more advanced functions of the server. The best approach may be to steer the beginning instructor toward a more basic template, later introducing the advanced functions of the server using a "toolkit" approach. Keeping the initial design focus on basic functions allows instructors to build a solid foundation without the concerning themselves with the complexities advanced server functions inherently bring.

Redevelopment

Instructors may move very quickly between redevelopment and innovation, especially if their initial experimentation and use of templates has given them a high comfort level. The process of redevelopment includes two major goals. First, instructors begin to look beyond the "cookbook" approach of the template to develop pages more reflective of their own teaching style and course development needs. Secondly, the instructor will generally attempt to recreate many of the course functions and concepts within the web page. For example, essential course concepts contained in outlines, lecture notes, and results of classroom discussions are likely to be reproduced in Web form. Important administrative functions such as practice quizzes, course calendars, and discussion areas are advanced examples that may require advanced design preparation and support, as they require user interactivity as opposed to displaying static information.

Finally, knowing about the opportunity for a "redevelopment" from the start allows the instructor to operate less critically in the initial phases of development. From this point of view, the redevelopment phase can be marketed to faculty as a time to reexamine what has been created up to this point and switch direction if appropriate.

Innovation

Innovation provides the gateway for unlimited high-end Web development and brings the development cycle full circle. Moving past templates and page redesign, innovation is concerned with development at the next level, often encompassing interactive pages that engage student input and interaction.

Before instructions advance into these areas however, it is important that they receive ongoing guidance in understanding the difference between *technological innovation*, and *educational innovation* however. While there is no bright line separating the two, looking at new technologies from a critical viewpoint will help eliminate poor technological choices that serve more to demonstrate technological wizardry than contributing to the teaching and learning process. What may first appear to be "innovation" may forestall an otherwise successful development effort; embracing new technology too quickly or without proper planning leads to dead-ends that make recovery difficult. For example, a reasonably complete and well organized course page may quickly become bogged down by excessively large and cumbersome graphics, unnecessary use of movies or other high-bandwidth applications, and tools requiring students to download and configure advanced "plug-ins" before the page can be seen. The danger is that using the leading edge technology does not necessarily produce leading edge students; technologies should be selected based on an impartial evaluation of how they engage the learner opposed to other less complicated and universally compatible solutions. The development tools and resources that promise the most exciting web development opportunities cannot be applied successfully unless their use is part of a larger institutional plan which provides for their large-scale integration. For example, at the present time connecting Web pages to databases stored on mainframes or other large computing systems requires extensive setup of back-end facilities by dedicated computer professionals.

How can new technologies be effectively integrated while avoiding these pitfalls? One successful approach has been to develop a supported "toolkit" of higher-end supported tools which instructors may use to develop advanced page functions. The "toolkit" approach is an effective way of introducing new technologies which heading off rogue directions that can slow the development process. When instructors are ready to venture past templates towards innovative pages of their own design, providing them with a set of advanced tools which have been tested and are supported within the organization. For example, new graphics design packages that can be used to create three-dimensional images are becoming widely available and have advanced to the point that they are not prohibitively difficult to use. Developing a workable support strategy for all of the available packages however would be impossible. Even attempting to support the top ten packages would likely be a tremendous drain on institutional resources given the disparity between the various packages. In contrast however, selecting the best one or two packages and making them readily available to instructors as part of a supported toolkit provides a more workable solution. As instructors justifiably demand greater support for functionality, the toolkit can be expanded to include appropriate resources to fill those needs without overextending the support staff. Advanced workshops and introductory training for these supported packages then becomes more manageable. In order for a the "toolkit" approach to work effectively, institutional support staff must take an active role in supporting the products included in toolkit as well keeping the toolkit updated to reflect advances in technology and required additional functionality.

Conclusion

The World Wide Web has become and will likely remain an increasingly important medium for supplementing and even delivering course content. Although the Web we have today is the product of very recent technologies, many of the problems educators' face in effectively using the Web today parallel the problems experienced using the "new" technologies over ten years ago. Overcoming the many potential roadblocks that stand in the way of successful Web development requires educators to work in close cooperation with the administrators and technologists responsible for developing the underlying infrastructure that makes the Web possible. Notwithstanding the many reasons propounded for delaying development, now is the time to move forward even if on a small scale. Once the decision has been made to move forward planning deployment using the naturally progressive steps of experimentation, use of the template, redevelopment, and innovation will provide instructors with a comfortable and productive development environment. Using the "toolkit" approach for bringing new technologies into the development environment will help head off rogue directions while providing a manageable support path.

Enhancing Elementary Curricula through Internet Technology

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Abstract

Radical advancements in Internet technology over the last decade have created endless opportunities to expand the realm of the elementary classroom. The World Wide Web (WWW), e-mail, Newsgroups, and Internet Relay Chat (IRC) are four of the most prominent utilizations of Internet technology. This paper demonstrates how one mid-western, suburban elementary classroom has enhanced its curriculum and improved classroom interaction by maximizing Internet technology. In addition to reviewing the merits of this case study, the reader will also: (a) be presented with a rationale for utilizing Internet technology with existing curricula, (b) examine the current debate on the issue of networking schools, (c) compare and contrast the pros and cons of utilizing Internet technology in elementary classrooms, and (d) consider the coalescence of curriculum and technology. An overview regarding the current application of Internet technology in an elementary setting highlights its true benefits: students conducting research on a topic of interest, communication and collaborative projects between students around the world, and the opportunity for students to publish original work.

Technology and Cognition

Tremendous enthusiasm presently exists toward the networking of school classrooms and the coalescence of curriculum and technology. While many critics have labeled this current educational trend as nothing more than an "expensive infatuation with the Internet" (Banks & Renwich, 1997), others view this emerging technology as an opportunity to motivate students to participate in the learning process.

Over the years, educational theorists have recognized the role technology plays in fostering human intelligence. David Olson (1976) noted that "intelligence is not something we have that is immutable: it is something we cultivate by operating with a technology, or something we create by inventing a new technology." This view can be summarized by saying that the role of technology is to act as both an extension of, and a stimulus to, human cognition (Sewell, 1995). Seymour Papert's work, culminating in his influential book *Mindstorms*, visualized a role for computers and technology that emphasized "breaking down the barriers that frequently exist between differing areas of the curriculum, as revolutionizing the nature of learning, and as lowering the threshold of the abstract" (Papert, 1980).

If the current application of Internet technology is only viewed by the elementary teacher as a means of providing remediation and enrichment, a tremendous opportunity to challenge young mind's will be lost. "Classroom computers can change children's minds, but to do so they need to be used by teachers who do not view computers as surrogate teachers so much as tools with which their own educational goals can be reached" (Underwood & Underwood, 1990).

Nora Sabelli, of the National Science Foundation, said it best: "The Net's main value will be breaking the isolation of the classroom by allowing children to talk to experts, exchange ideas, and tap into real time information" (Kronholz, 1997). This attitude reflects a growing rationale toward utilizing such technology in an elementary setting. Without doubt, Internet technology has the potential to serve as the mediating factor between the learning environment and the acquisition of human intelligence.

Case Study of a Mid-Western Suburban Elementary School

A case study was conducting during the 1996-1997 school year in a rapidly growing mid-western, suburban elementary school. The case study specifically examined a fifth grade classroom that was utilizing Internet technology to complete a variety of classroom projects. The school selected for this study is one of six elementary schools networked to both a middle school and high school within the school district. The school district budgeted and completed a massive capital improvement project that involved networking all of the school buildings. This project included the purchase of a network file server, as well as, contracting the installation of fiber optic cable between all buildings within the district. The school examined in this study was outfitted with two, thirty-unit computer laboratories that utilize Macintosh Power PCS. Both laboratories were equipped for Internet applications, in addition to providing an Internet connection for each classroom computer (one per room).

A survey conducted at the beginning of the school year revealed that sixty-four percent of the students assigned to

this classroom had previous experience with the Internet. Forty-three percent indicated that they had access to the Internet in their home, while only twenty-five percent of this group indicated that they had previously used the Internet to complete research on a school project. Eleven percent of the students from this classroom indicated that they had no prior knowledge of the Internet and were being introduced to Internet technology for the first time.

The teacher involved with this case study received extensive training in educational technology as a pre-service teacher. However, the pre-service training was void of any Internet experience. The teacher indicated that Internet experience was acquired through personal interest, beginning with the teacher's enrollment through an Internet Service Provider (ISP) in October of 1995. Since that time, the teacher had completed some formalized training related to Internet technology.

Some of the applications observed during the study included: (a) utilizing a variety of Internet search engines to retrieve biographical information on notable individuals of the twentieth century, (b) downloading a variety of images to be printed in color and later displayed in a student project, (c) accessing weather satellite images to make predictions regarding the daily weather forecast, (d) linking to a variety of educational sites that provided specific information regarding both social studies and science topics (e.g., Colonial America, global warming, etc.), and (e) sending and retrieving e-mail (e.g., electronic pen pals). Prior to being allowed to utilize any Internet application, students had to complete a school permission slip (that was signed by a parent) acknowledging that the school district's policy regarding Internet access had been reviewed with the child.

Tremendous enthusiasm was noted in regard to students completing research on assigned topics. Many students, who earlier demonstrated a dislike for completing research, were extremely active in the retrieval of information related to a specific topic being discussed in class. A small percentage of students found the exercise to be frustrating and opted for a more conventional approach to completing their research (i.e., utilizing an encyclopedia).

While the overall effectiveness of applied Internet technology is inconclusive in this case study, there were several positive benefits noted. The majority of students were actively engaged in research for an extended period of time. Students displayed an ability to work independently of the teacher, requiring only minimal assistance while conducting "Web" searches. Finally, students were able to incorporate much of the information gained from their Internet search into a final written report (i.e., a biography of a notable person from the twentieth century).

The Current Debate on Internet Technology

The debate over networking schools and providing Internet access to all students is complicated by a number of political and economical issues. President Clinton recently escalated the debate by committing fifty-seven million dollars toward "technology literacy grants", aimed at assisting poor school districts that lack the fiscal resources required to "hard wire" their buildings. The Clinton Administration has also pressured the Federal Communications Commission (FCC) to "establish a 2.25 billion-dollar Universal Service Fund, which will link schools across the country to the Internet beginning in 1998" (Associated Press, 1997). President Clinton has further promulgated Internet access in schools by encouraging school districts to consider volunteer labor as an alternative to contracting the labor required to hard wire a building. Clinton views such a community effort as "an old-fashioned barn raising [when] neighbor joins with neighbor to do something for the good of the entire community" (McAllister, 1997).

Critics are quick to point out that regardless of the amount of money offered through federal and state agencies, the Internet will remain only a promise, and not the panacea that people predict. Critics point to a National Study conducted by the Rand Corporation of Santa Monica, California. The Rand Corporation study concluded there was no significant evidence to justify "networking" all of the nation's schools and that computers as a whole "remain marginal contributors in most schools". Sandra Banks and Lucille Renwich (1997) noted three obstacles to achievement: (a) a high price tag, (b) lack of teacher training, and (c) no consensus on best use. In a June 8, 1997 article appearing in the *Los Angeles Times*, Banks and Renwich noted that only a small percentage of successful, Internet equipped schools exist. One such school, Blackstock Junior High School in Ventura County, California has shown tremendous success in student achievement attributed directly to the coalescence of technology and curriculum. This success is marred by the tremendous cost associated with their success. For example, Blackstock Junior High School invested three billion dollars over a ten-year period. During this time, teachers were given a year off to receive training in the appropriate application of Internet technology and the school's curriculum was completely overhauled to included Internet requirements. To maintain their success, the Blackstock Junior High School currently operates with a technology budget in excess of $380,000 a year (Banks and Renwich, 1997).

The outcome of this debate is undecided. Many leaders in the field of education question whether the enormous cost to provide the hardware required for Internet technology is really worth the investment. Adding to the enormous price tag is the realization that only five percent of current funding goes toward training teachers in the use of this technology. Only eighteen states presently require pre-service teachers to receive training in Internet technology, and of these eighteen, only five require that veteran teachers receive training prior to renewing their teaching license (*Wall Street Journal*, 1997). Without conclusive evidence on the effectiveness of Internet technology in the elementary classroom, many educators question whether money is being wasted on an expensive experiment. Nevertheless, Stuart

Biegel, Professor of Education and Information Studies at the University of California, Los Angeles (UCLA), poses an interesting question: "It is a step into the unknown, no question about it. So the question is, do we take the step or do we sit back and let somebody else do it?" (Banks and Renwich, 1997).

Biegel's remarks demonstrate the reality that supersedes any debate. Internet technology is here to stay. It will continue to work its way into the elementary classroom and curriculum. Rather than wasting time debating its cost effectiveness or its merit as an instructional tool, the debate should be muted in favor of developing this emerging technology into an effective teaching tool.

Implications for the Future

A review of educational research leads one to conclude that the true obstacle to realizing successful integration of Internet technology and elementary curricula lies in the fact that "past staff development programs have not focused on the specific instructional computer skills needed by teachers to integrate the Internet into classrooms" (O'Donnell, 1996).

In the book, *Integrating Computer Into the Classroom*, Edith O'Donnell notes the need for "a new philosophy". This new philosophy must fulfill three purposes: (a) recognize that just placing computers with Internet access into classrooms is not adequate for integration, (b) recognize that teachers wish to integrate Internet technology, but do not know how, and (c) recognize that present in-service programs are inadequate for widespread integration of Internet technology into the classroom. Teachers must gain the necessary instructional strategies to go beyond hands-on computer skills to teacher-driven instructional strategies that provide confidence and enthusiasm to inspire utilization of Internet technology in a whole class environment (O'Donnell, 1996).

Summary

The marriage of Internet technology and elementary curricula holds the potential to change the way students look at learning. Teachers and their students need to move from planned learning to authentic experiences; Internet technology provides the means by which we can influence that change. Internet technology, properly applied, holds the potential to help students not only to prepare and complete assignments, but integrates experience and subject matter. Used properly, the Internet can act as a stimulus for the discussion and exchange of ideas. The Internet can also provide for individualized instruction, an ideal that educators continually advocate. Finally, the Internet encourages interactivity, promoting active learning between students of all ages and abilities. The Internet is not just a technology for presenting material to be learned, nor is it just an outlet for students to express themselves, although both of these are roles the Internet can fulfill. It is both these and more.

While the utilization of Internet technology shows no more promise than conventional teaching methods (with regard to academic achievement) in the elementary classroom, the appropriate application of Internet technology can be responsive to differing learner characteristics, can provide authentic opportunities for application, and can motivate students to learn.

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"Future Proofing" Faculty: The Struggle to Create Technical Lifelong Learners

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Abstract

College faculty can minimize valuable time and resources invested in inappropriate technologies by staying in step with technological progress. A "future proof" approach to technology recognizes and welcomes small failures, considering them part of the ongoing process of absorbing technology into the learning process. "Future proofing" attempts to understand the factors that influence and impact technology upon learners. The factors that comprise the concept of "future proofing" include:

(1) market dominance solutions*: based on a strong market presence this often proves to be the single greatest factor in decision making;*

(2) ease of use*: users of technology prefer simplicity over functionality;*

(3) the best-practice approach*: since technology is a delivery medium, proven successful teaching and learning practices are likely to work when technology is added;*

(4) technology non-reliance: *users should avoid relying too heavily on the expertise of technical gurus;*

(5) least cost*: free software should be rigorously reviewed and users should plan on receiving limited or no technical support, since software freely available may disappear or fall victim to programmer neglect; and*

(6) best guess-roulette: *creative and effective solutions evolve from combinations of technology only possible from experimentation.*

Introduction

The use of technology has the potential of being the greatest single change agent effecting learners. A major problem individuals often encounter is choosing the "correct" technology. Faculty are faced with a multitude of equally compelling technologies having the promise of being the ultimate solution—**today**! The problem is not the lack of technical solutions available to solve problems, it is knowing where the rest of world is heading with technology. Ignorance with respect to where technology is heading can force countless hours of working and reworking solutions to the point that a paradigm shift deadlock will bring to a halt all creativity and productivity. Time is forever lost retooling thought processes and skills, not to mention the hard costs of revamping hardware and software. Unless one is fortunate to have unlimited resources available to forge new directions, it makes sense to stay technically in-sync-step with the rest of the world; only then is it financially viable for vendors to build solutions to your fingertips.

This begs the question, how does one determine where the rest of the world is heading? Do you determine the most popular technology by number of solutions sold? Do you determine direction based upon the ease of use of the technology? Do you rely on colleagues? Do you seek insight from local technical gurus? Do you seek to minimize your perceived risk by working with free or nearly free solutions. Or, do you spin the roulette wheel of technology only to find out you are playing Russian roulette?

Purpose

If you do not know where you are going, then any technological road will get you there. The purpose of this paper is to explore approaches that can help one avoid investing valuable time and resources into technologies that may lead into dead-end streets that discourage learners from pursuing knowledge through technology. All too often, technical solutions are chosen to solve immediate needs with little attention given to the critical evaluation of how best to integrate and leverage investments in existing infrastructures. To create technical life-long learners every effort must be made to avoid frustrating learners with short-term technological solutions. One sure way to discourage learners is to prevent them from building upon their existing knowledge base as they progress to the next level. The rate of change in technology today demands a tactical approach that anticipates and welcomes change. As new technologies are introduced, the capacity for change must be planned from the beginning or the learner will not be able to carry forward the skills learned from previous experiences.

How to "Future Proof"

The future is most difficult to predict. Technology is encroaching into every facet of modern life. The rapid change of technology can create a stranglehold on decision-making ability of the average teacher. Why would technophobic teachers ever make decisions concerning the use technology when the threat of totally starting over holds a death grip on their careers? Time is limited and failures are unavoidable. The only way to proceed is to develop a "future proof" approach to technology that recognizes and welcomes failure as the tool to help chisel away toward a solution that seamlessly absorbs technology into the learning process. Small failures can and should be recognized for what they are; small nudges guiding an individual to the best implementation of technology.

"Future proofing" is an art, not science; it can not guarantee immunity from failure. However it can provide a career insurance policy that inhibits the policyholder from making catastrophic decisions with respect to the implementation of technology. Each step in the "future proofing" process can be individually analyzed to clarify the critical components that makes that step unique in the process.

Using the above question, "how does one determine where the rest of the world is heading?", and spin off questions that logically follow, an will attempt will be made to identify the major factors in the "future proofing" process. Knowing how to "future proof" requires an examination of the factors that serve as the basis for this concept. Any factor alone has the power to swage the final determination of how best to prepare for the future.

Factor 1: Market Dominance

Depending on the degree of market dominance, solutions based on a strong market presence often prove to be the single greatest factor in decision-making. As a user of technology, it would be a relief to know there are other individuals coping with the exact same technical issues; there is safety in numbers. For example, Microsoft Word is the dominant word processing software package in the world today. If another vendor ever attempted to challenge Microsoft's dominance, they would have to develop solutions which provide compelling reasons to switch. In an attempt to sway Word users to another software platform, a vendor would develop migration strategies to facilitate the conversion of Word documents to a new format. If you were using a word processing package that had little or no market presence, then vendors would not be as willing to spend time or resources developing migration strategies. On a purely financial self-interest basis, vendors will develop and tailor solutions that meet the needs of the greatest number of users.

When it is not possible to clearly identify a market leader, it would make sense to choose a technology path allowing greatest freedom for migration in the future. For example, the Web browser war between Microsoft and Netscape for Web market dominance can be described as a virtual tie. In this situation it would be wise to determine the common technology between the two vendors' solutions and select a strategy allowing for a flexible migration path in the future. If this instance, if one were developing Web-based solutions, it makes sense to develop pages that are non-proprietary; pages that adhere to the Hyper Text Markup Language (HTML) standard. At a later date, once it is obvious who the market leader is, web pages should be able to be folded into the vendor solution with little trouble.

Factor 2: Ease of Use

Ease of use issues are related to the KIS (Keep It Simple) principle. Given the choice, users of technology would gladly surrender functionality in favor of simplicity. The simplest technical problem can quickly become an insurmountable barrier, preventing the teaching and learning process from occurring productively. Technologists and educators must be brought together and focus their energies on keeping the complexities from getting in the way of learning.

Strive for the highest common denominator in technology and functionality without sacrificing the message. To achieve the highest common denominator, a conscious effort must made to avoid using technologies that place the learner on the "bleeding edge". More often then not, the appeal to include flashing gizmos is often too compelling to resist and quickly becomes the focus of problems that create unnecessary barriers to the teaching and learning process. For example, the use of plug-ins and helper applications for Web based applications create instant configuration problems for learners as they try to adapt their browsers to the latest and greatest technology possible. Stay far enough behind the bleeding edge of the technology curve to provide the highest functionality possible with minimum user frustration and confusion. If you can not delivery the message, you are failing the learner.

Factor 3: Best Practice Approach

Successful teaching and learning practices that have worked in the past are good indicators of what may work in the future when technology is added. Technology in most situations is just a delivery medium, the message often remains the same. What has changed is how the message is delivered and way the learner interacts with the new medium. Technology in itself is not the means to create technical life long learners, it is how the technology is applied to the learning process that counts! Technology, properly applied, has the potential of creating new pathways to dynamically engage the learner.

The converse is also true; poorly applied technology can discourage the learner and make the learning process much worse than if nothing were done at all.

In real life situations, unexpected failures often arise when applying new technology to traditional education processes. What really matters is how you apply the technology. Failures are part of the struggle and should be used as

learning opportunities to gain a better understanding of how to refine the best practice approach to create technical lifelong learners. We must constantly reevaluate, inquire, and collaborate on new approaches for the application of technology to learning, or we will never fully realize the potential technology has to offer. Continual experimentation and evaluation of the application of technology to learning will reveal how best to combine proven learning practices with new technology innovations. The application of technology is a work-in-progress, constantly changing and evolving. Determine what has worked successfully in the past and investigate ways to use the dynamic nature of technology to refine and improve desired learning approaches.

Factor 4: Technical Non-Reliance

Avoid relying too heavily on the expertise of technical gurus. Too often their focus is purely technical based, and the solutions offered are too complex to have any tangible benefit to learners. Technical applications for the sake of technology sizzle are surely going to frustrate and change the focus from learner based solutions to excesses in frustration. Always temper the advice from technical people with questions like: What will this give me when I am finished? How long will it take to implement? Who do I call when I have problems? How much does this cost?

Input from technical experts is absolutely necessary in the development of technical lifelong learners. However, a little technical input can mutate what was a learning opportunity to a computer science project where programming, software installation and complex configurations are required. Constant evaluation of the initial goal must occur to guarantee the application of technology is improving the learning process.

Factor 5: Least Cost

The success of the World Wide Web (WWW) can directly be attributed to software that has been freely available on the Internet. Mosaic, Netscape and Internet Explorer are examples of free WWW browsers that have revolutionized the delivery of information. The initial lure of assembling learning solutions using free or nearly free software should be rigorously reviewed before foundational decisions are made effecting future directions. Software freely available today, may instantly disappear or fall victim of programmer neglect. When assembling free software, plan on receiving limited or no technical support from the author or vendor.

Factor 6: Best Guess—Roulette

The best guess approach often leads to failure; but by eliminating possible solutions one can work toward the correct solution(s), one failure at a time. This approach can be costly in terms of human resources as well as hard costs in computing equipment. As illogical as this approach may seem, innovative applications of technology can emerge from experimenting with varied and dissimilar learning technologies. Creative and effective solutions evolve from combinations of technologies only possible from experimentation.

Summary

The "future proofing" concept is a learner-based strategy designed to help faculty keep pace in the rapidly changing world of technology. Unanticipated change can result when one is not aware of technological solutions and their potential impact on learning. Staying abreast of technology requires an investment of time and the capacity to accept failure as a positive influence. Realizing technology has become an integral component of the educational process; technology awareness and skills are absolutely essential for faculty and learners to be prepared for the 21st century. "Future proofing" is an approach to understanding the factors that influence technology, and hence, the impact technology has on learners. As new technologies enter the education scene, always keep the focus on learning. Is the technical enhancing the learning process?

Observation of Instruction via Distance Learning: The Need for a New Evaluation Paradigm

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Abstract

Technology as a tool used to enhance instruction must be viewed in its proper perspective. Instruction via distance learning is an excellent example. Instruction must be appropriate for the intended audience, and must be observed and evaluated within the expectations of criteria used for evaluating effective teaching. Traditional criteria may be appropriate for evaluating regular classroom instruction, but not appropriate for distance learning instruction. Criteria such as "wait time and questioning techniques," are well documented, but were derived through tedious observation and recordings of repetitive behaviors within a regular classroom. As an administrator or evaluator observes in a classroom where instruction is being delivered via television, consideration must be given for adaptations that must be made for observing the distance learning classroom. Observation training in the distance learning classroom will be tedious, but new examples and innovative ways of documenting teaching behaviors are needed. The authors present a case for the development of new criteria for evaluating distance learning instruction.

Introduction

Paradigms used in the observation and evaluation of regular classroom teaching may not be applicable when observing instruction via distance learning. The body of knowledge gleaned from the research on effective teaching when applied to teaching on television may simply not fit. At the very least, teacher behaviors tried and tested in a regular classroom will need modification if they are to be successful in distance learning. This is especially true when the teaching is to be performed in a *one-way video* mode. In this mode, the student must assume more of the responsibility for learning. Teaching on television is usually conducted in a one-way video—two-way audio, or two-way interactive video format. This article deals with the key issues that are essential to quality instruction via distance learning. As teaching and learning address the urgency of the technological explosion, compatible accommodations must be made for impending changes.

Instruction via distance learning needs close scrutiny and critical evaluation as it holds the potential to change teaching and learning. Although the costs may be prohibitive, the impact for teachers and learners is far too great to ignore. It is not a panacea; neither should it be dismissed with an attitude of this too shall pass!

Observation in the Distance Education Environment

Distance education is a distinguished system of education, distinguished from other educational forms by its separation in both time and place and by its teaching and learning acts (Rumble, 1989). The teacher is a very important element in the educational process, whether in a traditional classroom or in a distance education setting. One of the ways to determine the effectiveness of instruction conducted on a distance learning system might be to observe and document the characteristics and behaviors of distance learning instructors for comparison to the teaching behaviors found in the research on effective teaching. Specific teaching behaviors such as providing effective praise (Brophy, 1981), use of advance organizers (Ausubel, 1960) or frequency of reviews (Cruickshank, 1986) might serve as starting places. Questions about effective teaching might include inquiry into interaction such as: 1) how often does the instructor initiate interaction with each student, 2) how often do the students initiate interaction with the instructor, 3) how much wait time does the instructor give a student responding to a question, 4) how often does the instructor use advance organizers, ***or*** 5) how much time does the instructor spend in reviewing previous lessons? Questions like these might be more useful in an observation instrument for teaching on television than an instrument normally used in a regular classroom. An analysis of the amount of teacher dialogue compared to the amount of student dialogue or a determination of how much of the interaction the teacher initiated and how much the students initiated might also prove beneficial (Barker, 1988).

Several studies assessing student attitudes toward media and technology in the distance learning environment have been conducted (Allen, 1995, Bangpibob, 1995, and Bozik, 1995). Adult attitudes toward instructional technologies are positive (Dillon, Haynes & Price, 1990); however, other studies indicate student attitudes are influenced by their familiarity with the technologies employed (Riddle, 1990, Smith & McNeils, 1993). Teachers and learners must realize computers are not

inherently interactive. They provide an excellent environment for discussion, but they are only interactive if students participate responsively and regularly (Eastmond, 1995). Kinzie, Delcourt and Powers (1994) found attitudes are important predictors of success and are critical areas for future examination. Distance learning students express a need to know classmates and a desire to interact with someone else in class (Egan & Sebastian, 1993). The practice most often mentioned by students in a description of outstanding electronic teaching practices was the practice of providing for student-to-student and instructor-to-student interaction (Western Cooperative for Educational Telecommunication, 1995). Clearly, an examination of instructional effectiveness must consider an assessment of student attitudes toward the learning delivery system.

Teaching strategies and course design influence student attitudes in a distance learning environment. Students are positive toward interactive teaching methods (Burge, 1994); however, their attitudes toward the impact of technological difficulties are negative (Riddle, 1990). Saba and Shearer (1994) found students felt connected and satisfied in a computer-facilitated interactive video classroom, yet felt isolated from the main class and saw themselves as passive observers in a video-only classroom. Keegan's comment might serve as a summation: Interactive learning environments have proven difficult to design and deliver; however, current instructional emphases must consider new interactive technologies if transactional distance between learners and instructors is to be bridged (Keegan, 1993).

The one-way video—two-way audio format necessitates conveying of information where the nonverbal dimension of teaching is missing for the most part (the student can see the teacher, but the teacher cannot see the student). The role of the teacher is radically altered. The teacher must make illustrations by describing or by creating verbal pictures for the students. Pinney's research (1969) found that without the opportunity to see the student, the teacher must prepare the students in such a way that they assume more responsibility for their own learning. Usually, there is no opportunity for immediate clarification as one would do in a normal classroom setting. This represents a major adjustment if the teacher uses a research based teaching approach.

Preparing the students to learn is an essential element in effective teaching. The beginning of the class is an important time. First impressions tend to have lasting effects, and teaching at the beginning of the period might be much more influential than the instruction taking place later. The beginning of class is one of the most critical teachable moments. The teacher must take this into account and work diligently to get the students ready to learn (Hunter, 1982).

Whether one uses Hunter's anticipatory set or some other term, how the teacher addresses learning at the beginning of the class period is extremely important. If this thinking were extended throughout the duration of a particular course then one would be well advised to model the appropriate behaviors early in the school year or semester. Opportunities to teach through modeling are greater at this time because rules and procedures are amenable to change (Doyle, 1986).

Setting the stage for learning when one is teaching on television becomes much more demanding of the teacher in terms of details that must be addressed. The flow of instruction must be planned in advance with materials and other strategies that do not require student interaction during the class period. The teacher must prepare visuals to illustrate processes that he/she might use to enhance learning. With the student role in learning largely dependent on the learner, the teacher will encounter difficult problems if the student has a motivation problem. This is true for any type of teaching situation, but teaching via distance learning formats tends to exaggerate the problem. Perhaps a more realistic approach for observing/planning and organization for instruction over a one-way video—two-way audio format would be to examine the materials themselves and try to determine the intent of the teacher. Observation could then discern if the teacher's intent were effectively reached. While preparation for teaching without anticipating student interaction may be necessary, the teacher would be well advised to plan for student interaction as much as possible. This may necessitate class assignments where the students are required to interact with each other via computers, or telephone or with materials the teacher has provided. Either way, the preparation for such occurrences will greatly enhance the chances for them to actually materialize. In some distance learning situations, teachers use chat rooms or newsgroups where the students interact via the computer between the times classes meet. When students log on, their messages are recorded and the teacher is able to make some assessment as to how much interaction is actually occurring.

Effective teaching includes modeling on the part of the teacher. When one is observing instruction on television, an appropriate behavior might be to look for the teacher's illustrations or demonstrations, or modeling behaviors as they are displayed for the students who sit in the studio where the televised teaching takes place. Interviews with T. Wiedmer & J.C. Thompson, Jr., university teachers who have taught on television, verify that students have the advantage of the verbal and nonverbal dimensions of the teaching act and are able to discern and communicate more clearly than those at distance sites (Personal Communication, Spring, 1997). Thus a criterion for observing teaching on television might be to determine how well the teacher utilizes the students who are present at the programming site for demonstrating teaching points he/she wants to make. How does one observe for overlapping behaviors on the part of the teacher on television? One suggestion might be for the teacher at the beginning of the class to start a review session by directing a question to the entire class; take the roll, or pass out papers (perhaps through a fax machine) while the students are thinking about the answer (wait time), then call on a student whom the teacher thinks will answer. By utilizing strategies like this, the teacher can conduct the review and take care of housekeeping chores at the same time. The stage is set for the students to think about their answers and compare them to the one given by the student called upon. In this way, unvoiced misunderstandings or incorrect answers can be corrected without visibility or embarrassment. On television this teaching

situation will need to be modified to utilize the students who are in the studio to model the behaviors sought by the teacher.

Modeling behaviors that teach desired outcomes might be observed as intentional or unintentional on the part of the teacher. How the teacher models respect for the students in the class sets the stage for how the students treat each other. In an attempt to explore the impact of invitational teaching practices on underachieving and apathetic teacher education students, Lange (1988) found a positive correlation between the invitational teaching techniques and increased positive experience for each student in the study. This study was an overt attempt to look at positive modeling behaviors and their impact on students who were disenchanted with their choice of a career. Students do not easily discern intentions unless the teacher exhibits overt behaviors. Overt teacher behaviors that are designed to enhance student motivation and attitude should be included in any evaluation paradigm of teaching on television.

A research based teaching model indicates the need to check for understanding. In the one-way video—two-way audio format, opportunity to check for understanding might not be as applicable at the moment the teacher needs it as it would be in the regular classroom. The teacher therefore must make opportunities for this crucial step in the teaching process. Student interaction in distance learning situations is often accomplished via telephone or computer via telephone lines. If the students are to utilize the telephone to interact from distant sites, elapsed time may be dependent upon the number of lines accessible to the students. Further, responsive telephone calls by students may consume so much time that the question or comment becomes out of place in the sequence of interactive events. Without the opportunity to check for understanding at the most opportune time, the teacher may not be as aware of the student's comprehension of the content or processes being taught and may be unable to adjust the instruction for optimal learning.

Programs which permit only selected on-line classes to call in can hardly pretend to be interactive when a majority of their students are simply watching a one-way TV instructional program that does not allow them to call-in, ask questions, or make comments. Another factor is whether or not students at a receiving site would be able to be on-line with students at other receiving sites at the same time, thereby enabling not only teacher/student interaction but also student/student interaction (Barker, 1988).

Effective use of time is a variable necessary for successful teaching; however, when one observes teaching on television, there is the realization that the use of time must be evaluated differently. When the teacher asks a question, three to five seconds of wait time is well documented in the literature (Rowe, 1996), but this is not realistic in a distance learning classroom. An adjusted expectation might well be as long as ten seconds or an adjusted definition of wait time might be developed to include student/teacher interaction via telephone. The obvious question arises, however, that if wait time must be extended, how does a teacher cover the necessary learning material needed in the course? Or, if the teacher adjusts and makes decisions to concentrate on more essential elements of the content, who participates in the decision as to what is essential? These are typical of the decisions teachers have to make (Hunter, 1982).

Interviews with teachers who have taught on television indicate it is not possible to process material initially, but teachers adjust over time and tend to acclimate to the demands of teaching on television. With practice and experience, improvement can take place. Strategies drawn from the research literature that might be applicable here include: 1) repeating content three or more times at *spaced intervals* results in content retention (Jersild, 1928); 2) *Proactive markers* such as "look at this", "watch me", or "now get this" increase retention also (Ehrensberger, 1945; Petrie, 1963; and Maddox and Hoole, 1975).

Teaching in a distance learning format that is one-way video—two way audio presents a different situation from that of the normal classroom. A study of communication always includes a discussion of how much of a spoken message is received and decoded through the nonverbal gestures or nuances that accompany it. Estimates range as high as 93% of a spoken message is received nonverbally. Teaching on television in a passive one-way video system mandates that the teacher must convey information or processes in a medium that restricts the nonverbal dimension of the communication process. In observing teaching, it is common to view a series of communication exchanges that result in teacher and student behaviors that can be codified. The observation may be accurate only to the extent that the observer has the opportunity to summarize the complete exchange. In observing teaching in a distance learning format, the observer will not have access to complete verbal and nonverbal exchanges and may have to extrapolate or hypothesize occurred. This raises the potential for differential and/or erroneous interpretation.

The role of the student in distance learning is quite different from that of a live classroom. The student must cope with the technology to be able to participate in class assignments. Students must assume more responsibility for their own learning. Perhaps this is the greatest real gain. Collaboration with the teacher to increase learning is essential in any learning situation. However, when the medium is a passive learning format like distance learning, both the teacher and the learner must exert more effort. Precision of language used by the teacher when a concept is introduced and defined is important, but when examples and non-examples are given, it becomes critical. It should be noted that concepts are attained more completely when both examples and non-examples are provided (Tennyson, Woodley, and Merrill,1972).

Learning is enhanced when the teacher states each concept, law, or rule clearly. This might be accomplished by defining or stating the components, explaining in a language from which the students can profit or in such a way as to allow the students to demonstrate either by example or analogy. When students have opportunities for guided and independent practice, achievement is enhanced (Klausmeier, 1976). In 1979 Anderson, Evertson, and Brophy found a strong correlation between the number of minutes spent in guided practice (where

a large number of questions were asked) and achievement. They also found a positive correlation between student achievement and the number of responses, suggesting interactive student practice at a brisk pace. Rosenshine and Stevens (1986) found that correctives and a high percentage of correct responses provided during guided practice are essential. The question then becomes: How does the teacher give guided practice in a distance teaching/learning format?

Independent practice used to extend content that has already been taught is a sound research based teaching practice. It usually involves two stages: 1) working on the first few examples or questions, and 2) when students have mastered the material and are working on reinforcement (Samuels, 1981). In the first stage, instruction is focused on the teacher's behavior and is usually a direct instructional situation. An ineffective teaching behavior that is often observed when students ask questions about material that has just been presented is that the teacher often repeats the first example that was used to explain the concept. Not only is the example repeated, it is often repeated more slowly, loudly or precisely. This practice is ineffective because the teacher is emphasizing an example that the student did not understand the first time it was presented. It is exacerbated by the fact that the teacher repeats it slowly and often more loudly as if to emphasize that the fault lies with the student and not the example. It is the wise and skilled teacher who recognizes this situation and shifts to another example while assuming the responsibility for the student not understanding. Frayer (1970) found that a few well-chosen examples were better than numerous examples and the number of examples that a teacher uses may not be as significant as the quality of examples given.

In a distance learning format, the teacher will be hard pressed to incorporate independent practice while the lesson is being taught. Learning then entails work or practice beyond the classroom. Teaching on television can be greatly enhanced by use of computer-assisted interaction. Riel (1993) found computer-mediated communication raised cross-cultural awareness. Social interaction is increased (Johnson-Lenz & Johnson-Lenz, 1993), writing skills are enhanced (Paulsen, 1992), knowledge construction and thinking are facilitated, and independent learning strategies are developed (Mason & Kaye, 1989). However, lack of visual cues can also inhibit depth of communication (Selfe & Meyer, 1991). From these studies an evaluation of teaching on television, especially when the evaluator is trying to assess independent practice, clearly must attempt to assess activities that occur beyond the classroom and between times when the class meets. Interaction between students outside the classroom may be a direct reflection of the teacher's action during classtime.

Summary

Instruction via distance learning is a widespread practice among educational institutions. It is utilized for upper level classes at the high school level to provide opportunities for students who plan to pursue higher levels of study. Colleges and universities use distance learning for a variety of instructional purposes from delivering classes within state borders and between states nationwide to video conferencing that might have international hookups. The explosion of technology has served to remove the barrier of distance for access to learning. The speed with which electronic signals can transmit information has permeated nearly all areas of society; education is no exception. Technology is here to stay and its implications for instruction stagger the imagination.

An issue of distance learning that must be considered is the quality of the instruction and learning that takes place. The research on evaluating instruction via distance learning formats has been largely confined to analyses of self-reported data from participants. Careful observation with well researched criteria are needed to evaluate the effectiveness of distance learning instruction. The research on effective teaching is a body of knowledge that has been accumulated largely in traditional classrooms. The distance learning site is not a traditional classroom as far as teaching and learning are concerned, and the traditional criteria utilized for observing and evaluating teaching are not appropriate for observing and evaluating instruction via distance learning. As evaluators use the results of research on effective teaching and apply them to distance learning instruction, modifications of existing criteria need to be made. There is also a need for new criteria that are more compatible with distance learning environments.

Student attitudes toward learning are especially important for success in a distance learning situation. The teacher and learner must possess a degree of confidence and comfort with the technology. When the nonverbal dimension of teaching is missing, the preparation for instruction is different and must focus more on created visual images rather than direct observation.

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The *Mid-Western Educational Researcher* is a scholarly journal that publishes research-based articles addressing a full range of educational issues. The journal also publishes literature reviews, theoretical and methodological discussions that make an original contribution to the research literature, and feature columns. There are four issues of the journal published annually.

The journal is now accepting manuscripts for review and possible publication in 1997 and beyond. Manuscripts are submitted to blind reviews by at least two researchers with knowledge of the literature in the appropriate area. Furthermore, the editors will review the manuscript and make the final decision. The review process requires approximately three months.

Manuscripts are accepted from faculty, students, and professionals working in non-educational settings. Membership in the MWERA is not required in order to submit a manuscript for review. The editors encourage the submission of revised papers that have been presented at the annual meetings of the MWERA, AERA, and other professional organizations.

Submit four (4) copies of the manuscript with a cover letter to Deborah L. Bainer (see address in left margin). Manuscripts should conform to the style and format described in the *Publication Manual of the American Psychological Association*, 4th edition. All manuscripts should be typed, double spaced, on 8 1/2 x 11 paper with 1 1/2 inch margins on all sides. An abstract of less than 100 words should accompany the manuscript. The author's name and affiliation should appear on the title page only. Submissions typically are less than 20 pages in length. If the manuscript is accepted for publication, the author(s) will be asked to provide a disk file (WP 5.1 or higher on a 3 1/2 inch high density IBM formatted disk) as well as a printed copy of the final version. Please note that the editors reserve the right to make minor modifications in order to produce a concise and clear article.

Questions regarding the journal or the submission of feature columns should be directed to the editors.

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