8-1999

Instructional technology adoption at the University of Tennessee : perceived influences of select faculty members

Jean Ann Derco

To the Graduate Council:

I am submitting herewith a dissertation written by Jean Ann Derco entitled "Instructional technology adoption at the University of Tennessee : perceived influences of select faculty members." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Education.

E. Dale Doak, Major Professor

We have read this dissertation and recommend its acceptance:

Susan E. Metros, Ralph G. Brockett, John R. Ray

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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INSTRUCTIONAL TECHNOLOGY ADOPTION AT THE UNIVERSITY OF TENNESSEE: PERCEIVED INFLUENCES OF SELECT FACULTY MEMBERS

A Dissertation
Presented for the
Doctor of Education
Degree
The University of Tennessee, Knoxville

Jean Ann Derco
August, 1999

DEDICATION PAGE

This dissertation is dedicated to my parents

Margaret V. and George R. Derco

whose love and support are endless

and to the memory of my maternal grandmother

Anna C. Vahaly

who inspired me to pursue scholarship

ACKNOWLEDGMENTS

Many people supported and encouraged me to pursue and reach this goal. At the forefront of those to whom I am grateful are my dissertation committee members: Dr. John R. Ray, whose guidance and encouragement helped me manage the research process; Prof. Susan E. Metros, whose input and enthusiasm for my topic kept it fresh; and, Dr. Ralph G. Brockett, whose thoughtful comments motivated me to continually reflect upon and improve this study. I am especially indebted to my Committee Chair, Dr. E. Dale Doak, who accepted me as his student when I was searching for an academic home that could fulfill my educational interests. His mentoring and friendship helped me to grow both professionally and personally and influenced me to achieve this milestone.

ABSTRACT

Instructional technology can help transform college teaching from a teacher-centered instructional paradigm to a learner-centered paradigm. However, any educational change must begin with the faculty because only they can make a personal commitment to use technology in their teaching. This study focused on faculty members who have adopted the computer as an educational innovation seemingly in spite of the barriers. The purpose of the study was to identify how selected university faculty members are integrating instructional technology into their teaching practices and to determine the primary intrinsic and extrinsic rewards and incentives that influenced them to do so. Investigating what rewards and incentives were deemed as important to faculty who have already adopted instructional technologies can assist higher education in creating conditions that will influence more faculty to adopt the new instructional technologies.

Data were gathered using a survey instrument, which was completed by 41 faculty members from the University of Tennessee at Knoxville, who were identified as integrating instructional technologies into their teaching practices. In addition, 12 of these respondents were selected to participate in a semistructured interview. In summary, email was reported as being used

more than any other computer-driven instructional technology followed by using web-based materials that support course content; showing computer-projected visuals while lecturing; and, providing a web-based syllabus. This study found that the participating faculty members were overwhelmingly influenced to start using instructional technologies by intrinsic rewards and incentives, primarily because they wanted to increase their teaching effectiveness and improve their instruction. Additionally, the most influential extrinsic rewards and incentives were related to receiving work-related support and recognition or encouragement.

It can be concluded from this study's findings that instructional technology will be adopted by faculty who want to improve their instruction and perceive technology use as beneficial to the teaching/learning process. Recommendations based on the findings included suggestions to increase satisfaction in teaching, encourage instructional technology adoption, address facilities and equipment, and conduct further research.

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CHAPTER 1

Introduction

> "Always remember that the major barriers to implementing technology in education are not technical or economic, but psychological, organizational, political, and cultural." - Christopher Dede

Background and Rationale

Global economy was first dominated by the agricultural age followed by the industrial age, in which mass production of consumer goods was the prevalent economic force. Today, we have entered the information age with the economic emphasis focused on the customization of products and services. The workforce will require people who have the skills to know when and how to find or collaboratively create information to solve problems.

The future will belong to the "knowledge worker," according to Church (1993). Business and industry will be looking for individuals who have strong problem-solving skills and can work in collaborative teams. A survey of the Fortune 500 companies regarding the future skills requirements of the workforce produced the following list, in order of importance (Longworth & Davies, 1996, p. 3):

1. Teamwork
2. Problem-solving
3. Interpersonal skills
4. Oral communication
5. Listening
6. Personal/career development
7. Creative thinking
8. Leadership
9. Goal setting/motivation
10. Writing
11. Organizational development
12. Computation
13. Reading

These are skills that prepare individuals for the "flexible" workplace, in which customized production replaces mass production and expertise is vested in people with specialties, not in positions (Kerka, 1994). Workers will derive pay, prestige and status from their specialties and skills (Imel, 1994). And, the concept of "job" may disappear and be replaced by "meaningful market-driven work assignments in post-job organizations" (Huey, 1994, p. 44). The mastery of basic skills is no longer sufficient as workers need to know how and when to apply these skills. An information-literate person, as described by Doyle (as cited in Rutherford and Grana, 1995, p. 82), "is one who can identify a problem, recognize the need for accurate and complete information to make a decision, ask questions based on information needs, develop search strategies, access and evaluate information, organize and integrate information, and use it in critical thinking and problem solving." As society adjusts to the changes of the information age, educational institutions are trying to determine how students should be prepared to best succeed in the careers of the new work place.

Hall (1995) suggests that for nearly a millennium, the concept of the university could be best described with the word "convocation," as in the territorial assembly of members of a college or university. The university concept was formed as a defense measure against the possible destruction of knowledge and wisdom that had been laboriously hand-recorded and passed down through generations. Pockets of scholars cloistered around these distinguished collections of manuscripts, and accepted only the best students into the university. Throughout history, the hallmark of university excellence has been the ability to attract world-class faculty and matriculate students with a high intellectual profile, accumulate rare library collections, and build sophisticated laboratory facilities. These attributes of university excellence have historically been in short supply; therefore, those universities that could obtain more of these attributes than their rivals, increased their prestige (Hall, 1995). The origin of the university concept served to perpetuate the notion that higher education should limit its scarce resources to only those who were perceived to best benefit from it. Historically, students have had to meet carefully prescribed prerequisites and have been thoroughly screened before being admitted to a university program. Gradually, over the past century, the university of convocation has sought ways to lessen the problems of scarcity. The university has opened its doors to more students by increasing in size. However, increasing the size of a single university could not fulfill the enrollment demand and many individual institutions united to form enormous university systems (Hall, 1995).

Times continue to change. In 1991, Carol Aslanian, President of the USA College Board, reported the following about the demographics of university students (Longworth & Davies, 1996, p. 117):

> For every collegian under 25, there is one over that age. A college student who is full time, in residence, and less than 22 years of age accounts for only about 20% of all college students in the U.S. Among students who study at the graduate or professional levels, 51% are 30 years or older.

In the future, universities will not only serve residential students, but a diverse mix of off-campus learners. By the year 2000, each individual in the workforce will need to accumulate the equivalent of 30 credit hours every seven years to keep current (Dolence & Norris, 1995). By 2005, 63 percent of the labor force will be aged 35-55 and will "bear the brunt of adapting to the needs of a highly competitive global economy characterized by rapid technological change" (National University Continuing Education Association, 1996, p. 5). Some futurists suggest that workers in the information age will need to spend at least 20 percent of each day engaged in learning (Dolence & Norris, 1995). This can translate into the full-time equivalent (FTE) of approximately 20 - 28 million learners in the United States at any point in time, compared to 12 million during the industrial age (Dolence & Norris, 1995). To meet the needs of vastly increased numbers of learners, education's delivery methods will have to expand.

Although technology advancement is dynamic and progressing at a rapid pace, teachers primarily employ technologies and instructional strategies that are 50 to 75 years old (Snyder, 1995). New technologies and teaching strategies have been developed throughout the years, but there has not been much change in the way most classes are organized and conducted. This suggests that educational institutions are not keeping up with the changes going on in society. The implication for our society is that our future workforce will be unprepared to meet the new types of employment requirements that the new economy in the information age will demand. Leavitt (1997) suggests that students should at least have part of their education delivered through technology because this is the way the world will work in the future. Additionally, having seen the way in which technology has transformed business, many critics of American schools perceive technology as a means for bringing about revolutionary changes in education (Means, et al., 1993). According to Ely (1995), a current trend in education is that educational technology is perceived as a major vehicle in the movement towards educational reform. As a result, almost every state in the United States has developed an educational technology plan wherein the vital role of technology is evident (Ely, 1995).

A widely accepted goal in education is for students to become independent, self-directed lifelong learners (Moursand, 1996). And, Knowles's (1989) model of andragogy suggests that adults prefer to be self-directed learners. To be contributing members of society, people need to develop skills that will enable them to learn how to learn, as skills they may need in the future may not currently exist. A paradigm shift from the traditional teaching model that is teacher-centered to a learner-centered model can help transform higher education's instructional practices in order to fulfill the workforce needs of business and industry and to survive (Albright, 1996; Guskin, 1994; Hall, 1995; Rutherford & Grana, 1995; Hall & Shiffman, 1996; Means et al., 1993). According to Hall & Shiffman (1996), the learner-centered model can be accomplished in the following four ways: (1) individually design each student's learning program based on his or her unique learning requirements; (2) recognize what students already know; (3) shift the role of faculty from lecturer to mentor or facilitator; and (4) allow students to progress at their own pace.

Because technology can enable flexible learning, which is independent of time and distance, or where the instructor is physically located, or where the learning resources are housed and accessed, new emerging technologies can help higher education achieve this paradigm shift (Hall & Shiffman, 1996). However, educational change must begin with the faculty because only they can make a personal commitment to use technology in their teaching (Albright & Graf, 1992; Ely, 1995). In order to meet the needs of vastly increasing numbers of learners and to promote technological fluency among learners, faculty need to become adept not only with using a computer, but with effectively integrating newer technologies into teaching practices. For example, faculty may develop courseware applications, create Web pages, facilitate electronic communication with students, and/or use any other content-appropriate instructional applications of technology.

Providing opportunities for faculty development may provide part of the solution for the high learning curve associated with technology implementation for instruction. However, according to Blackburn and Lawrence (1995), there is a general skepticism regarding faculty development among many faculty who believe that development programs, books, or colleagues cannot help them to improve their teaching. This is attributed to the fact that faculty members across the country are getting older and have seen many how-to-teach fads come and go (Blackburn & Lawrence, 1995). Certainly, faculty attitudes directly impact the success or failure of any development program (Lewis, 1991). There are a number of other issues that concern faculty and prevent them from using new technologies. Rutherford and Grana (1995) suggest that faculty are generally afraid of the change new technologies may bring, the time commitment involved in learning these technologies, and not knowing where or how to start. The possibility of technological failure and the concern of appearing incompetent are also concerns that do not help to instill a sense of confidence within faculty members. Lastly, faculty may be afraid of "being replaced by an electronic duplicate of themselves, executed by a graduate assistant or low-paid adjunct" (as cited in Levine-Elman, 1997, paragraph 9).

With so many disincentives to the integration of technology into teaching practices, influencing faculty to embrace new technologies is an uphill battle. Regardless of organizational issues, it is a reality that today's technological business environment "means that educators must address the issue of technological fluency for all students" (Fulton, 1998, p. 63). The pressure to adopt new and emerging technologies is not likely to decrease; rather, it will most likely increase with dramatic speed (Cornell & Martin, 1997).

One factor that can help influence faculty members to adopt new and emerging technologies is the existence of rewards and incentives (Blackburn & Lawrence, 1995; Rogers, 1995; Havelock, 1970; Tuckman, 1979; Callas, 1992; Snyder, 1995; Albright, 1996). Rewards and incentives are linked to faculty motivation (Weimer, 1990). Motivators may be either intrinsic or extrinsic. With intrinsic motivation, an internalized personal desire is the reward. Intrinsic rewards can include "the satisfaction derived from intellectual curiosity, an opportunity for achievement and self-expression, and the pleasure of expertness" (Bowen & Schuster, 1986, p. 113). Conversely, with extrinsic motivation, a reward that is external to a person's internal drives and interest is the motivator. External rewards can include a promotion, public recognition, or extra resources.

It seems clear that instructional technology can help transform college teaching from a teacher-centered instructional paradigm to a learner-centered paradigm. However, the technology alone cannot accomplish this lofty task. Ultimately, any educational change needs to start with a commitment from faculty members to use technology in their teaching. The challenge lies within higher education to create conditions that will influence more faculty to adopt the new instructional technologies by investigating the rewards and incentives that are linked to faculty motivation.

Statement of the Problem

Given societal changes, the demands of business and industry, and the perception that educational technology is a major vehicle in educational reform, technology needs to be integrated into the teaching-learning process. In the university environment, the individual professor "is the single most important factor influencing appropriate implementation of media and technology for learning" (Ely, 1995, p. 9). The problem is to understand the conditions within the university environment that will influence individual faculty members to adopt new instructional technologies. Based on the results of this study, it is hoped that recommendations can be offered on how to create these conditions.

Purpose of the Study

Regardless of the difficulties involved in doing so, many faculty are incorporating newer instructional technologies into their teaching practices. The purpose of this study is two-fold: (1) to identify how selected university faculty members are integrating instructional technology into their teaching practices; and (2) to determine the primary factors that have influenced them to do so.

Research Questions

The following research questions are addressed in this study:

1. How are select faculty members integrating instructional technology into teaching practices?
2. Which intrinsic and extrinsic motivation factors are identified as providing the greatest influence for select faculty members who are currently integrating instructional technology into their teaching practices to learn about technology?
3. Which intrinsic or extrinsic motivation factors are perceived by select faculty members as the most influential in motivating them to integrate technology into teaching practices? Why were these motivation factors the most influential?
4. What are the relationships among the intrinsic and extrinsic motivation factors that the select faculty members perceive as most influential and their level of instructional technology use?

Significance of the Study

Technology integration in education is a prominent issue across the country. The Campus Computing Project, begun in 1990, is an annual national study of the use of information technology in higher education conducted by Claremont Graduate School in Claremont, California. In 1998, the survey reported that over one-third (33.3%) of the 571 institutional respondents identified "assisting faculty integrate technology into instruction" as the single most important information technology issue at their institution in the coming years (The Campus Computing Project, 1998). In a review of the research in educational technology, it was reported that although computers and technology can be used to help students learn new material in new ways, newer technology applications are generally not being integrated into the curriculum. (Thompson, et al., 1996).

Innovative methods to persuade and influence faculty to adopt the new technologies need to be implemented within higher education. Previous studies have explored why faculty members are not incorporating instructional technologies into teaching practices. These studies focused on identifying the barriers or disincentives of adopting educational innovations (Hoffman, 1996; Snyder, 1995; Thompson, 1986; Comer, 1986; Malayery, 1986). This study differs from previous investigations because it focuses on individuals who have adopted the computer as an educational innovation seemingly in spite of the barriers. By identifying what the primary influences were for faculty who are currently integrating instructional technologies into their teaching practices, new information may be revealed that will assist in creating conditions within the university environment to influence faculty members to adopt newer instructional technologies.

Findings from this study can also form the foundation for recommendations to faculty development professionals within higher education who are faced with similar goals and issues regarding faculty implementation of instructional technologies. The goal is to offer recommendations to administrators, and others, for creating conditions that will lead more faculty members to incorporate instructional technologies into teaching practices.

Assumptions

The following assumptions apply to this study:

1. Faculty members, who are participants in this study and have previously reported that they are integrating instructional technology into their teaching practices, are indeed doing so.
2. Faculty members who participate in this study will provide accurate responses to the survey questions.

Delimitations

This study was restricted to University of Tennessee, Knoxville (UTK) regular faculty who participated in a survey, which was developed and implemented by graduate students in Dr. John Ray's class "Using Research for Curriculum Improvement," for the Innovative Technologies Collaborative (ITC) at UTK during Spring 1997. Regular faculty are those who are employed by the University either full-time or part-time with a continuing contract for more than twelve months. Those faculty members who identified themselves as "incorporating instructional technology in direct support of student learning (i.e., computer delivered tutorials and other applications used for class exercises and assignments)" on the ITC survey were contacted during the fall semester of 1997 to solicit willingness to participate in this dissertation study. Forty-seven faculty members volunteered to participate in the study.

Limitations

The procedure for identifying and selecting the participating faculty limited the number of participating faculty members. Therefore, there may be additional faculty members who are also incorporating instructional technology into their teaching practice who were not included in this study's sample population. Because this study was limited to a selected group of faculty members at one university, the results cannot be generalized.

Definitions of Terms

Asynchronous Communication: When two or more persons are communicating to each other during different time periods.

Courseware: "Term used to describe those computer application programs, and other media, such as texts and video, that support educational objectives" (Reynolds & Anderson, 1992, p. 244).

Disincentives: The factors that keep faculty members from integrating instructional technology into teaching practices.

Educational Innovation: "Those attempts at change in an educational system which are consciously and purposefully directed with the aim of improving the present system." (as cited in Abaya, 1991, p. 28).

Educational Technology: See instructional technology.

Electronic Communication: Any communication between two or more persons that is accomplished via computer, such as electronic mail (email).

Extrinsic Motivation: Behavior that follows from factors and incentives that are external to a person's internal drives and interests.

Incentives: The factors that help influence faculty members to integrate instructional technology into teaching practices (e.g., release time, travel funds, development funds, or encouragement from senior-level administrators and department heads).

Instructional Aid: "Media designed and produced for use by the instructor in teaching." (Reynolds and Anderson, 1992, p. 14).

Instructional Media: "Those media that provide a direct link between the work of the course developer and the student. When using instructional media, the role of the instructor is usually that of course monitor, administrator, counselor, and supervisor. Students undertake most work by self-direction and by the guidance supplied within the instructional media" (Reynolds & Anderson, 1992, p. 14).

Instructional Technology: For this study, instructional technology refers to the use of computing technology (computers, computer peripherals, internet access, Web-based instruction, desktop teleconferencing, etc.) to support teaching and learning.

Information Technology: See educational technology. "There is an undercurrent in the literature that appears to equate information technology with educational technology" (Ely, 1995, p. 43).

Intrinsic Motivation: "Behavior that follows from internal drives and interests" (Blackburn & Lawrence, 1995, p. 284).

Networked Teaching and Learning: Using electronic communication, both synchronous and asynchronous, as the delivery method for teaching and learning.

Server: A computer in a network that is accessed by multiple users.

Synchronous Communication: When two or more persons are communicating during the same time period.

Web Page: An electronic document that is uploaded to a server and accessed on the World Wide Web through a Web Browser.

World Wide Web: "An Internet service that links documents by providing hypertext links from server to server" (Freedman, 1995, p. 439).

Organization of the Study

This study is organized into five chapters. Chapter One introduces the problem under study, describes the purpose of the study, defines terms, and lists the research questions and parameters of the study. Chapter Two provides a literature review of the following related topics (1) the role and benefits of instructional technology particularly within higher education; (2) adoption of educational innovations; and, (3) faculty rewards and incentives for educational innovation. Chapter Three describes the particpants and the research method used in this study. In Chapter Four, the results of the study are discussed and Chapter Five provides a summary and conclusions of the study, as well as recommendations for future studies.

CHAPTER 2

Review of the Literature

The following review of research literature is divided into three sections. The first section provides an overview of instructional technology within higher education. The second section outlines the process faculty members undergo when deciding whether to adopt an educational innovation. A discussion of the rewards and incentives that seem to influence faculty to adopt an educational innovation is contained in the third section.

The challenge lies within higher education to create conditions that will influence more faculty to adopt the new instructional technologies. The first step in influencing faculty to incorporate instructional technology into their teaching practice is to show them that technological change is worthwhile (Armstrong, 1996). Therefore, the first section of this chapter provides an overview of the role and benefits of instructional technology within higher education.

Getting people to adopt any new idea is a difficult process. The adoption and integration of computing as an educational innovation is a process that generally takes faculty members about seven years to accomplish (Snyder, 1995). The second section of this chapter discusses diffusion research as it relates to the adoption of technology. As organizations within higher education try to stimulate the diffusion and adoption of an educational innovation, it is important to understand the decision-making process that faculty members progress through.

Finally, educational change must begin with the faculty because only they can make a personal commitment to use technology in their teaching (Albright & Graf, 1992; Ely, 1995; Wedman & Strathe, 1985). One factor that can help influence faculty members to adopt an educational innovation is the existence of rewards and incentives (Blackburn & Lawrence, 1995; Rogers, 1995; Havelock, 1970; Tuckman, 1979; Callas, 1992; Snyder, 1995; Albright, 1996). Therefore, the final section of this chapter discusses research related to the rewards and incentives that seem to influence faculty to adopt an educational innovation.

Instructional Technology in Education

Role of Instructional Technology

The primary motivation for incorporating technology into education is the belief that it will support higher forms of learning (Means et al., 1993). The historical roles of instructional technology, as outlined by Lewis and Wall (1988) include the following:

- To help students experience events, times, people and places that would not otherwise be possible in class.

- To better accomplish tasks, such as projecting an image for the entire class to view.
- To perform routine teaching tasks.
- To prepare students for the workplace by exposing them to technologies they will encounter there.
- To reach students who cannot attend classes on campus via distance learning.

These roles of instructional technology are still applicable today; however, with new emerging technologies, such as the Internet, instructional technology can have an even greater role within education. Technology can help transform college teaching from a teacher-centered instructional paradigm to a learner-centered paradigm (Albright 1996; Guskin, 1994; Hall, 1995; Rutherford & Grana, 1995; Hall & Shiffman, 1996; Means et al., 1993). Old instructional technologies, such as overhead transparencies and videotapes, are used to support lecture-style instruction and thus support the teacher-centered paradigm. New technologies, such as email, the World-Wide-Web, computer-based multimedia, and desktop videoconferencing can be used to facilitate the learner-centered paradigm and expand learning's dimensions to seemingly unlimited boundaries. Barr & Tagg (1995, p. 16-17) outline some of the differences between these two educational paradigms, as shown in Table 2-1.

There is a strong argument for incorporating technology into education

Table 2-1. Comparison of educational paradigms.

Teacher-Centered Paradigm		Learner-Centered Paradigm
• Provide/Deliver Instruction • Transfer knowledge from faculty to students • Improve quality of instruction	Mission & Purposes	• Produce Learning • Elicit student discovery and construction of knowledge • Improve quality of learning
• Inputs, resources • Quality of entering students	Criteria for Success	• Learning and student-success outcomes • Quality of exiting students
• Time held constant, learning varies • 50-minute lecture, 3-unit course • Private assessment • Degree equals accumulated credit hours	Teaching/Learning Structures	• Learning held constant, time varies • Learning environments • Public assessment • Degree equals demonstrated knowledge and skills
• Knowledge comes in "chunks" and "bits" delivered by instructors • The classroom and learning are competitive and individualistic	Learning Theory	• Knowledge is constructed, created, and "gotten" • Learning environments and learning are cooperative, collaborative, and supportive
• Definition of Productivity: cost per hour of instruction per student	Productivity & Funding	• Definition of Productivity: cost per unit of learning per student
• Faculty are primarily lecturers • Faculty and students act independently and in isolation	Nature of Roles	• Faculty are primarily designers • Faculty and students work in teams with each other and other staff

Source: Barr, R.B., & Tagg, J. (1995). From teaching to learning: A new paradigm for undergraduate education. Change, 27, (6), 13-25.

to prepare students for technology-laden work environments; however, this is not the only reason to consider using instructional technologies. Newer technologies can be used "to deliver instruction that stresses thinking, solving complex problems, and interdisciplinary work" (Means et al., 1993, p. 83). In 1991, Kozma and Johnson examined over 700 multimedia software packages that were submitted to the EDUCOM/NCRIPTAL (National Center for Research to Improve Postsecondary Teaching & Learning) Higher Education Software Awards competition over a four-year period. They identified the following seven areas to illustrate how the new instructional technologies expand on the historical roles of instructional technology to transform the learning process in new ways:

- From reception to engagement - With technology, students are moving from being the passive receptors of knowledge (teacher-centered paradigm) to actively engaging in the construction of knowledge (learner-centered paradigm).
- From coverage to mastery - Using technology, teachers can provide drill and practice exercises until students demonstrate mastery of the content.
- From classroom to the real world - Technology is being used to expose students to work environments, not just the technologies that will be encountered there.

- From text to multiple representation - Technology is expanding our capabilities for expressing ideas in visual modes, such as three-dimensional models that students can manipulate.
- From isolation to interconnection - Technology has helped us move learning from an individual event that occurs in isolation to a collaborative activity that involves the ideas of many.
- From products to processes - Technology is helping teachers and students move from concern over producing academic work to the processes that create knowledge.
- From mechanics to understanding in the laboratory - Simulated technology-driven laboratory environments allow students the luxury of exploring alternative hypotheses instead of only completing the required classic experiments due to the expense of operating laboratories.

In 1991, Kozma and Johnston suggested that the computer had already launched a revolution in the teaching-learning process within higher education. According to Kenneth Green, director of the annual Campus Computing Project at the Claremont Graduate School in Claremont, California, "students of all ages and across all fields come to campus expecting to learn about and also to learn with technology" (The Campus Computing Project, 1998, paragraph 2). Armstrong (1996) suggests that the first step in influencing faculty to incorporate instructional technology into their teaching practices is to show them that technological change is worthwhile. Therefore, the next section discusses the benefits of instrucitonal technology.

Benefits of Instructional Technology

Pinheiro & Oblinger (1993) identified the following three advantages of using computer-based technology in education:

- Unlike information that is written on a chalkboard, information that is stored in a computer is reusable.
- Adding or updating lecture material stored in a computer is quick and easy.
- Computers allow for consistent delivery of information across courses with multiple sections and different instructors.

Managing course materials is easier via the computer, but the most significant benefit of instructional technology in the educational process is not the technology itself, but rather the interaction between the technology, the student's abilities, the instructional goals, and the instructional environment (Kozma & Johnson, 1991). In response to a challenge by Joe Wyatt, Chancellor of Vanderbilt University, the higher education EDUCOM organization sponsored a study to identify 100 success stories about uses of information technology to improve undergraduate education in 1993. The results reported varying perceived benefits of technology use by students, faculty, departments, and institutions.

In a third of the success stories, students mention that better understanding of the same or more material was a perceived benefit. Furthermore, students generally perceived that technology enabled them to grasp and apply complex concepts in order to solve real-world problems. About a third of the stories mentioned the students' flexibility of accessing information at a convenient time and place, as well as the ability to control the rate of their progress as a major benefit (EDUCOM, 1993).

One of the faculty's most important perceived benefits was their increased interest in pedagogical principles to revitalize their teaching activities. The ability "to teach more material, more technical material, or more difficult material" (EDUCOM, 1993, p. 18) was also mentioned in almost half of the stories. And, in approximately one fourth of the stories, faculty perceived the ability to offer immediate feedback, improved student-teacher relationships, and the ability to reinforce material presented in class as benefits of technology use (EDUCOM, 1993). The primary perceived benefit of technology use from the department's and institution's perspective was in gained recognition or reputation in order to attract new students and faculty (EDUCOM, 1993).

In 1980, Kulik, Kulik and Cohen provided a meta-analysis of findings regarding the effectiveness of computer-based college teaching. With meta-analysis, researchers apply the same objective methods for analyzing an individual study to a collection of results, allowing for generalizations about the effectiveness of an approach in a population of settings rather than for one individual setting. Out of an initial pool of 500 studies, a final group of 59 were selected for this meta-analysis by using a set of explicit guidelines for inclusion. Results of the meta-analysis showed that computer-based instruction (CBI) raised examination scores by about three percentage points, or about one-quarter standard deviation compared to those who were taught in a traditional classroom. Findings also suggested that college students tended to like their courses somewhat more and become more interested in the subject matter when the instruction was computer-based. However, the most dramatic finding in this meta-analysis related to time spent on an instructional task. In every study where computer-based instruction substituted for classroom teaching, the computer reduced the time required for instruction by about one-third of that required by conventional teaching methods.

Newer approaches to measure the effects of instructional technologies on student learning outcomes focus on understanding the relationships between the introduction of technology and student learning achievement by isolating various elements of a learning project (Means et al., 1993). Instead of only focusing on how the hardware and software may affect student performance, these studies also supply detailed descriptions of how a particular class or student uses the technology as well as the culture of the classroom. Means et al. (1993) report that a commonality in this body of research is that students were more engaged with the content and experienced an increase in collaborative learning when using technology. Additionally, a shift to student-centered learning was accomplished when technology use was integral to completing the learning project (Means et al., 1993).

Ehrmann (1997) offers the following three lessons from his and others' experiences with the educational uses of instructional technology:

- Technology can enable important curricula changes, even when the content is not supported through the technology. In other words, student use of productivity software or electronic communications can provoke active learning, rethinking of assumptions, and discussion.
- The educational strategies for using technology are more important than the technology itself.
- If teaching strategies are independently selected by faculty members and students, the cumulative effect can be significant, yet still remain invisible. For example, the opportunity to rework assignments is easier when a productivity software is used to create the assignment.

This suggests that technology can support the kind of transformation of student learning that is integral to education reform. However, an awareness of the role of instructional technology and how it can benefit the educational process is only the first step towards the integration of technology into teaching practices.

Integration of Instructional Technology

Despite research findings regarding the positive relationship between technology and learning outcomes, as well as the perceived benefits, there are many challenges for technology's integration into education. Faculty need to know how to use a variety of computing applications; keep abreast of new technologies and evaluate each one's potential to support inquiry-based teaching and learning; know how to enhance the curricula with different technologies; take on new teaching roles; and, respond to individual students (Means et al., 1993). Rutherford and Grana (1995) suggest that faculty are generally afraid of the change new technologies may bring, the time commitment involved in learning these technologies, and not knowing where or how to start. The possibility of technological failure and the concern of appearing incompetent are also concerns that do not help to instill a sense of confidence within faculty members. Also, support services are often under-funded, so faculty can't be certain that basic hardware and software will consistently be available and in working order (Ehrmann, 1997). Obviously, the early stages of technology implementation require more effort and time, initially making the instructor's job harder. However, the instructors who are involved with technology consider it worthwhile because "they sense that their students are learning more and approaching their classroom activities with a heightened level of motivation" (Means et al., 1993, p. 71). And, both faculty members and students currently possess greater computer literacy and interest than ever before (Hazen, 1992). Last year, the annual Campus Computing Project (1998) reported that email was the most-used technology in college courses. The percentage of classes using email jumped to 44.4 percent in 1998, compared to 32.8 percent in 1997, 25.0 percent in 1996, and just 8.0 percent in 1994.

Regardless of the actual and perceived benefits of instructional technology or the challenges of technology integration, the adoption and integration of computing as an educational innovation is a slow process. An innovation is any idea, practice or object that is perceived as new by members of the social system in which the innovation is being introduced (Rogers, 1995). There is a particular process that individuals progress through when deciding whether to adopt an innovation. It is important to consider this process when a university is attempting to create conditions within its environment that will influence individual professors to adopt new instructional technologies. This is because it generally takes faculty an average of seven years from when they start using a computer until they begin to incorporate computing technology into teaching practices (Snyder, 1995). As this study attempts to offer recommendations on how to create these conditions within a university enviroment, the next section discusses the adoption process.

Diffusion and Adoption of Innovations

The Diffusion Process

Getting people to adopt any new idea is a difficult process. It is no different with educational innovations. From the time an innovation becomes available until it is widely adopted can take years. Time is just one element in the diffusion of innovation. Diffusion is "the process by which an innovation is communicated through certain channels over time among members of a social system" (Rogers, 1995, p. 5).

The innovation-decision model, which is based upon fifty years of diffusion research, represents five-stages that an individual progresses through in order to make a decision about adopting an innovation. The five stages are knowledge, persuasion, decision, implementation and confirmation (Rogers, 1995). Knowledge occurs when an individual receives some information about the innovation and gains an understanding of its functionality. Persuasion occurs when an attitude, either favorable or unfavorable, about the innovation is formed. Decision occurs when an individual participates in activities that lead to either adoption or rejection of the innovation. Implementation occurs when the innovation is finally used. Finally, confirmation occurs when an individual seeks reinforcement about the innovation's use through evaluations and other feedback.

Adopter Categories

Individuals progress through the five stages of the innovation-decision model at different rates. The variable of this progression is innovativeness, or the degree to which an individual adopts an innovation earlier or later in relation to others in the social system (Rogers, 1995). Innovativeness is a continuous variable that is depicted by categories of adopters who share a similar degree of innovativeness. The Saucio study, conducted in the early 1960s by Paul J. Deutschmann and Fals Borda, made many contributions to diffusion research, including demonstrating the usefulness of the conceptual tools of innovativeness and adopter categories (Rogers, 1995). The adopter categories set forth by the Saucio study are ideal types based on observations of reality and abstractions from empirical research. These adopter categories are innovators, early adopters, early majority, late majority, and laggards. A successful innovation will be adopted by the social system in order of these categories of adopters (Geoghegan, 1994). When the innovativeness of each adopter category is placed on a graph, a typical bell curve is formed, as shown in Figure 2-1.

The innovator is extremely venturesome and is able to take risks and cope with a high level of uncertainty about an innovation at the time of adoption. Innovators may not be respected by the other members of a social system because their interest in new ideas leads them outside of their local peer circle. They make up two to three percent of the social system and have

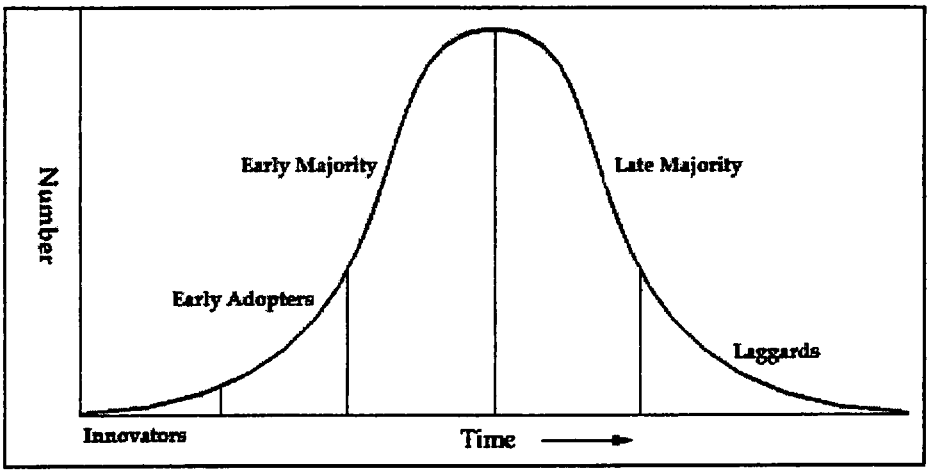

Figure 2-1. Adopter Categories based on Innovativeness
Adapted from: Rogers, E.M. (1995). Diffusion of innovations (4th ed.). New York: The Free Press.

a primary interest in the technology itself, rather than its application to specific problems.

Early adopters have the greatest degree of opinion leadership because they are integrated into the local social system more easily than the innovators. Potential adopters therefore look to the early adopters for information about the innovation. Early adopters combine an interest in the technology with a pragmatic concern for how it can be applied to problems and tasks. About ten percent of a social system falls within the early adopter category.

The early majority group accounts for one-third of the members of a social system and as such they are a very important group to persuade in the diffusion process. Their focus is on the teaching and learning process rather than the tools, or technologies, that can support teaching and learning.

Although they may deliberate for some time before adopting a new idea, they are comfortable with technology and will eventually follow willingly.

The late majority tend to adopt an innovation as a result of peer pressure, as they are generally less comfortable using technology. The late majority also make up about one-third of the social system. The last fifteen percent of the social system to adopt an innovation are laggards. They tend to be suspicious of innovation and base decisions on what has previously been done. Laggards are the most likely to never adopt the innovation.

Innovation Adoption

Moore (1991) uses the concept of adopter categories based on innovativeness to describe the market penetration of any new technology product in terms of the consumers it attracts over time. Moore proposes that there is a chasm to be bridged between the early adopters and early majority as illustrated in Figure 2-2. If the innovation fails to cross this chasm, then the innovation

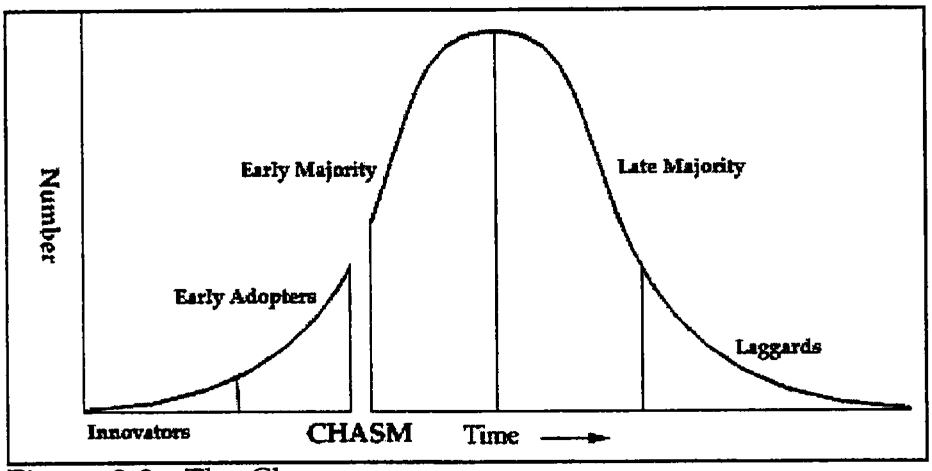

Figure 2-2. The Chasm
Adapted from: Moore, G.A. (1991). Crossing the chasm: Marketing and selling technology products to mainstream customers. Harper Business.

will only be adopted by about fifteen percent of the social system (Geoghegan, 1994).

Because there are significant differences in the characteristics between the early adopter and early majority, the methods used to persuade and influence faculty to adopt the new technologies must individually target each distinct group (Moore, 1991). These differences are listed in Table 2-2. Any faculty development program that emphasizes computing technology should focus on each individual's unique relationship with the technology, instead of on the technology itself (Wedman & Strathe, 1985). This is because the adult learner tends to be self-directed with a readiness to learn that correlates with the tasks he or she is responsible for performing. Also, learning that is problem-centered compared to content-centered, is more meaningful for adults (Knowles, 1989).

Table 2-2. Characteristics of the early adopter and the early majority.

Early Adopter	Early Majority
Favor revolutionary change	Favor evolutionary change
Visionary	Pragmatic
Project oriented	Process oriented
Risk takers	Risk averse
Willing to experiment	Want proven applications
Generally self-sufficient	May need significant support
Horizontally connected	Vertically connected

Source: Geoghegan, W.H. (1994). What ever happened to instructional technology? Reaching mainstream faculty. Norwalk, CT: IBM Higher Education. (p. 14).

Although the characteristics of individuals are certainly crucial to the adoption of educational innovations, there are other factors that seem to facilitate the process of adopting a technological innovation within educational settings. Donald Ely, an eminent researcher in the instructional technology field, has studied this topic for over twenty years. He has identified the following eight conditions as specifically facilitating the adoption of educational technology innovations (Ely, 1990):

- Individuals are dissatisfied with the status quo of the education environment.
- The individuals who will implement the innovation possess sufficient knowledge and skill.
- The resources (hardware and software) that are needed to implement the innovation are available.
- The individuals who will implement the innovation have time to learn, adapt, integrate, and evaluate the innovation.
- Rewards or incentives exist for participants.
- The individuals who will implement the innovation have been involved in the decision-making process and are expected and encouraged to participate.
- Commitment to endorse and support the innovation is evident.
- Leadership is evident within the organization.

Ely points out that these eight conditions have evolved from observation and experience and should not be perceived as a guaranteed formula. Rather, these conditions can serve as a gauge or checklist to ensure optimum conditions for adoption. All eight factors may not be present in every situation, but if any element is excluded, then the chances for successful implementation are reduced (Ely, 1990).

There are two viewpoints to consider when trying to introduce an innovation (Havelock, 1970). One perspective belongs to the people who are facing change (i.e., faculty), and the other point of view is of those who are trying to change someone else (i.e., administrators, faculty developers). However, educational change must begin with the faculty because only they can make a personal commitment to use technology in their teaching (Albright & Graf, 1992; Ely, 1995). One factor that can help influence faculty members to adopt an educational innovation is the existence of rewards and incentives (Blackburn & Lawrence, 1995; Rogers, 1995; Havelock, 1970; Tuckman, 1979; Callas, 1992; Snyder, 1995; Albright, 1996). Therefore, the research related to the rewards and incentives attributed to innovation within higher education are discussed in the next section.

Faculty Rewards/Incentives For Educational Innovation

Rewards in American higher education generally fall into one of four categories (Tuckman, 1979). These categories are (1) salary increments or merit raise; (2) positive feedback from students and peers and feelings of self-worth and self-satisfaction; (3) promotion; and, (4) increased career options due to engagement in a specific activity. According to Weimer (1990), rewards and incentives are linked to faculty motivation. Basically, motivation can be described as an inner urge that moves or prompts a person to act in a certain way. Weimer states that motivation is "a force that energizes behavior" (1990, p. 21). Martin and Briggs (1986, p. 201) state that "motivation is a hypothetical construct that broadly refers to those internal and external conditions that influence arousal, direction, and maintenance of behavior." According to Keller, motivation "refers to the choices people make as to what experiences or goals they will approach or avoid, and to the degree of effort they will exert in that respect" (1983, p. 369).

Motivators, or factors that influence a person's behaviors, may be either extrinsic or intrinsic. People who are extrinsically motivated act to maximize rewards (Blackburn & Lawrence, 1995). Extrinsic rewards come in different forms and can include promotion, public recognition, or extra resources. With extrinsic motivation, the external reward is the motivator. Conversely, intrinsically motivated behavior follows from internal desires and is only minimally affected by external rewards. Intrinsically motivated activities are behaviors that a person engages in to feel competent and self-determining (Deci, 1975).

According to Deci (1975), the need to feel competent and self-determining will motivate two general types of intrinsically motivated behaviors. The first type includes behaviors where a person seeks out situations that provide a challenge; the second type of behaviors are intended to conquer the challenge (Deci, 1975). However, if a person feels overchallenged, he or she will seek a less taxing situation which will provide a challenge that will make optimal use of his or her abilities (Deci, 1975).

Research on Faculty Motivation

Motivation in the academic profession is largely intrinsic. Intrinsic rewards include "the satisfaction derived from intellectual curiosity, interest in ideas, exercise of rationality, opportunity for achievement and self-expression, fascination with complexity, ability to solve difficult problems, the pleasure of expertness, and participation in decisions affecting one's life" (Bowen & Schuster, 1986, p. 113). In reviewing previous studies about the major sources of work satisfaction for faculty members, McKeachie (1979) noted that intrinsic satisfactions were reported to be much more important than extrinsic rewards. Aebi (as cited in McKeachie, 1979) reported that intrinsic motivation is emphasized when faculty discuss the factors that contribute to work satisfaction, while extrinsic factors are emphasized when reporting dissatisfaction.

McKeachie (1979) reports that emphasis on salary and promotion incentives may result in poorer, rather than better, university teaching. In systems that emphasize extrinsic rewards, the administration must provide unending promotions and pay increases in order to maintain high motivation among faculty members (McKeachie, 1979). In 1971, Deci (1995) reported the first studies that supported the hypothesis that when a monetary reward is given to people for doing an intrinsically motivated activity, and the reward is contingent upon their performance, the desired behaviors will only last as long as the rewards are forthcoming. In an experiment where monetary rewards become an incentive for behaviors that were previously intrinsically motivated, the behavior stopped when the monetary reward stopped, thus suggesting that monetary rewards actually undermine people's inherent intrinsic motivation (Deci, 1995). This experiment was replicated two subsequent times by Deci with the same results. Other studies have also supported Deci's findings (Staw, 1975; Kruglanski et al., 1975; Greene & Lepper, 1974).

In 1960, Gustad conducted a questionnaire and interview study to find out why people chose to be college teachers. When asked what was most rewarding, Gustad's faculty members listed research first, stimulation from colleagues second, and salary third, although salary was not rated as an important reward beyond a certain level of compensation (as cited in McKeachie, 1979). According to Blackburn and Lawrence (1995), offering faculty more money to give attention to an activity that holds little personal value will not change their behavior. Most researchers agree that extrinsic rewards alone including salary increases, promotion, and awards for outstanding teaching will neither motivate professors to improve teaching nor improve overall teaching effectiveness (Peters and Mayfield, 1982). Conversely, Kozma (1979) reports that if faculty members perceived teaching as a rewardable activity, then they might be more innovative in their teaching practices than those who see other activities as rewarding. McKeachie (1979) notes that although rewards may influence behavior, the long-term effect is dependent upon the individual faculty member's expectations. For example, faculty may compete for prizes, but if they enjoy the activity, they will continue the behavior even if they don't win (Blackburn & Lawrence, 1995).

Other studies have found that "faculty prefer incentives such as release time, travel funds, development funds, or encouragement from senior-level administrators and department heads" (Williams & Peters, 1997, p. 107). Time is highly valued by faculty members and universities typically give sabbaticals or release time for various scholarly projects. But it is less common to give time to revise a course or to develop a new teaching skill (McKeachie, 1979).

Regardless of extrinsic rewards, faculty do seem to care about their work. In a questionnaire distributed to 964 teaching faculty at Illinois State University, there were 360 returned as usuable. Ninety-six percent of the respondents indicated that a personal satisfaction for a job well done had either high or very high personal importance as a reward for educational innovation. Ninety-one percent indicated "increased effectiveness as a teacher" as having high or very high personal importance (Jabker & Halinski, 1977). In a survey conducted with all 133 faculty members at Delhi College, in which 94 of the returned surveys were usable, sixty-seven percent of the respondents indicated that their own desire to change was the most important factor toward the adoption of educational innovations. (Callas, 1992). A comprehensive list of the rewards and incentives, both extrinsic and intrinsic, that are perceived by faculty as influential in adopting an educational innovation is presented in Table 2-3.

Faculty Motivation and Educational Innovation

According to Kozma (1979), there are four sets of factors that influence the adoption and dissemination of innovations. They are: (1) the social interaction among members of a system (informal network); (2) the existence of a set of resources and consultants who promote change (formal network); (3) the personal satisfaction derived from those engaged in change (intrinsic reward); and, (4) the encouragement of administrators (extrinsic reward). A study was conducted at the University of Michigan in 1976 to determine the relative importance of the informal network, the formal network, intrinsic rewards, and extrinsic rewards in predicting the number of innovative instructional techniques used by university faculty. The findings indicated that a large portion of the use of innovative teaching methods in the classroom can be predicted by participation in a formal network of resources

Table 2-3. Rewards and incentives that university faculty perceive as important.

Reward/Incentive		Reference
	Income Related	
Increase in your salary for incorporating technology		Ely, 1990; Callas, 1992; Tuckman, 1979; Snyder, 1995; Wedman & Strathe, 1985
Receive promotion/tenure		Callas, 1992; Tuckman, 1979; Jabker & Halinski, 1977; Snyder, 1995; Wedman & Strathe, 1985
Received a stipend		Kozma, 1978
Increased opportunity to act as a consultant		Jabker & Halinski, 1977; Tuckman, 1979
Royalty paid to you on sales of materials developed by you		McKeachie, 1979
Department funding for your development time		Kozma, 1978
University funding for your development time		Kozma, 1978
Travel funds for technology conferences		McKeachie, 1979; Callas,1992; Williams & Peters, 1997
Awarded external grant monies for development		Callas, 1992
Awarded grant/fellowship funding from the ITC		Callas, 1992 (inferred)
Copyright ownership of materials developed by you		McKeachie, 1979
	Recognition/ Encouragement	
Received recognition within department/division		Callas, 1992; Snyder, 1995; Lewis, 1991
Received recognition within university		Callas, 1992; Snyder, 1995; Alfonsi, 1985; Lewis, 1991
Received national/international recognition a. papers b. presentations c. published technology-driven materials		Jabker & Halinski, 1977; Williams & Peters, 1997; Bowen & Schuster, 1986

Table 2-3. (continued)

Reward/Incentive		Reference
	Recognition/ Encouragement	
Received encouragement from senior-level administrators and department heads		Kozma, 1978; Ely, 1990
Received positive feedback from a. colleagues b. students c. administrators		Blackburn & Lawrence, 1995; Tuckman, 1979; Snyder, 1995
	Time	
Received release time to develop materials		Wedman & Strathe, 1985; Williams & Peters, 1997; Kozma, 1979; McKeachie, 1979; Jabker & Halinski, 1977
Received a reduced teaching, research, service load while developing technology-driven materials		Callas, 1992
Able to schedule an afternoon or day off a week		Callas, 1992
Mini-sabbatical or leave of absence to develop materials		Callas, 1992; McKeachie, 1979
	Development Opportunities	
Received demonstrations of instructional technology		Kozma, 1978; Callas, 1992
Received practical training from professional educators		Kozma, 1978; Callas, 1992
Attended workshops on instructional technology at a conference		Kozma, 1978; Callas, 1992
Attended courses offered by the ITC		Kozma, 1978; Callas, 1992 (inferred)

Table 2-3. (continued)

Reward/Incentive		Reference
	Work-Related Support	
Received clerical assistance		Ely, 1990; Dornbush, 1979
Received technical assistance		Ely, 1990; Kozma, 1978
Received teaching assistance		Dornbusch, 1979; Snyder, 1995
Received more or better hardware		Ely, 1990; Snyder, 1995
Received more or better software		Ely, 1990; Snyder, 1995
Received an internet connection in your office		Snyder, 1995
Received lab space		Lewis & Wall, 1988
Received access to high-technology classrooms		Snyder, 1995
	Professional/ Personal	
Received personal satisfaction from intellectual stimulation		Bowen & Schuster, 1986; Peters & Mayfield, 1982; Tuckman, 1979
Received personal satisfaction of being engaged in change		Kozma, 1979; Callas, 1992; Tuckman, 1979
Wanted to develop familiarity with computing technology		
Was fascinated with the complexity of instructional technologies		Bowen & Schuster, 1986
Received pleasure/pride in becoming an expert with instructional technology		Bowen & Schuster, 1986
Enjoyed the creative activity		Blackburn & Wallace, 1995
Enjoyed the challenge		Deci, 1975
Liked the opportunity for achievement		Blackburn & Wallace, 1995
Liked the opportunity for self-expression		Bowen & Shuster, 1986

Table 2-3. (continued)

Reward/Incentive		Reference
	Professional/ Personal	
Perceived sense of being valued for innovative teaching contributions		McKeachie, 1979
	Teaching	
Wanted more opportunity to give students individual attention		Williams & Peters, 1997
More opportunity to work/be with students		Peters & Mayfield, 1982
Desired to improve instruction		Callas, 1992; Williams & Peters, 1982
Wanted to use technology to implement instructional techniques		Williams & Peters, 1982
Given preference regarding your teaching assignment		Jabker & Halinski, 1977
Wanted to increase effectiveness as a teacher		Williams & Peters, 1982

that promote innovative teaching (Kozma, 1979). This finding is supported by Albright & Graf (1992) who suggest that a very important aspect of technology integration is providing consulting services to help faculty members use instructional technologies effectively in their teaching. Additionally, faculty consultants need to have credibility and status within the university environment (Lewis, 1991). This includes having professional qualifications such as the doctorate, involvement in professional associations valued by faculty, or holding an adjunct faculty appointment (Sell & Chism, 1991).

More recently, a survey was completed by 750 faculty members in six state universities in Ohio to determine the requirements for faculty adoption of computers for instruction. In 750 returns, 90% of the faculty were using computers; however, only 10% were using them in the classroom. The only personal attribute that was a constant predictor of computer adoption was the technological orientation of the faculty's discipline. Additionally, the study found a negative relationship between adoption and incentives, which may indicate that faculty who adopt computers in the classroom are not externally motivated — rather they are internally motivated (Hirschbuhl & Faseyitan, 1994).

Bess (1977) contends that to improve competence in teaching, it is not enough to increase external incentives. Rather, he advocates increasing the faculty sensitivity to the joys and pleasure of teaching. McKeachie (1979) concurs with Bess, and cites a body of research that indicates that intrinsic factors are the primary motivational forces for college faculty. Satisfactions in teaching can come from observing students learn, having more opportunity to interact with students, knowing them as individuals, and following the development of students in order to see a change (McKeachie, 1979). Callas (1992) reports that several studies have shown a willingness by faculty to improve instruction based solely on their own desire to improve instruction. Attempts to influence faculty behavior by creating methods of enhancing intrinsic rewards, such as an atmosphere that provides intellectual stimulation, is more likely to improve teaching than offering extrinsic rewards and punishments (McKeachie, 1979). Weimer (1990) indicates that intrinsic motivators will yield more positive and enduring results with faculty members. Peters and Mayfield (1982) report that of 213 faculty respondents of a survey at a comprehensive southern land-grant university, two-thirds indicated that an organizational climate that was intellectually stimulating was a motivating reward for teaching effectiveness.

Blackburn and Lawrence (1995) conducted an in-depth national survey of faculty to determine why faculty do what they do at work. They concluded that neither intrinsic nor extrinsic motivation theory can wholly account for faculty behavior. Rather, faculty rely on a combination of each reward system depending on the factors and circumstances (Blackburn & Lawrence, 1995).

Summary

This study investigates how and why select faculty began using instructional technology and what the influences were that motivated them to do so. Therefore, this chapter offered a review of the literature on the relevant areas, which include the benefits of incorporating instructional technology into teaching practices, particularly within higher education; the process for the diffusion and adoption of innovation; and, the incentives or rewards that influence faculty during the adoption process of an educational innovation.

Instructional technology alone cannot transform college teaching from a teacher-centered instructional paradigm to a learner-centered paradigm. Ultimately, educational change needs to start with a commitment from faculty members to use technology in their teaching. A first step in influencing faculty to incorporate instructional technology into teaching practices is to communicate the benefits of technological change. Therefore, this research study identifies how select faculty members are integrating instructional technology into teaching practices to support the teaching-learning process.

Understanding of the diffusion process is important to this research because for higher education to meet the challenge of creating conditions that will influence more faculty to adopt the new instructional technologies, possible connections between the characteristics of the early adopters and early majority need to be explored. The differences in characteristics between the early adopters and early majority were presented in Table 2-2. These differences suggest that the methods used to persuade and influence faculty to adopt the new technologies must individually target each group. Geoghegan (1994) suggests that that if the innovation fails to be adopted by the early majority, then only about fifteen percent of the social system will ever actually implement the innovation. Therefore, it is imperative to explore possible connections between the early adopters and the early majority. These connections may be related to the rewards and incentives that are linked to faculty motivation, so this study identifies what the primary influences were when select faculty began integrating instructional technologies into their teaching practices. And, in order to present these influences for faculty response in this study, a literature review to determine which rewards and incentives are valued by faculty within higher education was conducted.

By focusing on faculty who implemented educational innovation in the face of many challenges, and in spite of the lack or rewards and incentives, this study may reveal new information regarding faculty development and innovation adoption. This information may assist in creating innovative methods to bridge the chasm between the visionary group of innovators and early adopters and the remaining adopter categories. McKeachie (1979) suggests that to motivate faculty, one needs to consider ways of changing the environment to increase intrinsic rewards and ways of appealing to important individual motives. Organizations within higher education can use this information to create conditions that will enhance inherent intrinsic motivators and lead more faculty members to begin incorporating instructional technologies into teaching practices.

CHAPTER 3

Method

In Chapter One, the problem was introduced and described. Chapter Two provided a review of the literature associated with instructional technology implementation within higher education; adoption of educational innovations; and, faculty rewards and incentives for educational innovation. In this chapter, attention shifts to the collection and analyses of the data for this study.

Population and Sample

This study was restricted to UTK regular faculty who participated in a survey, which was developed and implemented by graduate students in Dr. John Ray's class "Using Research for Curriculum Improvement," for the Innovative Technologies Collaborative (ITC) at UTK during Spring, 1997. Regular faculty are those who are employed by the University either full-time or part-time with a continuing contract for more than twelve months. Of the approximately 1,450 regular faculty who received this survey, 348 responded. Of the respondents, there were 125 faculty members who identified themselves as "incorporating instructional technology in direct support of student learning (i.e., computer delivered tutorials and other applications used for class exercises and assignments)." These 125 faculty members were contacted by Dr. John Ray during the fall semester of 1997 to solicit willingness to participate in this dissertation study (see Appendix A). Sixty-five responses were received with 50 faculty members volunteering to participate in the study. Forty-seven faculty members were available to participate when the research was conducted during the fall semester of 1998.

Research Design

The research methodology used for this study was complementary multiplism, which is "the use of complementary research methods such that the weaknesses of one are covered by the strengths of another and the body of work as a whole is strengthened" (Krathwohl, 1998, p. 680). First, a printed survey was administered to collect data because it allowed for personal reflection, as many of the survey items asked the participant to recall past events. Also, a printed survey allowed participants to review a list of 48 items that appeared all on one page. This was especially important because participants were asked to rank, from this list of 48 items, the five most influential items that motivated them to incorporate instructional technology into their teaching.

After analyzing the survey results using descriptive statistics, a sample of respondents was identified to interview. Interviewing is an opportune way of gaining a description of actions and events that happened in the past (Maxwell, 1996). Because this study aimed to determine the factors that influenced select faculty members to incorporate instructional technology into teaching practices, the interview questions clarified these factors by allowing for detailed descriptions and explanations concerning the faculty member's use of instructional technology.

Instrumentation and Data Collection

Survey Instrument Construction

The survey instrument (see Appendix B) was developed from information gathered during a review of the literature on faculty development and adoption of educational innovation in higher education. Questions 1-7 covered the demographics section of the survey. These questions gathered information about the participants college/school and unit/department affiliation, faculty rank, primary assignment, years of service, full or part-time status, and gender.

Faculty members' level of technology use was targeted in questions 8 - 10. These questions were used, with permission (see Appendix C), from the Levels of Computer Use (LCU) assessment, which was developed by Henryk R. Marcinkiewicz and Paul W. Welliver (1993). The LCU was derived from the model of Instructional Transformation (Rieber & Welliver, 1989; Welliver, 1990) and focuses on the adoption of the computer as an educational innovation. This model describes a teacher's progression through the following five stages of involvement with computers (Marcinkiewicz & Welliver, 1993):

1) Familiarization - when a teacher first becomes familiar with computers.

2) Utilization - when the teacher uses computers in teaching.

3) Integration - when computers have become critical to the teaching.

4) Reorientation - when the teacher restructures teaching activities to expand the computer-teacher-student relationship.

5) Evolution - when the teacher continues practicing and learning about how to improve instruction through systematic implementation of computer technology.

In the LCU, use is defined as "the integrated employment of computers in teaching" (Marcinkiewicz & Welliver, 1993, p. 681). The LCU designates two levels of use — utilization and integration. At the utilization level, a teacher shares and delegates teaching duties with the computer; however, the absence of computers would not prevent the implementation of the instruction. At the integration level, teaching responsibilities are also shared by and delegated to the computer, but the absence of computers would prevent the implementation of instruction. In the current form of the LCU, only one dimension (use) is assessed, which allows for paired comparisons between the utilization level and the integration level.

The four LCU items selected for use in this study's survey have had the highest response consistency when the LCU was field tested. The estimated reliability of these four items using the Coefficient of Reproducibility (CR) was .96 and the consistency of classification of the measure was estimated computing Cohen's Kappa (Kappa = .72). A CR of .90 is the criterion for demonstrating that items form an ordered scale of allowable response patterns (Marcinkiewicz & Welliver, 1993).

These four items construct four different pairs for comparisons between the utilization and integration levels of computer use (see following example). With paired comparisons, the respondent is forced to endorse one item per pair, thus indicating the level of use. The four paired comparisons are as follows:

1. *a. In my instruction, the use of the microcomputer is supplemental.

   •b. The microcomputer is critical to the functioning of my instruction.

2. *a. The use of the microcomputer is not essential in my instruction.

   •b. For my teaching, the use of the microcomputer is indispensable.

3. •a. The microcomputer is critical to the functioning of my instruction.

   *b. The use of the microcomputer is not essential in my instruction.

4. •a. For my teaching, the use of the microcomputer is indispensable.

*b. In my instruction, the use of the microcomputer is supplemental.

Note: * indicates the utilization level

• indicates the integration level

Responses for the utilization level receive a value of one, while responses for the integration level receive a value of two. A score of four points indicates consistent computer use at the utilization level, and eight points indicates a consistent use at the integration level. A score of 5, 6 or 7 indicates an inconsistency of computer use. The last five questions in this section (11 - 16) are included to gather additional information about how faculty are using instructional technology to promote student learning.

Question 17 included 48 different items that target the intrinsic and extrinsic influences related to adopting instructional innovation. These items were derived from a review of the literature on faculty development and incentives for educational innovation. Refer to Table 2-3 in Chapter 2 for a complete list of these 48 items and their corresponding literary sources. Question 18 asked faculty members to rank the five most influential factors, from the 48 items in question 17, that motivated them to incorporate instructional technologies into teaching practices.

According to Ely (1990), who began studying the conditions for technological change within libraries in 1976, there are "eight conditions that appear to facilitate the implementation of educational technology in a variety of education-related contexts" (Ely, 1990, p. 299). These eight factors are:

1. Dissatisfaction with the Status Quo - when the feeling exists that something could be better.
2. Knowledge and Skills Exist - when the people who will implement the educational innovation possess sufficient skills and knowledge to do the job.
3. Resources are Available - when the tools and other relevant materials are accessible to the innovator and to the learners (i.e., hardware and software).
4. Time is Available - when those who want to implement the educational innovation make or are provided with time to learn, adapt, integrate, and reflect on what they are doing.
5. Rewards or Incentives Exist for Participation - when particular intrinsic or extrinsic motivators exist for each individual.
6. Participation is Expected and Encouraged - when each person has had an opportunity to comment on the implementation of innovations that will directly affect their work.
7. Commitment by Those Who are Involved - when there is firm and visible evidence that there is endorsement and continuing support for implementation of the innovation.
8. Leadership is Evident - leadership from administration and the person who is implementing the innovation is provided by continual communication about their enthusiasm for the innovation.

Question 19 had eight items that focused on seven of these eight conditions. To determine the eighth condition, question 20 polled faculty members about the knowledge and skills they possessed when they first began to incorporate instructional technology. Questions 21-23 asked what computing skills faculty members currently possess. Question 24, which is the last question, inquired about the availability of respondents for the interview segment of this study.

Survey Content and Construct Validity

Content validity is "a subjective measure of how appropriate the [survey] items seem to a set of reviewers who have some knowledge of the subject matter" (Litwin, 1995 , p. 35). A construct is "a characteristic which is presumed to exist but which cannot be directly measured" (Krathwohl, 1998, p. 426). Construct validity is a check to determine if the survey questions do provide a measure of the construct(s), which for this study are: (1) faculty member's level of technology use; (2) influences for incorporating instructional technology into teaching practices; and, (3) conditions for instructional technology implementation. An initial assessment of content and construct validity for the survey instrument used in this study was accomplished by reviewers who are this researcher's dissertation committee members. These committee members are faculty members who collectively had expertise in use of instructional technology, educational innovations, faculty development and motivation, and research methodology.

To further assess the content and construct validity of the survey instrument, a pilot study was conducted prior to survey implementation. Three faculty members from the target population, each representing a different academic discipline, were selected to participate in the pilot. An hour and a half was allotted to pilot the survey instrument. Each pilot participant completed the survey and then discussed concerns and recommendations with this researcher. Based upon the discussion of the pilot participants, several minor changes were made to the survey instrument prior to implementation.

Survey Implementation

The survey instrument was distributed through campus mail on September 4, 1998 to the 47 faculty members whose selection was described earlier in this chapter. Each survey had an identifying number that was assigned to a participating faculty member. This was necessary because certain faculty members would need to be contacted to arrange an interview. An advance-notice email was sent to the participants to inform them of when they would be receiving the survey. The purpose of the advance-notice email was to promote interest so that participants would complete the questionnaire when it arrived (Dillman & Salant, 1994). Several days after sending the advance-notice email, the survey was mailed with a cover letter via the campus mail (Dillman & Salant, 1994). Thirty-nine surveys were received with the first mailing. To increase the return rate, a follow-up reminder was sent with another copy of the survey on September 15, 1998, which was approximately two weeks after the original mailing (Babbie, 1990). Four more surveys were received after the second mailing for an overall return rate of 91 percent.

Interview Process

Purposeful sampling was implemented to select the interviewees for the qualitative portion of this study. Purposeful sampling is "a strategy in which particular settings, persons, or events are deliberately selected to provide important information that can't be gotten as well from other choices" (Maxwell, 1996, pp. 70). The goal of purposeful sampling was to achieve a representativeness of individuals who were using instructional technology at a high level. For this study, a high level user of instructional technology was defined as a faculty member who is:

1. identified as being at the integration level of computer use (score of 8) as indicated by The Levels of Computer Use assessment (survey questions 8-11); AND,
2. used at least three different computer-based delivery methods for instruction, with one being Web-based (survey question 12); OR,
3. indicated that he/she develops either Web pages or computer-based tutorials for instructional purposes (survey question 13).

Of those survey respondents who are at the integration level of computer use, 16 met all three selection criteria. Twelve were selected to be interviewed. Four respondents were not interviewed because two were faculty within the library system; one had participated in the pilot study; and one represented a specific department that had more than one respondent who met the selection criteria. Because use of technology and the conditions that impact technology use varies greatly between academic disciplines, it was more meaningful for this study to interview faculty who represented a variety of disciplines than to increase the number of faculty interviewed.

The 12 interview participants were contacted individually to arrange a one-hour interview time at a mutually agreed-upon location. The interviews were semistructured because more structure when interviewing is appropriate when exploring a predetermined research problem in contrast to an emergent one (Krathwohl, 1998). All participants were asked the same open-ended questions in the same order, therefore assuring that the data was collected uniformly. Questions were asked exactly as they were worded. The questions for the personal interviews were developed (see Appendix D) to expand upon data collected with the survey and focused on faculty members' experiences with integrating instructional technology. Depending on responses, additional open-ended questions were asked of certain interview participants. The interviews were tape-recorded. The first two interviews were transcribed by a third party. However, the remaining ten interviews were transcribed by this researcher because use of a third party transcriptionist was not time-efficient.

Research Questions

The following research questions were addressed in this study:

1. How are select faculty members integrating instructional technology into teaching practices?
2. Which intrinsic and extrinsic motivation factors are identified as providing the greatest influence for select faculty members who are currently integrating instructional technology into their teaching practices to learn about technology?
3. Which intrinsic or extrinsic motivation factors are perceived by select faculty members as the most influential in motivating them to integrate technology into teaching practices? Why were these motivation factors the most influential?
4. What are the relationships among the intrinsic and extrinsic motivation factors that the select faculty members perceive as most influential and their level of instructional technology use?

Data Analysis

The initial step of data analysis for this study was to analyze the survey data. The data from the surveys were entered into SPSS, which is a statistical computer software application. Data from the surveys provided descriptive statistics, mainly frequencies and percentages as well as a snapshot of (1) how selected university faculty members are integrating instructional technology into their teaching practices; and (2) the primary factors that have influenced them to do so. Survey data was also used to identify participants who met the interview selection criteria.

Whereas the survey instrument provided data about the units and categories of information gathered for this study, the interviews provided contextual analysis. Contextual analysis attempts to look at the relationships that connect statements and events within a context into a coherent whole (Maxwell, 1996). However, because the interview data provided further description of the past events and actions that lead select faculty members to integrate technology into teaching practices, a categorizing strategy was used to sort the data for analysis. During the interview data analysis, commonalties and trends were identified among the faculty members regarding their use of instructional technology, the factors that influenced them to integrate instructional technology into teaching practices, and any incentives they may have received when they first began to incorporate instructional technologies.

Data analysis for each interview involved unitizing and categorizing the data collected during 12 one-hour interviews. The first step in categorizing interview data involves coding each interview's transcript. In coding, a descriptive word or phrase is assigned to each unit of relevant notes (Krathwohl, 1998). An initial code list was developed using the sections (units) of questions on the survey instrument and identifying categories for each unit of information. As interviews were coded, several units were added and the codes for the categories within each unit were expanded to accommodate the analysis. See Table 3-1 for a complete list of the codes. After the transcripts were coded, a photocopy was made of each. The most critical task in qualitative research is to constantly winnow the information to reveal the essences of the data (Wolcott, 1990). Wolcott (1990) also suggests that computer programs for qualitative analysis actually encourage more data collection because they can accommodate almost limitless quantities of data. Therefore, this researcher chose to manually sort the data wherein the relevant categories of information within each transcript were physically cut out and sorted into stacks according to units. Each piece of data was identified with a unit and category code, the identifying number assigned to the respondent, and the page number on which the data appeared in the original transcript. The data was identified in this way so that the applicable transcript could be consulted, if needed. The next step in analyzing the interview data was to re-read each unit of data of which the most pertinent information was highlighted with a colored marker. Finally, data was further winnowed by identifing key phrases and the data was descriptively summarized by this researcher according to each interview question.

Summary

During the fall semester of 1998, 43 faculty members at the University of Tennessee, Knoxville, completed a printed survey that queried them about their use of instructional technology, the influences that motivated them to

Table 3-1. List of codes used for interview data analysis.

Instructional Technology Use	ITU		
ITU: World-Wide-Web	ITU-WWW	AF	Anonymous Form
		S	Syllabus
		R	Resources
		LN	Lecture Notes
		G	Grades
		SM	Supporting Materials
		AP	Assign/Problems
		TUT	Tutorials
ITU: Web-Based Discussion	ITU-WBD		
ITU: Email	ITU-EM		
ITU: Present Visuals	ITU-VIS		
ITU: Multimedia	ITU-MM		
ITU: Demonstration	ITU-DEMO		
ITU: Tool in Field	ITU-TF		
ITU: Content Fit	ITU-CF		
ITU: Workplace Preparation	ITU-WP		
ITU: Simulation Game	ITU-SG		
ITU: Tutorials	ITU-TUT		
IT Development	**ITDEV**		
IT Use - by Students	**ITS**		
ITS: Communications	ITS-COM		
ITS: Supplement Class	ITS-SUP		
ITS: Complete Assignments	ITS-AS		
ITS: Create Presentations	ITS-CP		
ITS: Develop Web Pages	ITS-DW		
Influences: Rewards and Incentives	**INF**		
INF: Income Related	INF-IR		
INF: Recognition/Encouragement	INF-RE		
INF: Time	INF-TI		
INF: Development Opportunities	INF-DO		
INF: Work-Related Support	INF-WRS		
INF: Professional/Personal	INF-PP		
INF: Teaching	INF-TE		
INF: NONE University level	INF-NUT		
INF: NONE	INF-NONE		

Table 3-1. (continued)

Factors Present	FAC
FAC: Dissatisfied with Status Quo	FAC-SQ
FAC: Hardware/Software Available	FAC-HS
FAC: Time Available	FAC-TI
FAC: Rewards/Incentives Existed	FAC-RI
FAC: Input/Control	FAC-IC
FAC: Continuing Support	FAC-CS
FAC: Dept. Head Committed	FAC-DH
FAC: Computer Skills	FAC-CS

Professional Development Activities	PD
PD: Research	PD-R
PD: Workshops	PD-W
PD: Collab/w/people	PD-CP
PD: Working with Companies	PD-COM
PD: Attend Conferences	PD-C
PD: Summer Seminar	PD-SS
PD: Get Online	PD-ONL
PD: ITC	PD-ITC
PD: See Student Achievement	PD-SA
PD: Project/Grant Work	PD-PG
PD: Ask People	PD-AP
PD: Read	PD-READ
PD: Meetings	PD-M

Joys of Teaching	JT
JT: University Support	JT-UT
JT: Instrinsic	JT-I
JT: Teacher Models/Examples	JT-M/E
JT: Show benefits of Effec. Use	JT-SBE
JT: Some people just not into it	JT-NOT
JT: Technical Help	JT-TH
JT: Workshops/Instr	JT-INST

Beginning Technology Use	BTU
BTU: MainFrame	BTU-MF
BTU: Word Process	BTU-WP
BTU: Punch Cards	BTU-PC
BTU: Programming	BTU-PROG
BTU: Play Games	BTU-PG
BTU: Data Analysis	BTU-DA

Table 3-1. (continued)

Beginning Instr. Technology Use	BITU
BITU: Log onto Network	BITU-N
BITU: Teach Content	BITU-TC
BITU: Demonstration	BITU-DEM
BITU: Word Processing	BITU-WP
BITU: Present Visuals	BITU-VIS
BITU: Fit Teaching Style	BITU-TS
BITU: Administrative Tasks	BITU-ADM
BITU: Tool in Field	BITU-TF
BITU: Programming	BITU-PROG
BITU: Conduct Experiments	BITU-EX

Facilitites	F
F: Facilties(Creative Use)	F-CU
F: Lack of Tech Classrooms	F-LTC
F: Lack of Equipment	F-LE

Keep Abreast of Technology	KAT
KAT: Get Online	KAT-ONL
KAT: Meetings	KAT-M
KAT: Journal Subscriptions	KAT-SUB
KAT: Ask Others	KAT-AO
KAT: Family Members	KAT-FM
KAT: Project Work	KAT-PRO
KAT: Students	KAT-STU
KAT: ITC Workshops	KAT-ITC
KAT: Conferences	KAT-CONF
KAT: Working w/Companies	KAT-COM

incorporate instructional technologies into their teaching practices, and the conditions that may have facilitated their implementation of instructional technology. Of these 43 participants, 12 were selected to participate in interviews to gather supporting data. Because this study aimed to determine the factors that influenced select faculty members to incorporate instructional technology into teaching practices, the interview questions clarified these factors by allowing for detailed descriptions and explanations concerning that faculty member's use of instructional technology.

CHAPTER 4

Data Analysis

The purpose of this chapter is to provide the results of this study. The data analysis was conducted to answer the research questions initially posed in Chapter One. Data were collected as described in the previous chapter. This chapter reports the research data in two sections: Survey Results and Interview Findings.

Survey Results

The statistical findings for the survey are reported in this section. The survey was completed by 43 faculty members at the University of Tennessee, Knoxville. The overall response rate was 91%, of which 41 surveys were usable, yielding a 87% usable response rate. For each question on the survey, the number of respondents was 41 unless noted otherwise.

Table 4.1 shows the demographics of the survey respondents including affiliation by College or School. Over half of the respondents were full professors (n= 21, 51.2%) and 29.3% were associate professors (n=12). The majority of respondents indicated that teaching was their primary assignment (n=32, 78.0%) and 39 (95.1%) respondents were full time faculty members. Over half of the respondents had between six and twenty years of service at

Table 4-1. Demographics of survey participants.

College/School	Number of Participants
Arts and Sciences	23
Engineering	4
Social Work	1
Communications	2
Education	4
Architecture & Planning	1
Libraries	2
Human Ecology	1
Business Administration	2
Information Science	1
Total	41
Rank	**Freq (%)**
Full Professor	21 (51.2)
Associate Professor	12 (29.3)
Assistant Professors	6 (14.6)
Instructors	2 (4.9)
Primary Assignment	
Teaching	32 (78.0)
Administration	2 (4.9)
Research	5 (12.2)
Missing	2 (4.9)
Employment Status	
Full - time	39 (95.1)
Part - time	2 (4.9)
Amount of Service	
6-10 years	9 (22.0)
11-15 years	5 (12.2)
16-20 years	9 (22.0)
More than 20 years	13 (31.7)
5 years or less	5 (12.2)

the University (n=23, 56.1%). Thirteen faculty members (31.7%) had more than 20 years of service while only five (12.2%) had five years or less service at the University.

Research Question 1

How are select faculty members integrating instructional technology into teaching practices?

Survey questions 7 - 16 asked faculty members about their use of instructional technology. Email was reported as being used more than any other instructional technology to support teaching (n=32, 78.0%). Respondents used email to communicate with their students and encouraged their students to also use email for communication. Eighty percent (n=33) of the participants in this study encouraged students to use supplementary computer-driven course materials, such as Web pages or other computer-based applications outside of class. Almost three-fourths (n=30) of the respondents report that they used a computer to demonstrate specific concepts in class. The most frequently selected goal of computer use was for student mastery of basic skills and concepts related to the course's subject matter (n=22, 41.5%).

When asked about their level of computer use, 28 (68.3%) respondents scored 8.0 on the LCU Assessment (Questions 7-10), which indicated the use of computers at the integration level. When asked to select all of the computer-driven delivery methods used in courses they teach (Question 11), most reported using email (n=32, 78.0%) followed by use of Web-based materials that support course content (n=26, 63.4%), as indicated in Table 4.2. Over half of the respondents used a computer to show visuals while lecturing (n=22, 53.7%) and 20 (48.8%) used a Web-based syllabus. Additional methods of computer use included 15 (36.6%) reports of using computer-based tutorials that students complete on their own. Ten (24.4%) faculty members used Web-based tutorials that students complete on their own; and, eight respondents (19.5%) reported using Web-based discussion forums. Four faculty members (9.8%) used Web-based self assessments, quizzes, or student surveys in their courses while three respondents (7.3%) reported using computer conferencing. Other uses of computers included three reports of using simulations (7.3%) and one report (2.4%) of using each of the following methods: student assignments, calculator programs, computer- based tests, delivery of handouts, live video, software demonstrations and videostreaming.

Question 12 asked faculty how often they use a computer for specific instructional purposes. Table 4.3 shows that 34 respondents (82.9%) indicated using the computer to communicate electronically with students either frequently (more than once a week) or sometimes (more than once a month). Thirty respondents (73.2%) indicated using the computer to demonstrate specific concepts in class while 22 (53.7%) used the computer to develop Web pages and to demonstrate computer software either frequently or sometimes.

Table 4-2. Computer-driven methods faculty use in class.

Computer-driven delivery methods used by faculty:	Freq	%
Email	32	78.0
Web-based materials that support course content	26	63.4
Show visuals while lecturing	22	53.7
Web-based syllabus	20	48.8
Computer-based tutorials students complete on their own	15	36.6
Web-based tutorials students complete on their own	10	24.6
Web-based discussion forums	8	19.5
Web-based self assessments, quizzes, student surveys	4	9.8
Computer conferencing	3	7.3
Other methods:		
Simulations	3	7.3
Student assignments	1	2.4
Calculator programs	1	2.4
Computer-based tests	1	2.4
Delivery of handouts	1	2.4
Live video	1	2.4
Software demonstrations	1	2.4
Videostreaming	1	2.4

Table 4-3. Frequency of faculty and student use of computers.

Faculty use computers to:	Frequently Freq (%)	Sometimes Freq (%)	Rarely Freq (%)	Never Freq (%)
Communicate electronically	26 (63.4)	8 (19.5)	6 (14.6)	1 (2.4)
Demonstrate specific concepts	18 (43.9)	12 (29.3)	5 (12.2)	6 (14.6)
Develop Web pages	14 (34.1)	8 (19.5)	4 (9.8)	15 (36.6)
Demonstrate computer software	8 (19.5)	14 (34.2)	6 (14.6)	13 (31.7)
Provide tutorials	6 (14.6)	10 (24.4)	7 (17.1)	18 (43.9)
Develop computer-based tutorials	7 (17.1)	5 (12.2)	9 (22.0)	20 (48.8)
Present lecture outlines in class	13 (31.7)	8 (19.5)	5 (12.2)	15 (36.6)
Students encouraged to use computers to:	**Frequently Freq (%)**	**Sometimes Freq (%)**	**Rarely Freq (%)**	**Never Freq (%)**
Communicate electronically	25 (61.0)	9 (22.0)	5 (12.2)	2 (4.9)
Use supplementary materials outside of class	19 (46.3)	14 (34.1)	6 (14.6)	2 (4.9)
Complete assignments	15 (36.6)	17 (41.5)	4 (9.8)	5 (12.2)
Create presentations	8 (19.5)	12 (29.3)	13 (31.7)	8 (19.5)
Develop Web pages	5 (12.2)	5 (12.2)	9 (22.0)	22 (53.7)

Sixteen faculty members (39.0%) indicated using a computer frequently or sometimes to provide tutorials for students to individually complete. Twelve respondents (29.3%) used a computer to develop computer-based tutorials either frequently or sometimes.

When faculty were asked how often they encouraged their students to use the computer for specific instructional purposes (Question 13), 34 (82.9%) indicated that they encourage students to communicate electronically with themselves or others either frequently or sometimes. Thirty-three (80.5%) respondents encouraged students to use supplementary materials such as Web pages, computer-assisted instruction modules, or other computer-based applications outside of class, while 32 (78.0%) participants encouraged students to use a computer to complete assignments. Twenty respondents (48.8%) indicated that they encourage students to create presentations using a computer and 10 respondents (24.4%) encouraged students to develop Web pages either frequently or sometimes.

Question 14 asked participants to select the goal that computer use is most directed toward in their courses. Although asked to select only one goal, seven respondents selected two or more items as their primary goal. Therefore, the percentages for this question were calculated using 53 respondents. The most frequently selected goal for using a computer was for student mastery of basic skills and concepts related to course subject matter (n=22, 41.5%). Communication was the second most frequently selected goal with 15 respondents (28.3%) followed by problem solving which was selected by 17% of faculty members (n=9). Three respondents (5.6%) indicated that teaching about computers was the primary goal of using a computer in their classes. No respondents indicated that either challenging high ability students or remediating deficiencies of some students was the primary goal of using computers. Other goals of computer use that were supplied by respondents included "for collaborative learning" (n=1, 1.9%); "for critical evaluation of Web-based information" (n=1, 1.9%); "as a required tool in the field" (n=1, 1.9%); "for research current work" (n=, 1.9%). Table 4.4 lists the goal that computer use is most directed toward in courses and the primary focus of computer use in instruction.

Although participants were asked to select only one primary focus, five selected two or more items as their primary focus, which increased the number of respondents for this question to 48. When participants were asked to indicate the primary focus of computer use in their instruction (Question 15), 33% indicated that their primary focus for using a computer was to present information (n=16) followed by almost 19% who indicated using a computer for informational searches (n=9). Six respondents (12.5%) reported using a computer to focus on problems and questions and five (10.4%) used the computer primarily to run simulations and/or games. Two faculty members (4.1%) indicated using a computer to test/drill on necessary skills and two more respondents (4.1%) used the computer for students to develop

Table 4-4. Primary goal and focus for instructional computer use.

Primary goal:		Frequency	Percent
Student mastery of basic skills		22	41.5
Communication		15	28.3
Problem-solving		9	17.0
Teaching about computers		3	5.6
Challenging high ability students		0	0.0
Remediating deficiencies		0	0.0
Other primary goal:			
Collaborative learning		1	1.9
Critical evaluation of Web-based information		1	1.9
Required tool in the field		1	1.9
Research work		1	1.9
	Total	53	100.0
Primary focus:			
Present information		16	33.3
Informational searches		9	18.8
Problems and questions		6	12.5
Run simulations/games		5	10.4
Test/drill necessary skills		2	4.1
Students to develop own approach to learning		2	4.1
Vocabulary and facts		0	0.0
Other primary focus:			
Answer questions to avoid office hours		1	2.1
Composition		1	2.1
Laboratory tool		1	2.1
Language practice		1	2.1
Personal work		1	2.1
Reinforce key concepts		1	2.1
Teach software		1	2.1
Web site development		1	2.1
	Total	48	100.0

Note: Seven respondents selected two or more goals for a total n of 53. Five respondents selected two or more focuses for a total n of 48.

their own approach to learning. No one indicated using a computer primarily to focus on vocabulary and facts. Some other computer uses reported by respondents are "to answer questions to avoid office hours" (n=1, 2.1%); "for composition" (n=1, 2.1%); "as a laboratory tool" (n=1, 2.1%); "for language practice" (n=1, 2.1%); "for personal work" (n=1, 2.1%); "to reinforce key concepts" (n=1, 2.1%); "to teach software" (n=1, 2.1%); and "for Web site development" (n=1, 2.1%).

Table 4.5 shows how many students benefit from the respondents' teaching practices within a semester. Fourteen (34.1%) participants reported that they teach 26-50 students a semester followed by 13 faculty members (31.7%) who teach 51-75 students. About 17% (n=7) indicated having 1-25 students while almost 10% (n=4) have 76-100 students per semester. Three respondents (7.3%) indicated having over 100 students in their classes per semester.

Research Question 2

Which intrinsic and extrinsic motivation factors are identified as providing the greatest influence for select faculty members who are currently integrating instructional technology into their teaching practices to learn about technology?

Survey question 17 listed 48 different factors that were taken from the literature on faculty development and integration of instructional technology in higher education. The faculty participants were asked to indicate the

Table 4-5. Average number of students each respondent teaches within a semester.

No. of Students	Frequency	Percentage
1-25	7	17.1
26-50	14	34.1
51-75	13	31.7
76-100	4	9.8
Over 100	3	7.3
Total	41	100.0

amount of influence each factor had on motivating them to incorporate instructional technology into teaching practices. The factors were grouped into categories. Extrinsically motivating influences were represented by factors related to income, recognition/encouragement, time, development opportunities and work-related support. Intrinsically motivating influences were grouped by professional/personal (attributes) and teaching, with the exception of item 47, which is a teaching factor that represents an extrinsically motivating influence. Table 4-6 shows a complete listing of all 48 factors and their response rates.

The first 10 of the most frequently selected factors having had substantial influence were selected by over half of the participants. The first nine of these ten factors all represent intrinsically motivating influences. The two most frequently selected factors, which had substantial influence on the participants' decision to use instructional technology, represent teaching. They were "wanted to increase effectiveness as a teacher," which was selected

Table 4-6. Amount of influence reward/incentive factors had on faculty members' integration of instructional technology.

Reward/Incentive Factors	Substantial Influence	Some Influence	Minor Influence	Really No Influence At All
INCOME RELATED	Freq (%)	Freq (%)	Freq (%)	Freq (%)
01 Salary increase for incorporating technology	2 (4.9)	2 (4.9)	1 (2.4)	36 (87.8)
02 Considered towards promotion/tenure	3 (7.3)	2 (4.9)	5 (12.2)	31 (75.6)
03 Royalty paid to you on sales of materials developed by you	2 (4.9)	3 (7.3)	1 (2.4)	35 (85.4)
04 Department funding for your development time	1 (2.4)	4 (9.8)	3 (7.3)	33 (80.5)
05 University funding for your development time	1 (2.4)	0 (0.0)	4 (9.8)	36 (87.8)
06 Travel funds for technology conferences	2 (4.9)	2 (4.9)	4 (9.8)	33 (80.4)
07 Awarded external grant monies for development	4 (9.8)	5 (12.2)	6 (14.6)	26 (63.4)
08 Awarded grant/fellowship funding from the ITC	5 (12.2)	7 (17.1)	3 (7.3)	26 (63.4)
09 Copyright ownership of materials developed by you	3 (7.3)	1 (2.4)	4 (9.8)	33 (80.5)
RECOGNITION/ENCOURAGEMENT				
10 Received recognition within department/division	4 (9.8)	6 (14.6)	12 (29.3)	19 (46.3)
11 Received recognition within university	2 (4.9)	5 (12.2)	8 (19.5)	26 (63.4)
12 Received national/international recognition by:				
a. papers	3 (7.3)	6 (14.6)	6 (14.6)	26 (63.4)
b. presentations	5 (12.2)	6 (14.6)	5 (12.2)	25 (61.0)
c. published technology-driven materials	3 (7.3)	6 (14.6)	3 (7.3)	29 (70.7)
13 Received encouragement from senior-level administrators and department heads	4 (9.8)	6 (14.6)	11 (26.8)	20 (48.8)
14 Received positive feedback from:				
a. colleagues	5 (12.2)	17 (41.5)	9 (22.0)	10 (24.4)
b. students	20 (48.8)	12 (29.3)	4 (9.8)	5 (12.2)
c. administrators	5 (12.2)	6 (14.6)	12 (29.3)	18 (43.9)

Table 4-6. (continued)

Reward/Incentive Factors	Substantial Influence	Some Influence	Minor Influence	Really No Influence At All
TIME	Freq (%)	Freq (%)	Freq (%)	Freq (%)
15 Received release time to develop materials	2 (4.9)	2 (4.9)	4 (9.8)	33 (80.5)
16 Received a reduced teaching, research, service load while developing technology-driven materials	2 (4.9)	4 (9.8)	2 (4.9)	33 (80.5)
17 Able to schedule an afternoon or day off a week	4 (9.8)	1 (2.4)	3 (7.3)	33 (80.5)
18 Mini-sabbatical or leave of absence to develop materials	1 (2.4)	2 (4.9)	0 (0.0)	38 (92.7)
DEVELOPMENT OPPORTUNITIES				
19 Received demonstrations of instructional technology	6 (14.6)	5 (12.2)	7 (17.1)	23 (56.1)
20 Received practical training from professional educators	5 (12.2)	3 (7.3)	5 (12.2)	28 (68.3)
21 Attended workshops on instructional technology at a conference	5 (12.2)	8 (19.5)	7 (17.1)	21 (51.2)
22 Attended courses offered by the Innovative Technologies Center	5 (12.2)	2 (4.9)	11 (26.8)	23 (56.1)
23 Attended training related to specific software applications	3 (7.3)	5 (12.2)	5 (12.2)	28 (68.3)
WORK-RELATED SUPPORT				
24 Received clerical assistance	2 (4.9)	2 (4.9)	3 (7.3)	34 (82.9)
25 Received technical assistance	4 (9.8)	7 (17.1)	6 (14.6)	24 (58.5)
26 Received teaching assistance	4 (9.8)	2 (4.9)	6 (14.6)	29 (70.7)
27 Received more or better hardware	11 (26.8)	7 (17.1)	9 (22.0)	14 (34.1)
28 Received more or better software	8 (19.5)	11 (26.8)	9 (22.0)	13 (31.7)
29 Received an internet connection in your office	10 (24.4)	8 (19.5)	4 (9.8)	19 (46.3)
30 Received computer lab space	8 (19.5)	5 (12.2)	4 (9.8)	24 (58.5)
31 Received access to high-technology classrooms	9 (22.0)	7 (17.1)	6 (14.6)	19 (46.3)
PROFESSIONAL/PERSONAL				
32 Received personal satisfaction from intellectual stimulation	30 (73.2)	5 (12.2)	3 (7.3)	3 (7.3)
33 Received personal satisfaction of being engaged in change	27 (65.9)	8 (19.5)	3 (7.3)	3 (7.3)
34 Wanted to develop familiarity with computing technology	24 (58.5)	8 (19.5)	5 (12.2)	4 (9.8)

Table 4-6. (continued)

Reward/Incentive Factors	Substantial Influence	Some Influence	Minor Influence	Really No Influence At All
PROFESSIONAL /PERSONAL (continued)	Freq (%)	Freq (%)	Freq (%)	Freq (%)
35 Was fascinated with the complexity of instructional technologies	11 (26.8)	7 (17.1)	10 (24.4)	13 (31.7)
36 Received pleasure/pride in becoming an expert with instructional technology	13 (31.7)	10 (24.4)	10 (24.4)	8 (19.5)
37 Enjoyed the creative activity	22 (53.7)	10 (24.4)	5 (12.2)	4 (9.8)
38 Enjoyed the challenge	21 (51.2)	14 (34.1)	4 (9.8)	2 (4.9)
39 Enjoyed contributing to student development	31 (75.6)	5 (12.2)	4 (9.8)	1 (2.4)
40 Liked the opportunity for achievement	19 (46.3)	11 (26.8)	4 (9.8)	7 (17.1)
41 Liked the opportunity for self-expression	15 (36.6)	10 (24.4)	10 (24.4)	6 (14.6)
42 Perceived sense of being valued for innovative teaching contributions	12 (29.3)	10 (24.4)	10 (24.4)	9 (22.0)
TEACHING				
43 Wanted more opportunity to give students individual attention	14 (34.1)	12 (29.3)	5 (12.2)	10 (24.4)
44 Wanted more opportunity to work/be with students	11 (26.8)	11 (26.8)	10 (24.4)	9 (22.0)
45 Desired to improve instruction	32 (78.0)	4 (9.8)	2 (4.9)	3 (7.3)
46 Wanted to use technology to implement instructional techniques	25 (61.0)	9 (22.0)	5 (12.2)	2 (4.9)
47 Given preference regarding your teaching assignment	5 (12.2)	2 (4.9)	7 (17.1)	27 (65.9)
48 Wanted to increase effectiveness as a teacher	33 (80.5)	3 (7.3)	1 (2.4)	4 (9.8)

Note: Due to a rounding error, percentages may not add up to 100.0%.

by 80.4% of participants (n=33), closely followed by "desired to improve instruction," selected by 78% of participants (n=32). The next seven choices are intrinsically motivated with six of them representing professional/personal attributes. These are "enjoyed contributing to student development," (n=31, 75.6%); "received personal satisfaction from intellectual stimulation," (n=30, 73.2%); "received personal satisfaction from being engaged in change," (n=27, 65.9%); "wanted to use technology to implement instructional techniques," (n=25, 61.0%); "wanted to develop familiarity with computing technology," (n=24, 58.5%); "enjoyed the creative activity," (n=22, 53.7%); and, "enjoyed the challenge," (n=21, 51.2%). The tenth most frequently selected choice that had substantial influence, and the most frequently selected factor representing the extrinsically motivating influences, is "received positive feedback from students," (n=20, 48.8%). When considering factors that had either substantial or some influence toward integrating instructional technology into teaching practices, the same 10 factors top the list in a slightly different order. Table 4-7 lists all 48 factors in order of decreasing influence.

Thirteen of sixteen intrinsically motivating factors were more frequently selected than thirty of thirty-one extrinsically motivating factors as contributing substantial or some influence toward using instructional technologies. However, because the lack of extrinsic motivators is a major barrier of technology adoption according to the literature, it is worth

Table 4-7. Amount of substantial or some influence for each reward/incentive factor listed by decreasing influence.

	Substantial or Some Influence		
Reward/Incentive Factors	Freq (%)	Influence	Category
Wanted to increase effectiveness as a teacher	36 (87.8)	Intrinsic	Teaching
Desired to improve instruction	36 (87.8)	Intrinsic	Teaching
Received personal satisfaction of being engaged in change	36 (87.8)	Intrinsic	Personal/ Professional
Enjoyed contributing to student development	36 (87.8)	Intrinsic	Personal/ Professional
Enjoyed the challenge	35 (85.4)	Intrinsic	Personal/ Professional
Received personal satisfaction from intellectual stimulation	35 (85.4)	Intrinsic	Personal/ Professional
Wanted to use technology to implement instructional techniques	34 (82.9)	Intrinsic	Teaching
Enjoyed the creative activity	32 (78.0)	Intrinsic	Personal/ Professional
Received positive feedback from students	32 (78.0)	Extrinsic	Recognition/ Encouragement
Wanted to develop familiarity with computing technology	32 (78.0)	Intrinsic	Personal/ Professional
Liked the opportunity for achievement	30 (73.2)	Intrinsic	Personal/ Professional
Wanted more opportunity to give students individual attention	26 (63.4)	Intrinsic	Teaching
Liked the opportunity for self-expression	25 (61.0)	Intrinsic	Personal/ Professional
Received pleasure/pride in becoming an expert with instructional technology	23 (56.1)	Intrinsic	Personal/ Professional
Wanted more opportunity to work/be with students	22 (53.7)	Intrinsic	Personal/ Professional
Perceived sense of being valued for innovative teaching contributions	22 (53.7)	Intrinsic	Personal/ Professional
Received positive feedback from colleagues	22 (53.7)	Extrinsic	Recognition/ Encouragement
Received more or better software	19 (46.3)	Extrinsic	Work-Related Support
Received more or better hardware	18 (43.9)	Extrinsic	Work-Related Support
Received an internet connection in your office	18 (43.9)	Extrinsic	Work-Related Support
Was fascinated with the complexity of instructional technologies	18 (43.9)	Intrinsic	Personal/ Professional
Received access to high-technology classrooms	16 (39.0)	Extrinsic	Work-Related Support
Received computer lab space	13 (31.7)	Extrinsic	Work-Related Support
Attended workshops on instructional technology at a conference	13 (31.7)	Extrinsic	Development Opportunities
Awarded grant/fellowship funding from the ITC	12 (29.3)	Extrinsic	Income Related
Received demonstrations of instructional technology	11 (26.8)	Extrinsic	Development Opportunities
Received technical assistance	11 (26.8)	Extrinsic	Work-Related Support

Table 4-7. (continued)

Reward/Incentive Factors	Substantial or Some Influence Freq (%)	Influence	Category
Received national/international recognition by presentations	11 (26.8)	Extrinsic	Recognition/ Encouragement
Received positive feedback from administrators	11 (26.8)	Extrinsic	Recognition/ Encouragement
Received recognition within department/division	10 (24.4)	Extrinsic	Recognition/ Encouragement
Received encouragement from senior-level administrators and department heads	10 (24.4)	Extrinsic	Recognition/ Encouragement
Received national/international recognition by papers	9 (22.0)	Extrinsic	Recognition/ Encouragement
Received national/international recognition by published technology-driven materials	9 (22.0)	Extrinsic	Recognition/ Encouragement
Awarded external grant monies for development	9 (22.0)	Extrinsic	Income Related
Received practical training from professional educators	8 (19.5)	Extrinsic	Development Opportunities
Attended training related to specific software applications	8 (19.5)	Extrinsic	Development Opportunities
Attended courses offered by the Innovative Technologies Center	7 (17.1)	Extrinsic	Development Opportunities
Received recognition within university	7 (17.1)	Extrinsic	Recognition/ Encouragement
Given preference regarding your teaching assignment	7 (17.1))	Extrinsic	Teaching
Received a reduced teaching, research, service load while developing technology-driven materials	6 (14.6)	Extrinsic	Time
Received teaching assistance	6 (14.6)	Extrinsic	Work-Related Support
Able to schedule an afternoon or day off a week	5 (12.2)	Extrinsic	Time
Considered towards promotion/tenure	5 (12.2)	Extrinsic	Income Related
Royalty paid to you on sales of materials developed by you	5 (12.2)	Extrinsic	Income Related
Department funding for your development time	5 (12.2)	Extrinsic	Income Related
Salary increase for incorporating technology	4 (9.8)	Extrinsic	Income Related
University funding for your development time	4 (9.8)	Extrinsic	Income Related
Copyright ownership of materials developed by you	4 (9.8)	Extrinsic	Income Related
Received release time to develop materials	4 (9.8)	Extrinsic	Time
Received clerical assistance	4 (9.8)	Extrinsic	Work-Related Support
Mini-sabbatical or leave of absence to develop materials	3 (7.3)	Extrinsic	Time
Travel funds for technology conferences	1 (2.4)	Extrinsic	Income Related

discussing this study's findings regarding the influence of extrinsic factors. The 10 most frequently selected extrinsic factors having substantial or some influence toward the integration of instructional technology are listed on Table 4-8 and primarily address incentives related to work-related support and recognition/encouragement.

Over 60% of the participants indicated that all of the income-related factors really had no influence at all when they began to incorporate instructional technologies into their teaching practices (n=26-36; 63.4-87.8%). Likewise, over three-fourths of the respondents reported that each of the time-related factors really had no influence in their decision to use instructional technologies (n=33-38; 80.4-92.7%). About half to two-thirds of the participants indicated that the factors related to development opportunities really had no influence in motivating them to incorporate instructional technologies (n=21-28; 51.2-68.3%). When asked about factors related to recognition and encouragement, at least 19 participants (46.3%) said these factors really had no influence at all, with one exception — receiving positive feedback. Receiving positive feedback from students had substantial or some influence to about 78% of the respondents (n=32) while positive feedback from colleagues had at least some influence to approximately 53% of the participants (n=22). However, only 11 faculty members (26.8%) indicated that positive feedback from administrators had provided substantial or some influence in motivating them to use instructional technologies.

Table 4-8. Amount of substantial or some influence extrinsic reward/incentive factors had for at least twenty-five percent of faculty members.

Reward/Incentive Factors	**Substantial or Some Influence**
RECOGNITION/ENCOURAGEMENT	Freq (%)
Received positive feedback from students	32 (78.0)
Received positive feedback from colleagues	22 (53.7)
WORK-RELATED SUPPORT	
Received more or better software	19 (46.3)
Received more or better hardware	18 (43.9)
Received an internet connection in your office	18 (43.9)
Received access to high-technology classrooms	16 (39.0)
DEVELOPMENT OPPORTUNITIES	
Attended workshops on instructional technology at a conference	13 (31.7)
WORK-RELATED SUPPORT	
Received computer lab space	13 (31.7)
INCOME RELATED	
Awarded grant/fellowship funding from the ITC	12 (29.3)
RECOGNITION/ENCOURAGEMENT	
Received national/international recognition by presentations	11 (26.8)
Received positive feedback from administrators	11 (26.8)
WORK-RELATED SUPPORT	
Received technical assistance	11 (26.8)
DEVELOPMENT OPPORTUNITIES	
Received demonstrations of instructional technology	11 (26.8)
RECOGNITION/ENCOURAGEMENT	
Received encouragement from senior-level administrators and department heads	10 (24.4)

The final category to discuss includes factors related to support at work. Over half to four-fifths of the respondents indicated that receiving clerical assistance (n=34, 82.9%), teaching assistance (n=29, 70.7%), technical assistance (n=24, 58.5%), or receiving computer lab space (n=24. 58.5%) really had no influence at all toward using instructional technology. However, receiving hardware, software, an internet connection, and access to a technology classroom did contribute at least minor influence for over half of the participants.

Research Question 3

Which intrinsic or extrinsic motivation factors are perceived by select faculty members as the most influential in motivating them to integrate technology into teaching practices? Why were these motivation factors the most influential?

Question 18 asked participants to select and rank the five most influential factors that motivated them to incorporate instructional technologies into their teaching practices. The three most frequently selected first choices included the following:

- "wanted to increase effectiveness as a teacher" (n=13, 31.7%);
- "desired to improve instruction" (n=9, 22.0%); and,
- "received personal satisfaction from being engaged in change" (n=6, 14.6%).

Of the remaining factors, no more than two people selected the same first choice. Table 4-9 shows a complete listing of all 48 factors and indicates how many respondents selected each factor with its ranking.

When looking at the most frequently selected five influences without ranking order, the top five most frequently selected responses were also each representative of an intrinsic motivation factor and include the following:

- "desired to improve instruction" (n=31, 75.6%)
- "wanted to increase effectiveness as a teacher" (n=29, 70.7%)
- "enjoyed contributing to student development" (n= 24, 58.5%)
- "received personal satisfaction from intellectual stimulation" (n=18, 43.9%)
- "wanted to use technology to implement instructional techniques" (n=17, 41.5%)

Questions 19-23 support the "why" part of this research question because they focus on the "eight conditions that appear to facilitate the implementation of educational technology in a variety of education-related contexts" (Ely, 1990, p. 229). Question 19 asked participants to select all of the factors that were either present or applicable when they began to incorporate instructional technology into teaching practices. Only four of the eight conditions that support educational technology implementation are reported by at least half of the participants in this survey. Tables 4.10 and 4.11 summarize the results of questions 19-23. The four conditions that existed for at least 23 of the participants are:

Table 4-9. Ranking of the Five Most Influential Reward/Incentive Factors.

Reward/Incentive Factors	Ranking				
	1st	2nd	3rd	4th	5th
INCOME RELATED	Freq (%)	Freq (%)	Freq (%)	Freq (%)	Freq (%)
01 Salary increase for incorporating technology	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
02 Considered towards promotion/tenure	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
03 Royalty paid to you on sales of materials developed by you	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
04 Department funding for your development time	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
05 University funding for your development time	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
06 Travel funds for technology conferences	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
07 Awarded external grant monies for development	1(2.4)	0 (0.0)	0 (0.0)	1(2.4)	0 (0.0)
08 Awarded grant/fellowship funding from the ITC	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
09 Copyright ownership of materials developed by you	1(2.4)	0 (0.0)	0 (0.0)	0 (0.0)	1(2.4)
RECOGNITION/ENCOURAGEMENT					
10 Received recognition within department/division	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
11 Received recognition within university	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
12 Received national/international recognition by:					
a. papers	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
b. presentations	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
c. published technology-driven materials	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
13 Received encouragement from senior-level administrators and department heads	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1(2.4)
14 Received positive feedback from:					
a. colleagues	0 (0.0)	1(2.4)	0 (0.0)	1(2.4)	0 (0.0)
b. students	1(2.4)	0 (0.0)	3(7.3)	1(2.4)	1(2.4)
c. administrators	1(2.4)	0 (0.0)	1(2.4)	0 (0.0)	0 (0.0)

NOTE: Item 12 had two non-categorizable responses (a second and a fourth ranking) and Item 14 had one non-categorizable response (a third ranking).

Table 4-9. (continued)

Reward/Incentive Factors	Ranking				
	1st	2nd	3rd	4th	5th
TIME	Freq (%)	Freq (%)	Freq (%)	Freq (%)	Freq (%)
15 Received release time to develop materials	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
16 Received a reduced teaching, research, service load while developing technology-driven materials	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
17 Able to schedule an afternoon or day off a week	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
18 Mini-sabbatical or leave of absence to develop materials	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
DEVELOPMENT OPPORTUNITIES					
19 Received demonstrations of instructional technology	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
20 Received practical training from professional educators	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
21 Attended workshops on instructional technology at a conference	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
22 Attended courses offered by the Innovative Technologies Center	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
23 Attended training related to specific software applications	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
WORK-RELATED SUPPORT					
24 Received clerical assistance	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
25 Received technical assistance	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
26 Received teaching assistance	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
27 Received more or better hardware	0 (0.0)	1 (2.4)	0 (0.0)	0 (0.0)	1 (2.4)
28 Received more or better software	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.4)
29 Received an internet connection in your office	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
30 Received computer lab space	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.4)
31 Received access to high-technology classrooms	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.4)	1 (2.4)
PROFESSIONAL/PERSONAL					
32 Received personal satisfaction from intellectual stimulation	6 (14.6)	3 (7.3)	1 (2.4)	6 (14.6)	2 (4.9)
33 Received personal satisfaction of being engaged in change	2 (4.9)	2 (4.9)	0 (0.0)	2 (4.9)	3 (7.3)

Table 4-9. (continued)

Reward/Incentive Factors	Ranking 1st	2nd	3rd	4th	5th
PROFESSIONAL/PERSONAL (continued)	Freq (%)	Freq (%)	Freq (%)	Freq (%)	Freq (%)
34 Wanted to develop familiarity with computing technology	0 (0.0)	2 (4.9)	3 (7.3)	2 (4.9)	1 (2.4)
35 Was fascinated with the complexity of instructional technologies	0 (0.0)	1 (2.4)	0 (0.0)	0 (0.0)	0 (0.0)
36 Received pleasure/pride in becoming an expert with instructional technology	0 (0.0)	0 (0.0)	0 (0.0)	2 (4.9)	0 (0.0)
37 Enjoyed the creative activity	2 (4.9)	2 (4.9)	0 (0.0)	2 (4.9)	5 (12.2)
38 Enjoyed the challenge	0 (0.0)	1 (2.4)	4 (9.8)	0 (0.0)	6 (14.6)
39 Enjoyed contributing to student development	2 (4.9)	5 (12.2)	9 (22.0)	5 (12.2)	3 (7.3)
40 Liked the opportunity for achievement	1 (2.4)	1 (2.4)	0 (0.0)	1 (2.4)	0 (0.0)
41 Liked the opportunity for self-expression	0 (0.0)	1 (2.4)	0 (0.0)	0 (0.0)	0 (0.0)
42 Perceived sense of being valued for innovative teaching contributions	0 (0.0)	1 (2.4)	0 (0.0)	1 (2.4)	1 (2.4)
TEACHING					
43 Wanted more opportunity to give students individual attention	2 (4.9)	0 (0.0)	4 (9.8)	1 (2.4)	0 (0.0)
44 Wanted more opportunity to work/be with students	0 (0.0)	2 (4.9)	0 (0.0)	1 (2.4)	1 (2.4)
45 Desired to improve instruction	9 (22.0)	9 (22.0)	6 (14.6)	4 (9.8)	3 (7.3)
46 Wanted to use technology to implement instructional techniques	1 (2.4)	2 (4.9)	5 (12.2)	3 (7.3)	6 (14.6)
47 Given preference regarding your teaching assignment	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.4)	0 (0.0)
48 Wanted to increase effectiveness as a teacher	13 (31.7)	8 (19.5)	2 (4.9)	5 (12.2)	1 (2.4)

Note: Due to a rounding error, percentages may not add up to 100.0%.

Table 4-10. Factors that were present/applicable when faculty member began incorporating instructional technology into teaching practices.

Factors present/applicable:	Frequency	Percentage
Computer was available	34	82.9
Computer software was available	30	73.2
Had input/control over implementing instructional technology	27	65.9
Dissatisfaction with status quo of teaching methods	23	56.1
Computer Knowledge and Skills Exist	23	56.1
Department Head or Dean was committed to supporting technology integration	14	34.1
Had time to learn software, create materials, etc.	10	24.4
Had endorsement and continuing support for instructional technology implementation within your department or division	8	19.5
Rewards or incentives existed within your department to incorporate instructional technology	2	4.9
Total	41	100.0

Table 4-11. Perceived level of computer skills and knowledge when faculty first began to incorporate instructional technologies into teaching practices.

Beginning computer skill and knowledge level:	Frequency	Percentage
Excellent	12	29.3
Good	11	26.8
Average	11	26.8
Fair	3	7.3
Poor	4	9.8
Total	41	100.0

- Resources are Available
  Computer was available (n=34, 82.9%) and software was available (n=30, 73.2%)

- Participation is Expected and Encouraged
  Had input/control over implemention of instructional technology (n=27, 65.9%)

- Dissatisfaction with the Status Quo
  Dissatisfaction with status quo of teaching methods (n=23, 56.1%)

- Knowledge and Skills Exist
  Had good-to-excellent computer skills when they first began to incorporate instructional technology into teaching practices (n=23, 56.1%)

Of the remaining four conditions that help to support the integration of instructional technology into teaching practices, 34.1% of the faculty participants (n=14) indicated that their Department Head or Dean was committed to supporting technology integration. Only 10 faculty members (24.4%) indicated that they had time to learn software and create materials. Almost 20% (n=8) indicated that they had endorsement and continuing support for instructional technology implementation within their department or division. Only two respondents (4.9%) indicated that rewards or incentives existed within their department to incorporate instructional technology.

Research Question 4

What is the relationship between the intrinsic and extrinsic motivation factors that the select faculty members perceive as most influential and their level of instructional technology use?

The faculty members who participated in this study were invited to participate because they were high level technology users. Because such a high number of respondents scored an 8.0 (n=28, 68.3%) on the LCU assessment, which indicated that they were actively integrating instructional technology, no statistically meaningful correlation could be drawn between the level of instructional technology use and the most influential intrinsic and extrinsic motivation factors, as perceived by participating faculty members.

Interview Data

This section reports data gathered from the semistructured interviews. Twelve survey respondents, who meet all three criteria of a high level user of instructional technology, were selected to be interviewed. For this study, a high level user of instructional technology was defined as a faculty member who is:

1. identified as being at the integration level of computer use (score of 8.0) as indicated by The Levels of Computer Use assessment (survey questions 8-11); AND,
2. uses at least three different computer-based delivery methods for instruction, with one being Web-based (survey question 12); OR,
3. indicates that he/she develops either Web pages or computer-based tutorials for instructional purposes (survey question 13).

Two of the four research questions set forth in this study were explored in more depth during the interviews. These research questions were:

1. How are select faculty members integrating instructional technology into teaching practices?
2. Which intrinsic or extrinsic motivation factors are perceived by select faculty members as the most influential in motivating them to integrate technology into teaching practices? Why were these motivation factors the most influential?

Interview Questions 1-4:

When did you begin using a computer? When you first began using a computer, what did you use it for? When did you begin using a computer for instructional purposes? Why did you begin using a computer for instructional purposes?

It took an average of 10 years from the time the 12 faculty who were interviewed first started using a computer until they began to using computing technology for instructional purposes. These faculty members reported first using a computer for either word processing, programming, or data analysis. All interview participants were first exposed to computing technology when they were either undergraduate or graduate students, which may account for the 10 year average span to integrate technology into their own teaching. These faculty members first began to use computing technology for instructional purposes to support teaching's administrative tasks, to demonstrate software applications and/or because the computer became an essential tool in their field.

Interview Question 5:

Describe the ways you first began to use a computer for instructional purposes.

Initially, all of the interviewed faculty members used a computer primarily as a support tool for instructional purposes. Word processing software was used to create course materials and lecture notes, write textbooks, and create tests. Computers were also used to demonstrate concepts and software packages to students. Over half of the faculty (n=8) stated that they started to use a computer for instructional purposes because it provided a direct content fit to their subject area and four of those eight mentioned that the computer also became an essential tool in their field.

Interview Question 6:

You indicated on the survey that these [a list of that individual's responses were provided to him/her] were the five most influential factors that motivated you to incorporate instructional technologies into your teaching practices. Why were each of these so influential?

When looking at the most frequently selected five influences without ranking order, 75% (n=9) of the interview participants indicated that one of the most influential factors that motivated them to incorporate instructional technologies into their teaching was that they "wanted to increase effectiveness as a teacher." There was a tie for the second most frequently selected influence with five faculty each ranking "desired to improve instruction" and "enjoyed the challenge" within their top five factors. The following three influences each had four votes: "wanted to use technology to implement instructional techniques," "enjoyed the creative activity," and "enjoyed contributing to student development." And, finally, three faculty ranked each of these factors, "was fascinated with the complexity of instructional technologies," and "received personal satisfaction from intellectual stimulation."

These faculty felt that technology helped them to be a more effective teacher. As one interview participant said, "They just don't hear that this or that theory works, they get to see it work [via the computer]." And, faculty used the computer to help students experience or visualize what otherwise wouldn't be possible, such as where a muscle is physically located and how its location relates to its function.

In some academic disciplines the material that is taught is just a natural for being in a computer environment. However, faculty also have other compelling reasons to use technology. For example, one faculty member incorporated information from the Web into his/her courses because the information is up-to-date, whereas textbooks are not. Another faculty member observed that technology "made me rethink how I approach teaching — what needs to be emphasized more and perhaps what needs to be emphasized less . . . and it can change the ways you spend time in the classroom."

Overall, faculty felt that technology was helping them to better prepare students for life after college. Five faculty members specifically mentioned that they wanted to ensure that students are prepared to effectively use computing technology when they get out into the workplace.

Interview Question 7:

What type of professional development activities appeal to you?

Project work beyond teaching was mentioned by seven of the interview participants. Working with companies, collaborating with others in different fields or universities, and working within University-supported centers on additional projects were provided as examples of project work. Conference and seminar attendance was described as professional development by six faculty members. However, these faculty members were only interested in making a time-investment to attend conferences and professional meetings if they were presenting or participating in a way to enhance their reputation, both within the University and externally.

Other professional development activities mentioned included self-directed learning activities (n=4), research duties (n=3), University-sponsored workshop attendance (n=3), and learning from students who have graduated and made significant contributions to their field (n=1).

Interview Question 8:

Describe how you are currently integrating instructional technology (specifically a computer) into teaching practices.

The faculty who were interviewed primarily used instructional technology because it provided a fit with their subject matter (n=8) and was a tool used in their field (n=4), or it helped to prepare students for the technology they will encounter in the workplace (n=5). All 12 of the faculty who were interviewed have extensive Web sites for their courses that included lecture notes, assignments, practice problems, tutorials, and related links. Two faculty members used the Web to deliver all of their course material. The students of all 12 interview participants also used computing technology to enhance their learning in a variety of ways, such as conducting research, performing computations, and interacting with computer simulations.

Two faculty members who either do not have access to portable computing equipment or teach in rooms that are not designed for media delivery, have found innovative ways to expose their students to technology. Communicating through email was one way that these two interviewees, as well as the others, encouraged students to experience computing technology. Posting grades on the Web, as well as lecture notes and assignments, forced students to interact with the technology outside of the classroom. Four faculty reported using simulation software with their students. One interview participant, who does not have any computing capability in the classroom, provided the hard copy printouts of data output from the students' input into a computer simulation. Regardless of how faculty were using instructional technology, they all mentioned the flexibility allowed by the computer to immediately update course materials and have students be able to access these materials via the Web as a commanding reason to use technology.

Interview Question 9:

Describe the ways you keep abreast of the rapid advancements in computing technologies.

The most popular response to this question was reading — computing magazines and journals (n=9), newspapers (n=4), and listserv email (n=2). Several faculty members (n=4) also kept informed by browsing Web. These faculty browsed field-related Web sites, electronic bulletin boards, discussion groups and news-related Web sites. Learning from students (n=3), working on projects for outside companies (n=2), and attending University-sponsored workshops (n=2) were also mentioned as ways faculty keep abreast of the rapid advancements in computing technologies.

Interview Question 10:

Do you have any suggestions on how to increase faculty sensitivity to the joys and pleasures of teaching?

Faculty had a variety of ideas related to promoting the joys and pleasures of teaching. However, most of their comments related to addressing the barriers that prevent faculty from using instructional technology. Beyond the barriers, participants suggested that faculty generally want ideas for how technology can make them better instructors. For example, one interview participant observed that if you spend the time to create a presentation of lecture notes using Adobe PowerPoint, then when in the classroom, you would not have to waste time writing on the board — instead this time could be used to interact with the students.

Four faculty members suggested showing other faculty techniques that are easily accomplished, do not take a lot of time, and contribute to the teaching/learning process. Faculty want to know what is working for others and what methods can really influence student learning. Two faculty members specifically mentioned that faculty want to know how instructional technology can be used in their specific academic field. These interview participants suggested enticing faculty to try something small in scope so they can realize a quick result and be influenced by positive reactions from students.

Although no questions were asked by this researcher about the barriers to integrating instructional technology into teaching practices, many faculty offered their unsolicited opinions when asked interview question 10. Their comments related to poor facilities, lack of equipment, and lack of extrinsic rewards and incentives, including the relationship of teaching to tenure and promotion decisions.

Facilities

The campus facilities pose a significant roadblock to incorporating instructional technology into teaching. Many facilities on campus are older as described by one interview participant, "Our building is 1920's. Just getting the cart [technology cart] around is hazardous." Other comments regarding the facilities addressed simple barriers such as not having blinds that would close in a classroom, not being able to control room lighting, or a projection screen that is installed in a corner where you could not project onto it. As one participant stated, "You feel like you've got all this great stuff and you're ready to do this great thing and the sun is streaming into the room, I can't shut the blinds and I can't turn off the lights and I can't really set up to get the screen in focus."

One faculty member mentioned the logistics and territoriality with classrooms. For instance, to use a microphone in McClung Museum, a faculty member needs to retrieve it from the secretary each time it's used. Or if you wanted to teach in a particular classroom, you might have to bring all of your own equipment to use, even if equipment already resides in that room. Providing internet access in all of the classrooms was also mentioned by three interview participants as an important aspect toward influencing faculty to use instructional technologies in teaching.

Lack of computing labs is also another issue on campus that was mentioned by five interviewees. Because of lack of computing lab space, one interview participant collaborated with a colleague to schedule two sections of a class at the same time so they can share access to the same computer lab. Another interview participant stated, "We essentially have no computer labs available to use. The teachers are frustrated. Until the infrastructure is built up more, you've got real problems." Five faculty voiced the opinion that more computer labs are needed on campus. Even if you are lucky to have access to a computer lab, there are still problems. As one faculty member stated, "Even in a lab with 20 computers, my classes have 36 students, so they have to double up on computers." This means that students cannot accomplish any independent, computer-driven learning activities during the class. As another faculty member put it, "If you really want to go into making this more effective, we have to really spend money modernizing the classrooms and put the equipment in the classroom."

Equipment

Four faculty members described frustrations with equipment. "One too many times, I've tried to use it and it didn't work. . . . Somebody who had used it before, maybe had not turned if off correctly. . . . I always have a back up plan and then I just started going to my back up plan more often than not." Even though a particular college has a projection unit that can be taken to a classroom, another faculty member had so much difficulty using it, that he/she has gone back to using preprinted overhead transparencies. In fact, two faculty mentioned using preprinted overhead transparencies because of not having access to a computer and projector. And there can be problems even if faculty do have access to a computer and projector. One interview participant said that even when projecting in a large classroom, the quality of the projection was so poor that students had to access their own computer after class and repeat every demonstration to really see what was happening. As a result this faculty member felt that every classroom needs to have a big TV and a projector.

Four faculty members reported not having much equipment available for their use. "We've only got one good laptop in our department." Another faculty member purchased equipment — "I purchased this printer and gave it to the University as a gift, otherwise I would have to go down the hallway every time I print and that wouldn't work when I'm creating and changing." And, even though faculty can borrow certain equipment from the ITC, it is not convenient to do so. One participant observed that faculty members still have to run over to the ITC to pick up equipment, where there's no visitor parking. Then, you have to bring the equipment somewhere and you can't park legally where you bring it. Basically, most University faculty face an incredible hassle to just show some projected images in class.

To encourage more faculty to use instructional technologies, one interview participant felt that equipment needs to be set up for faculty and instruction needs to be provided on how to use it. And, even if equipment is available, somebody still needs to maintain the equipment and make sure that it is in working order. Another faculty member felt that departments should hire people to help improve instruction and help faculty incorporate new instructional techniques. Finally, students also still have a problem with computer access. In the library, students have to wait to use a computer and one faculty member suggested that this may be prohibiting some faculty from using instructional technologies in their teaching.

All of the faculty who were interviewed reported having a good computer, although upgrading systems was an issue for two participants. One participant shared that when he/she first came to the University, money was available to chose a computer, but then there was no way to upgrade it. Helping students outside of class can be difficult when faculty have older technology in their offices. This is because if students create a file with a version of software that is newer than the version residing on the faculty member's computer, then the file can't be opened on that faculty member's computer. Five faculty did report initial support at department level with securing equipment. "I was one of the first to get a PowerPC in the college —

they gave me the equipment or I couldn't do what I'm doing — and really I need a new machine right now. Within the college, someone's got to look at the allocation of resources across fields." Another interview participant received a new computer because he/she needed it to teach a class which required use of Microsoft Windows 95. Four faculty members reported that if any material or equipment was needed, they received it. It is noteworthy that all four of these faculty members represented a scientific field. One of these four participants stated, "Our department head is very supportive of anybody who wants to venture into this direction."

Incentives

There are very few incentives in the traditional rewards scheme within the University community. As one interview participant shared, "We don't have salary increments in our department for using innovative technologies. We don't have time off, we don't have anybody who teaches us. The incentives listed on the survey [see Appendix B] might have been important if they had been available. I mean I would have liked them, except that they weren't available." Another faculty member supported this view, "One of the things that you were asking for on your survey was support by the department or by the area and basically we just don't have that. I'm not saying that that wouldn't be really influential, it's just not available for us."

Only one faculty member received any incentives at the University or department level in terms of material or financial incentives. This faculty member described, "On several occasions there have been honors and awards that came from the department . . . so the feedback for the ego has been good and also the pocketbook because these things quite often carry financial rewards." As one participant observed, "The incentives are that you do something that no one else can do and that kind of builds your job security — it kind of makes you not expendable." Another faculty member shared a similar view, "And so if I leave the University, I mean that's the thing that I'm valuable. To be able to take this thing [computing skills] to another school and teach that class. I mean that's what they would be hiring me to do." Another interview participant felt that the administration should "Pay people for their teaching efforts. That means encourage people to do course development by having either release time for them or some salary supplements for the summer. . . . Multimedia takes an enormous amount of time to do and there's very little release time."

Tenure

All of the faculty made similar comments about the lack of recognition for teaching in promotion and tenure decisions. Comments were made supporting the notion that most University faculty do not perceive teaching as scholarship. One interview participant shared, "What you're expected to do is get research funds, teach graduate courses, interact with everybody, and seek out contacts — do all this stuff, and by the way if you can teach that's okay but it's not important." Another participant felt that "there must be some kind of trade-off between the time spent on research and the time spent on learning about instructional techniques. . . . It's also a research activity and must be rewarded." One faculty member said, "Don't tenure people who are not effective teachers. . . . If you're going to support education, you've got to support it — treat it on par with research."

One tenured faculty member thought that those "who are integrating instructional technology are probably already tenured because there's no guarantee that any kind of software creation and development is going to count as heavily in that process compared to the more traditional publications." Although survey participants were not asked about their tenure status, over half of the respondents were full professors (n=21, 51.2%), indicating that they have most likely attained tenure. Faculty members who were interviewed generally expressed that until teaching is a more important part of the tenure process, the untenured faculty probably won't integrate technology into teaching until they're personally driven. Three untenured interview participants expressed a concern of how they would account for the amount of computer-driven instructional materials they have developed and the time for their development in their tenure and promotion review. Another tenured interview participant observed that "Everybody always says that they feel a lot of pressure to not take too much time away from their research because the research is what is being reported and so you have to spend a lot of time on your research . . . there's more pressure on untenured faculty to be successful in research."

In terms of tenured faculty, getting more visibility for the ones who are actively incorporating it was seen as a way to get other tenured faculty involved. As one participant stated, "I think that the senior faculty will respect the senior faculty. And if they see people having fun, and are excited, maybe that will help."

Because the effects of teaching are often intangible, achievement in teaching is difficult to determine. Therefore, faculty promotion committees take the position of rewarding activities other than teaching (Bess, 1977). To influence more non-tenured faculty to use instructional technology, the teaching evaluation process needs to be broadened to rely less exclusively on student evaluations and instructional innovation should be considered at every level in the promotion and tenure process (Olsen & Simmons, 1996).

Summary

The purpose of this study was to report the findings of this study. The data were collected using a survey completed by 41 faculty members at the University of Tennessee, Knoxville. Interviews were then conducted with a subset of the survey respondents. The most prominent commonality among all of the participants in this research study was that all of these faculty members deeply care about what and how their students learn. They started using instructional technologies primarily because they wanted to increase their teaching effectiveness and improve their instruction. As one participant commented, "It's not about lectures, it's about how you get them to learn this stuff." Another noted, "I see it as a way of helping my effectiveness, rather than my efficiency." One faculty member observed that "This kind of technology is much more engaging for the students. It also enables me to have one-on-one interaction with the students. They find this stuff fun and that makes it easy for me to teach them." Another interview participant offered, "I think one of the things that we have to do as teachers is push our students into the future." Basically, these faculty felt that their students benefit and enjoy from the integration of instructional technology — "They're interested and paying attention."

Another common thread among all of the faculty who were interviewed was that they enjoy learning about computers and six participants even described learning about and using computers as "fun." Two faculty members actually entered graduate school specifically to learn about computers. Five participants indicated that they enjoy the challenge of keeping abreast of the advancements in computing technology. One interview participant said, "I like to be challenged and do things I've been told I can't do." The faculty members who were interviewed for this study both care about the teaching/learning process and enjoy working with computing technology. Together, these two attitudes generally account for why these faculty began, and continue, to incorporate instructional technologies into their teaching practices in spite of organizational barriers. As one participant shared, "I think the motivation for these changes was the fact that I didn't think that we were really serving the majority of the students well with the standard methodologies." Regardless of these faculty members enthusiasm for using instructional technologies, the bottom line is that they wanted to teach content, not technology.

CHAPTER 5

Summary

This study, which was conducted at the University of Tennessee, Knoxville, examined how selected University faculty members integrated instructional technology into their teaching practices and the primary factors that influenced them to do so. In the first chapter of this dissertation, information was presented regarding the significance of this study. A review of relevant literature was contained in Chapter Two. The third and fourth chapters discussed the research method and results, respectively. The purpose of this chapter is to discuss the conclusions and offer recommendations on how to create conditions within the university environment that will influence individual faculty members to adopt new instructional technologies. It is important to consider that the recommendations set forth in this study may not be applicable to every institution; however, they can provide a framework for the discussion of similar goals.

It is clear that technology needs to be integrated into the teaching-learning process given societal changes, the demands of business and industry, and the perception that educational technology is a major vehicle in educational reform. Forty-one faculty members at the University of Tennessee, Knoxville were included in the survey results of this study, which identified how these faculty were integrating instructional technologies into their teaching practices and what the primary influences were for doing so. Twelve of the survey participants were selected to participate in an interview with this researcher. In summary, the following were the major findings of this study:

1. Faculty started using instructional technologies primarily because they wanted to increase their teaching effectiveness and improve their instruction.
2. Email was reported as the instructional technology that is used the most in courses.
3. The influences for using instructional technology among the faculty who participated in this research were overwhelmingly intrinsically motivated.
4. The most influential extrinsic factors related primarily to receiving recognition/encouragement and work-related support.
5. The faculty who were interviewed believed that using the computer benefited their students.

Discussion

The survey identified the two most frequently selected factors that have had substantial influence on the participants' decision to use instructional technology, which were "wanted to increase effectiveness as a teacher" and "desired to improve instruction." The faculty who were interviewed primarily use instructional technology either because it provided a fit with their subject matter and is a tool used in their field, or to help prepare students for the technology they will encounter in the world of work. This finding is supported by the survey results. When participants were asked to select the goal that computer use is most directed toward in their courses, the most frequently selected goal was student mastery of basic skills and concepts related to course subject matter. Communication was the second most frequently selected goal of computer use, which is related to preparing students for the workplace where they will use email and other methods of electronic communication.

The emphasis on using instructional technologies to support the teaching/learning process was also indicated when faculty were asked how often they use a computer for specific instructional purposes. Demonstrating specific concepts in class, encouraging students to use supplementary materials, such as Web pages, outside of class, and encouraging students to use a computer to complete assignments were three of the most frequent computer uses related to instructional purposes. However, email was reported as the instructional technology that is used the most in courses. Faculty members used email to communicate with their students and they also encouraged their students to use email for communication. This finding is consistent with the literature regarding technology use in higher education. Email was used for several reasons: (1) using email is easy, available at no charge, and provides students with exposure to technology that does not take a lot of time and effort on the part of the instructor or the student; and, (2) using email prepares students for life after college by establishing a habit of communicating that is commonplace in work environments. Overall, faculty felt that technology is helping them to better prepare students for life after college.

The influences for using instructional technology among the faculty who participated in this research were overwhelmingly intrinsically motivated. The most prominent commonality among these faculty members was that they deeply care about what and how their students learn. They started using instructional technologies primarily because they wanted to increase their teaching effectiveness and improve their instruction. They also enjoyed both learning about computers and the challenge of keeping abreast of the advancements in computing technology. Together, these factors generally accounted for why these faculty began, and continue, to incorporate instructional technologies into their teaching practices.

The lack of technology-equipped facilities, computing equipment, and incentives were discussed as obstacles by interview participants. As this study did not focus on exploring the obstacles to technology implementation, it is unclear whether simply upgrading facilities and equipment will entice more faculty to use instructional technologies. How additional incentives and rewards for teaching might further influence the faculty use of instructional technologies was also not determined. After all, the faculty who participated in this study are incorporating instructional technologies while facing these same barriers. However, faculty do want to know what uses of instructional technology are working for others and what teaching methods can really influence student learning. Faculty development staff need to introduce faculty to techniques for incorporating instructional technologies into teaching practices that are easily accomplished, do not take a lot of time, and contribute to the teaching/learning process.

All of the faculty members who were interviewed made similar comments about the lack of recognition for teaching in promotion and tenure decisions. They generally expressed that until teaching is a more important part of the tenure process, the untenured faculty probably won't integrate technology into teaching until they're personally driven. This supports Bess (1977), who suggests that it is not enough to increase external incentives to improve competence in teaching. If teaching is to be a rewarding activity for which motivation is sustained, then it must be internally motivating. Therefore, ways of increasing faculty sensitivity to the joys and pleasures of teaching need to be explored.

Conclusions

It can be concluded from the findings of the study that instructional technology will be adopted and implemented by faculty who want to improve their instruction and perceive technology use as beneficial to the teaching/learning process. Faculty who hold this perception are largely intrinsically motivated to tackle the high learning curve attributed to the instructional implementation of technology. These faculty encounter frustrations but find creative ways to circumvent the barriers because they believe they are helping to better prepare students for life in the work world.

It can also be concluded that if faculty who care about their students' educational experience and are not using technology were aware of one or two directly applicable ways that technology could enhance the teaching of their discipline, then they would also begin to incorporate instructional technologies into their teaching practices. This can be attributed to the characteristic differences between the adopter categories of the early adopter of the early majority. As discussed in Chapter Two, the early majority comprise thirty percent of the social system and want proven applications and are risk averse. However, creating conditions that will influence even more faculty to adopt the new instructional technologies also means that the University needs to adequately address the obstacles of poor facilities, lack of equipment, and lack of extrinsic incentives, including the relationship of teaching to tenure and promotion decisions.

Recommendations

Based on the findings of this study, the following are recommendations related to creating conditions within higher education that will influence more faculty to adopt the new instructional technologies:

Increase Satisfaction in Teaching

- Promote institutional goals which specifically state how teaching is connected to the achievements of the University and, in turn, society at large.
- Provide opportunities for variations in the routine of teaching, such as teaching new courses, to encourage faculty to satisfy their own growth needs.
- Provide a social context for teaching with increased opportunities for collaboration, including the teaching of interdisciplinary courses so that teaching can become as intellectually stimulating as research activities, which offer more opportunity for interdisciplinary collaboration.
- Provide faculty and graduate teaching assistants with the tools for the effective execution of teaching through a faculty development program that targets pedagogy and teaching methodologies.

- Establish a faculty development system that goes beyond addressing the mechanics of teaching to helping faculty identify how teaching can meet their innermost needs.
- Develop a teaching evaluation process that is more objective so that teaching can become equivalent to research in promotion and tenure decisions.

Encourage Instructional Technology Adoption

- Present "customized" workshops or seminars about instructional technology to meet the needs of a particular department in order to stimulate more interest by offering ideas for technology use that are discipline-specific.
- Provide ideas to faculty for using instructional technology that are simple to implement and explain the corresponding benefits and contributions to student learning.
- Encourage and reward faculty to be willing to function as a novice/co-learner/experimenter when using instructional technologies.
- Ask faculty who are already users of instructional technology to offer demonstrations for their faculty colleagues.
- Highlight the instructional uses of technology across the campus in a manner similar to how the University's research achievements are disseminated.

- Promote uses of instructional technology with print mailings that highlight one idea for technology use per mailing, such as how email can support student learning.
- Offer networking opportunities for faculty to collaborate with other faculty who are also interested in learning about and/or using instructional technologies.

Address Facilities and Equipment

- Modernize the classrooms and put the computer/projection equipment in classrooms.
- Explore the options for providing technical support throughout the University, such as colleges and/or departments employing a technology support person(s).
- Implement a University program of recurring cycles of computer hardware and software upgrades for faculty members.
- Develop and support a system to deliver equipment to the faculty or to their classroom.
- Provide a special parking permit to faculty who have to pick up equipment from equipment loan centers and need to use that equipment in a building where they cannot park with their regular parking permit.

Conduct Further Research

- Conduct research to identify the optimum modes for helping faculty recognize how teaching can address their innermost needs.
- Determine the most important incentives and rewards within the University of Tennessee, Knoxville community.
- Conduct a study to determine if faculty who are not using instructional technology are intrinsically motivated toward teaching.
- Conduct research to identify methods of increasing faculty sensitivity to the joys and pleasures of teaching.
- Conduct similar research with non-tenured faculty to determine the rewards and incentives that they deem as important.
- Benchmark the best practices within peer institutions regarding faculty adoption of instructional technologies and faculty development.

Summary

Both faculty members and students currently possess greater computer literacy and interest than ever before (Hazen, 1992). The faculty who participated in this research were technologically enthusiastic and integrated instructional technologies into their teaching in spite of numerous organizational barriers. They believed that technology use benefits their students and the teaching/learning process.

Regardless of organizational issues, it is a reality that today's technological business environment "means that educators must address the issue of technological fluency for all students" (Fulton, 1998, p. 63). The pressure to adopt new and emerging technologies is not likely to decrease; rather, it will most likely increase with dramatic speed (Cornell & Martin, 1997). Increasing the satisfaction of teaching among faculty and further reducing perceived organizational barriers can encourage more faculty to begin integrating instructional technologies within teaching practices.

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APPENDICES

Appendix A

THE UNIVERSITY OF TENNESSEE
KNOXVILLE

College of Education
Education in the Sciences, Mathematics, Research and Technology
422 Claxton Addition
Knoxville, Tennessee 37996-3400
(423) 974-5037 - Fax (423) 974-8103

November 10, 1997

Dear Faculty Member,

In April, you received a survey from an EDSMRT Unit graduate class to gather information for the Innovative Technologies Center to help assess the current state of the faculty regarding:

- Tools (hardware/software) that are being used;
- Experience with different software packages; and,
- Activities encouraging implementation of instructional technologies.

One of my students, who was involved in the development of this survey, is planning to expand upon the information it provided with a dissertation study. Since the identity of survey respondents is confidential, I am contacting you to ask if you would be willing to participate in my student's dissertation study. The study will be conducted during the first half of 1998 and will require that you complete a survey instrument. Additionally, a sample of the survey participants will be contacted for an interview.

My student and I would appreciate your response by Friday, November 21. Please complete the form below. Then, detach and place it in the enclosed pre-addressed envelope and drop it in the campus mail.

Sincerely,

John R. Ray
Professor

JRR:jad

Name: ______________________

☐ No, I do not want to participate.

☐ Yes, I will participate. If yes, please complete the information below:

Dept.: ______________________

Phone: ____________ Email: ____________

Campus Mail: ______________________

Appendix B

September 4, 1998

Dear Faculty Member,

You were initially contacted by Dr. John Ray to determine if you would participate in this dissertation study. You were selected for participation because on a previous survey, implemented in the Spring of 1997 on behalf of the Innovative Technologies Center at UTK, you indicated that you incorporate instructional technologies into teaching activities to directly support student learning.

The purpose of this research is to identify how you are integrating instructional technology into your teaching practices and to determine the primary factors that influenced you to do so. The findings from this research study can help the Innovative Technologies Center, and other faculty development professionals within higher education, work with administrators to develop innovative methods of motivating all faculty members to begin incorporating instructional technologies into teaching practices.

It will only take about 10 minutes to answer the questions on this survey. Please return it through Campus Mail by September 15, 1998.

Of course all answers are confidential. Surveys are coded with identification numbers, which will only be used to identify respondents to contact for a follow-up interview. Ten respondents will be selected to participant in a follow-up interview within a few weeks.

Thank you for your willingness to participate in this research. If you have any questions, I may be contacted at 4-9551 or email at jderco@utk.edu.

Sincerely,

Jean Derco
4th Floor, Dunford Hall
Ed.D. Candidate, Instructional Technology
University of Tennessee

DEMOGRAPHICS

(1) College or School affiliation?

____

(2) What Unit or Department? (please specify)

____

(3) Indicate your current faculty rank. (check one)

01 ☐ Professor
02 ☐ Associate Professor
03 ☐ Assistant Professor
04 ☐ Instructor

(4) Indicate your primary assignment (more than 51% of your time). (check one)

01 ☐ teaching
02 ☐ administration
03 ☐ research

(5) Indicate your years of service at UTK, including this year. (check one)

01 ☐ 5 years or less
02 ☐ 6-10 years
03 ☐ 11-15 years
04 ☐ 16-20 years
05 ☐ more than 20 years

(6) Indicate whether you are a part-time or full-time faculty member.

01 ☐ part-time
02 ☐ full-time

INSTRUCTIONAL TECHNOLOGY USE

(7) Which statement do you most agree with? (check one)

01 ☐ In my instruction, the use of a computer is supplemental.
02 ☐ The computer is critical to the functioning of my instruction.

(8) Which statement do you most agree with? (check one)

01 ☐ The use of the computer is not essential in my instruction.
02 ☐ For my teaching, the use of the computer is indispensable.

(9) Which statement do you most agree with? (check one)

01 ☐ The computer is critical to the functioning of my instruction.
02 ☐ The use of the computer is not essential in my instruction.

(10) Which statement do you most agree with? (check one)

01 ☐ For my teaching, the use of the computer is indispensable.
02 ☐ In my instruction, the use of a computer is supplemental.

(11) Which of the following computer-driven delivery methods do you use in courses you teach? (check all that apply)

01 ☐ web-based course syllabus
02 ☐ web-based materials that support course content
03 ☐ computer-based tutorials that students complete on their own
04 ☐ web-based tutorials that students complete on their own
05 ☐ web-based self assessments, quizzes, or student surveys
06 ☐ web-based discussion forums
07 ☐ computer conferencing (chat room, CUSeeMe)
08 ☐ presentation of visuals as you lecture
09 ☐ e-mail
10 ☐ other________________

(12) How often do you use the computer for each of the following instructional purposes:

Please use the following scale:
1 = frequently (more than once a week)
2 = sometimes (more than once a month)
3 = rarely (once or twice a semester)
4 = never

01	to present lecture outlines in class	1	2	3	4
02	to demonstrate specific concepts in class	1	2	3	4
03	to provide tutorials for students to individually complete	1	2	3	4
04	to demonstrate computer software in class	1	2	3	4
05	to communicate electronically with your students	1	2	3	4
06	to develop Web pages	1	2	3	4
07	to develop computer-based tutorials	1	2	3	4

(13) How often do you encourage your students to use the computer for each of the following instructional purposes:

Please use the following scale:
1 = frequently (more than once a week)
2 = sometimes (more than once a month)
3 = rarely (once or twice a semester)
4 = never

01	to communicate electronically with you or others	1	2	3	4
02	to use supplementary materials such as Web pages, computer-assisted instruction modules, or other computer-based applications outside of class	1	2	3	4
03	to complete assignments	1	2	3	4
04	to create presentations	1	2	3	4
05	to develop Web pages	1	2	3	4

(14) Toward which of the following goals is your use of computers in your course most directed? (check one)

01 ☐ for teaching about computers
02 ☐ to challenge high ability students
03 ☐ to remediate deficiencies of some students
04 ☐ for student mastery of basic skills and concepts related to your course subject matter
05 ☐ as a means of problem solving
06 ☐ as a means of communication
07 ☐ other goal ________________

(15) When using computers for instruction, what is the PRIMARY FOCUS for their use? (check one)

01 ☐ to focus on vocabulary and facts
02 ☐ to focus on problems and questions
03 ☐ to test/drill on necessary skills
04 ☐ to present information
05 ☐ for informational searches
06 ☐ to run simulations and/or games
07 ☐ for students to develop their own approach to learning
08 ☐ other focus ________________

(16) Approximately how many students benefit from your teaching practices within a semester?

01 ☐ 1-25
02 ☐ 26-50
03 ☐ 51-75
04 ☐ 76-100
05 ☐ over 100

INSTRUCTIONAL TECHNOLOGY INFLUENCES

(17) How much influence did each of the following factors have in motivating you to incorporate instructional technologies into your teaching practices? (check all that apply)

Please use the following scale:
4 = substantial influence
3 = some influence
2 = minor influence
1 = really no influence at all

01	Salary increase for incorporating technology	1	2	3	4
02	Considered towards promotion/tenure	1	2	3	4
03	Royalty paid to you on sales of materials developed by you	1	2	3	4
04	Department funding for your development time	1	2	3	4
05	University funding for your development time	1	2	3	4
06	Travel funds for technology conferences	1	2	3	4
07	Awarded external grant monies for development	1	2	3	4
08	Awarded grant/fellowship funding from the ITC	1	2	3	4
09	Copyright ownership of materials developed by you	1	2	3	4
10	Received recognition within department/division	1	2	3	4
11	Received recognition within university	1	2	3	4
12	Received national/international recognition by:				
	a. papers	1	2	3	4
	b. presentations	1	2	3	4
	c. published technology-driven materials	1	2	3	4
13	Received encouragement from senior-level administrators and department heads	1	2	3	4
14	Received positive feedback from:				
	a. colleagues	1	2	3	4
	b. students	1	2	3	4
	c. administrators	1	2	3	4
15	Received release time to develop materials	1	2	3	4
16	Received a reduced teaching, research, service load while developing technology-driven materials	1	2	3	4
17	Able to schedule an afternoon or day off a week	1	2	3	4
18	Mini-sabbatical or leave of absence to develop materials	1	2	3	4
19	Received demonstrations of instructional technology	1	2	3	4
20	Received practical training from professional educators	1	2	3	4
21	Attended workshops on instructional technology at a conference	1	2	3	4
22	Attended courses offered by the Innovative Technologies Center	1	2	3	4
23	Attended training related to specific software applications	1	2	3	4
24	Received clerical assistance	1	2	3	4
25	Received technical assistance	1	2	3	4
26	Received teaching assistance	1	2	3	4
27	Received more or better hardware	1	2	3	4
28	Received more or better software	1	2	3	4
29	Received an internet connection in your office	1	2	3	4
30	Received computer lab space	1	2	3	4
31	Received access to high-technology classrooms	1	2	3	4
32	Received personal satisfaction from intellectual stimulation	1	2	3	4
33	Received personal satisfaction of being engaged in change	1	2	3	4
34	Wanted to develop familiarity with computing technology	1	2	3	4
35	Was fascinated with the complexity of instructional technologies	1	2	3	4
36	Received pleasure/pride in becoming an expert with instructional technology	1	2	3	4
37	Enjoyed the creative activity	1	2	3	4
38	Enjoyed the challenge	1	2	3	4
39	Enjoyed contributing to student development	1	2	3	4
40	Liked the opportunity for achievement	1	2	3	4
41	Liked the opportunity for self-expression	1	2	3	4
42	Perceived sense of being valued for innovative teaching contributions	1	2	3	4
43	Wanted more opportunity to give students individual attention	1	2	3	4
44	Wanted more opportunity to work/be with students	1	2	3	4
45	Desired to improve instruction	1	2	3	4
46	Wanted to use technology to implement instructional techniques	1	2	3	4
47	Given preference regarding your teaching assignment	1	2	3	4
48	Wanted to increase effectiveness as a teacher	1	2	3	4

(18) From the list in question 18, please rank the five most influencial factors that motivated you to incorporate instructional technologies into your teaching practices. (please write in the number of each item: e.g., 48 is "Wanted to increase effectiveness as a teacher")

1) ________

2) ________

3) ________

4) ________

5) ________

CONDITIONS FOR IMPLEMENTATION

(19) When you began incorporating instructional technology into your teaching practices, which of the following factors were present/applicable: (check all that apply)

01 ☐ dissatisfaction with the status quo of teaching methods
02 ☐ computer was available
03 ☐ computer software was available
04 ☐ you had time to learn new software, create materials, etc.
05 ☐ rewards or incentives existed within your department to incorporate instructional technology
06 ☐ you had input/control over implementing instructional technology
07 ☐ you had endorsement and continuing support for instructional technology implementation within your department or division
08 ☐ your department head or dean was commited to supporting technology integration

(20) In your opinion, what was your level of computer skills and knowledge when you began to incorporate instructional technology into your teaching practices? (check one)

01 ☐ excellent
02 ☐ good
03 ☐ average
04 ☐ fair
05 ☐ poor

(21) In your opinion, what is your current level of computer skills and knowledge? (check one)

01 ☐ excellent
02 ☐ good
03 ☐ average
04 ☐ fair
05 ☐ poor

(22) How did you acquire your computing skills? (check all that apply)

01 ☐ workshops
02 ☐ self-instruction
03 ☐ tutorials
04 ☐ formal education
05 ☐ other ______________________

(23) Which of the following computing skills do you now have? (check all that apply)

01 ☐ HTML
02 ☐ HTML editor (i.e., Front Page, Pagemill, Composer, etc.)
03 ☐ JavaScript
04 ☐ Java
05 ☐ CGI/Frames
06 ☐ Multimedia Software (i.e., HyperStudio, Authorware, etc.)
07 ☐ other ______________________
08 ☐ other ______________________

(24) Ten survey respondents will be selected to participate in a one-hour interview. If you are selected, will you be available: (please check all that apply)

01 ☐ September
02 ☐ October
03 ☐ November

Thank-you for volunteering to participate in this research and complete this survey.

Please send it through Campus Mail to:

Jean Derco
4th floor, Dunford Hall

Appendix C

To: Henryk_Marcinkiewicz@ferris.edu
From: Jean Derco <jderco@utk.edu>
Subject: Re: LCU assessment help
Cc:
Bcc:
X-Attachments:

Dr. Marcinkiewicz,
Thank you for responding to my inquiry on ITFORUM. I was able to open the attachment you emailed using Microsoft Word.

I'd like to request permission to use the four items listed below in a survey I'm developing for my dissertation study. Specifically they are:

1.	*a.	In my instruction, the use of the microcomputer is supplemental.
	•b.	The microcomputer is critical to the functioning of my instruction.
2.	*a.	The use of the microcomputer is not essential in my instruction.
	•b.	For my teaching, the use of the microcomputer is indispensable.
3.	•a.	The microcomputer is critical to the functioning of my instruction.
	*b.	The use of the microcomputer is not essential in my instruction.
4.	•a.	For my teaching, the use of the microcomputer is indispensable.
	*b.	In my instruction, the use of the microcomputer is supplemental.

Note: • indicates an item of the integration level.
* indicates an item of the utilization level.

Again, thank you for your interest. I'm sorry I missed your phone call this morning. We're running some all-day faculty workshops this week, so I haven't been in the office as much as usual.

Sincerely,
Jean Derco

From: Henryk_Marcinkiewicz@ferris.edu
X-Lotus-FromDomain: FERRIS
To: Jean Derco <jderco@utk.edu>
Date: Tue, 19 May 1998 11:41:53 -0400
Subject: Re: LCU assessment help
Mime-Version: 1.0

Jean Derco

Hello. Thanks for your note. Yes, you may use the items for your study. I would appreciate it if you would inform me of the results of your study.

Regards,

Henryk Marcinkiewicz

Appendix D

Participant: ______________________
Date: ______________________

INTERVIEW GUIDE	
(1)	When did you begin using a computer?
(2)	When you first began using a computer, what did you use it for?
(3)	When did you begin using a computer for instructional purposes?
(4)	Why did you begin using a computer for instructional purposes?
(5)	Describe the ways you first began to use a computer for instructional purposes.
(6)	You indicated on the survey that [provide list of responses] were the five most influencial factors that motivated you to incorporate IT into your teaching practices. Why were each of these so influencial?
(7)	What type of professional development activities appeal to you?
(8)	Describe how you are currently integrating instructional technology (specifically a computer) into teaching practices.
(9)	Describe the ways you keep abreast of the rapid advancements in computing technologies.
(10)	Do you have any suggestions on how to increase faculty sensitivity to the joys and pleasures of teaching?

VITA

Jean Ann Derco has extensive and varied experience within the field of education. In May 1979, she received the Bachelor of Arts degree in Art Education. After teaching elementary art for a year, she returned to higher education as the Coordinator of a Non-Print Learning Resource Center at the University of Pittsburgh, where she also received the Master of Education degree in Instructional Design and Technology in August 1984. She next worked as a Media Specialist within higher education and business settings before concentrating on a career as an Instructional Designer. She has more than ten years' experience designing course materials for adult education and training, including multimedia courseware for local and internet delivery. She also has vast experience in the management of multimedia projects and development teams. She received the Doctor of Education distinction at the University of Tennessee in August 1999 with a major concentration in Instructional Technology.

She is currently the Lead Instructional Designer for the Innovative Technologies Collaborative at the University of Tennessee, where she consults with faculty who are interested in incorporating instructional technologies into their teaching practices. She is also an Adjunct Instructor in the University's College of Education.