Computer Anxiety and Innovativeness as Predictors of Technology Integration

by

Richard Keith Rogers, B.A., M.S.

A Dissertation

In

INSTRUCTIONAL TECHNOLOGY

Submitted to the Graduate Faculty
of Texas Tech University in
Partial Fulfillment of
the Requirements for
the Degree of

DOCTOR OF EDUCATION

Approved

Dr. Nancy Maushak, Chair

Dr. Steven Crooks

Dr. Arturo Olivarez

Dr. Robert Price

Fred Hartmeister
Dean of the Graduate School

December, 2007

ACKNOWLEDGEMENTS

I would first off like to thank God for giving me the talents I have. Without Him none of this would be possible.

The next group of people are probably the biggest reason I finished this dissertation. My wife and children. Kelly, I will never be able to say I love you enough or thank you enough. You have been my constant means of support and love through out this whole process. Keaton and Kadison, I want to thank you for putting up with dad and his writing his “paper.” I love you both more than you will ever know. Thanks for all the memories on and off the field/court/diamond.

My parents were/are a constant in my life. You know how much I owe you both. But I want to mention two things. The first thing is dad’s wallet. I cannot remember dad’s wallet ever being closed to anyone, especially me. “There is always enough money!” Thanks Dad. The second thing is mom’s prayers. I know no other person on the planet who prays more than my mom. Mom, I want to thank you for those prayers over me through this dissertation. You can now wear out God on some other point.

The next group of people I want to thank are my friends. I could start naming them but I know I would leave someone out. You guys know who you are. We have broken lots of bread together. We have picked up conversations that were started years ago like it was yesterday. I have been extremely blessed in my life to always have awesome friends in my life. To you, I say a sincere and huge THANK YOU!

The last and certainly not the least group is my chair, Dr. Nancy Maushak and my committee. Dr. Maushak, thank you for “pushing” me to get this done. I am in your debt. Dr. Crooks, Dr. Olivarez, and Dr. Price: Thank you for being great examples of effective teachers and for pushing me to always go the extra mile.

TABLE OF CONTENTS

ABSTRACT

The focus of this study was to determine if there existed significant relationships between the level of computer anxiety, innovativeness, and the level of technology integration in pre-service teachers. There were two questions behind this study. 1. Is there a significant relationship between computer anxiety, innovativeness, and technology integration in pre-service teachers? 2. What are the current relationships between: gender, subject area, certification level and computer anxiety and innovativeness?

The population selected for this study was composed of 200 pre-service students enrolled at a private university in the state of Texas. The sample was a sample of convenience. The design of this study was correlational and predictive. Three instruments were used to collect the data: the Innovativeness Scale (IS) introduced by Hurt, Joseph, and Cook in 1977, the Computer Anxiety Index (CAIN) developed by Montag, Maurer and Simonson in 1984, the Teaching with Technology Instrument (TTI) developed by Atkins and Vasu in 1998.

Significant relationships were found between computer anxiety, innovativeness, and technology integration. Significant differences were also found between a pre-service teacher's certification level and computer anxiety. All-Level certification seekers had higher computer anxiety than other levels of certification.

No significant differences were found between certification level and innovativeness. None were found between content area and computer anxiety or innovativeness. The differences between gender and computer anxiety and the differences between gender and innovativeness were also found to be not significant.

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

Introduction

There is an explosion of multimedia digital technology, computers, and all that goes with them in the K-12 schools through out the country. Encouraged by federal, state and local officials, schools spent an estimated $6.9 billion in 1999 on desktop computers, servers, routers, wiring, Internet access, software, and everything else involved in making modern technology available (Kleiman, 2000). Will this money bring an adequate return on investment? That is, will all this technology improve education for large numbers of students? Will it help schools produce better-prepared students? In order for the students to be technologically savvy, you must have teachers who are trained in using the technology. Technology by itself will not do anything but sit there and collect dust. We cannot expect gains in education to be contributed to technology if the teachers are not using the technology in effective ways. And how can the teachers use the technology effectively if they are not trained to do so. The technological training of future teachers takes place in both the pedagogy classes and the content area classes. This study will examine the current training of pre-service teachers to effectively use technology.

Rationale

This study will examine how effective pre-service teachers are being trained to integrate technology. With the growing number of computers and increased access to the Internet in K-12 classrooms, teachers are under pressure to acquire skills in instructional technology and to integrate these skills across the curriculum. It is generally accepted in the literature that appropriate training of teachers should include the ability to use the computer for personal use (i.e., word processing, grade book, etc.) and to integrate it into the curriculum for use by students in the classroom (Hignite & Echternacht, 1992; Hochman, Maurer & Roebuck, 1993; Wiburg, 1994; Todd, 1993; Wetzel, 1993).

Several agencies, both at the national level and at the state level, have made recommendations or laws pertaining to the skills teachers should have in the area of technology and its integration across the curriculum. The International Society for Technology in Education, ISTE, developed the National Educational Technology Standards for Teachers, NETS*T, which focus on pre-service teacher education. Technology must become an integral part of the teaching and learning process in every setting supporting the preparation of teachers. Skilled educators are educators who are skilled in the use of technology for learning (ISTE, 2007).

On a broader scale, the National Council for Accreditation of Teacher Education, NCATE, has a set of standards for teacher preparation programs. NCATE accredited colleges of education need to adhere to the standards. The NCATE standards have several major themes one of which is the emphasis on technology. NCATE standards expect faculty and students to be able to use technology successfully and have adequate access to technology. They expect:

> Studies for all teacher candidates to include knowledge and experiences with educational technology, including the use of computer and related technologies in instruction assessment, and professional productivity. … Higher education faculty are required to be knowledgeable about current practice related to the use of computers and technology and integrate them into their teaching and scholarship" (National Council for Accreditation of Teacher Education [NCATE], 2007, http://www.ncate.org/institutions/standards.asp?ch=4)

Many states have technology standards related to initial certification. In Texas, the Texas Education Agency, TEA, stated "students should be 'computer literate' before entering high school and should apply the technology application knowledge and skills in the foundation curriculum as well as enrichment areas through out the high school years" (TEA, 2000, http://www.tea.state.tx.us/technology/ta/tac.html, ¶3). The TEA developed the Texas Essential Knowledge and Skills, TEKS, for the technology applications curriculum. For the first time there is a comprehensive K-12 curriculum that focuses on teaching and learning about and with technology. Some highlights of the TEKS, are that the student will be able to

- Use software programs with audio, video, and graphics to enhance learning experiences.
- Use appropriate software, including the use of word processing and multimedia to express ideas and solve problems.
- Integrate acquired technology application skills, strategies, and use of the word processor, spreadsheet, database, telecommunication, draw, paint, and utility programs into the foundation and enrichment curricula (TEA, 2000).

So at both the national and state levels the emphasis is on the integration of technology and not so much on “which button to push” of using the technology. Therefore it is important to take a baseline measurement of schools and colleges of education and their technology training of pre-service teachers.

The theoretical basis for this study is Everett Rogers’ diffusion and adoption theory. Innovativeness is the degree to which an individual is relatively earlier in adopting new ideas (Rogers, 1971). Rogers’ categorized people into five different classes: the Innovators, the first 2.5% of people in a society to adopt an innovation, the Early Adopters, the next 13.5% to adopt an innovation, the Early Majority, the next 34% to adopt, the Late Majority, the next 34% to adopt, and the Laggards, the last 16% of individuals to adopt an innovation. Personal innovativeness was found to be a unidimensional construct measured by an underlying continuum of willingness-to-change. Organizational innovativeness is the degree to which an organization is relatively earlier in adopting new ideas (Rogers, 1971).

Computer anxiety is based on the state/trait theory of anxiety proposed by Speilberger (1972). Computer anxiety is defined as fear or apprehension felt by individuals when they used computers, or when they considered the possibility of computer utilization (Montag, Simonson, and Maurer, 1984). Individuals with computer anxiety have the following behaviors:

- Avoidance of computers and the area where they are located.
- Excessive caution when using computers.

- Negative remarks toward computers and computing.
- Attempts to shorten periods when computers are being used.

Problem Statement

The focus of this study was to determine if significant relationships exist between the amount of computer anxiety pre-service teachers exhibit, their level of innovativeness, and their level of technology integration. Teachers are under a great deal of pressure to acquire skills in instructional technology and to integrate these skills across the curriculum. Although the number of computers and access to the Internet in K-12 classrooms has grown intensely over the last decade, there seems to be some barriers that prevent the majority of teachers from using computers in their classrooms.

Research Questions

Questions specific to this study are:

1. Is there a significant relationship between computer anxiety, innovativeness, and technology integration in pre-service teachers?
2. What are the current relationships between: gender, subject area, certification level, and computer anxiety and innovativeness?

Hypotheses

The following null hypotheses are derivative of the research questions.

H_{o1}: There is no significant relationship between computer anxiety, innovativeness, and technology integration.

H_{o2}: There is no significant relationship between gender and computer anxiety or innovativeness.

H_{o3}: There is no significant relationship between subject area and computer anxiety or innovativeness.

H_{o4}: There is no significant relationship between certification level and computer anxiety or innovativeness.

Significance of Study

This study proposes to connect technology integration with computer anxiety and innovativeness in pre-service teachers. All of these have been studied in in-service teacher populations. This study will look at a different population of pre-service teachers. The rationale behind the study is that if teacher educators can start the technology integration learning in the pre-service time then when those pre-service teachers become in-service teachers they will not have to start at the beginning of the integration curve. They will already be on the learning curve of integration and can have in-service training that is more meaningful. They can possible start integrating technology in their first year or two of teaching. Instead of throwing those first year teachers to the wolves they can be trained to think, teach, and learn with technology at a more mature level. The results of this study will help colleges of education to be able to use their resources better when training their pre-service teachers about technology integration. The faculty can focus on the variables that influence integration the greatest.

Limitations of this Study

This study focused on pre-services teachers at a private university in the state of Texas. Therefore, the results may not be generalizable to pre-service teachers of other states. Since most private institutions usually have smaller teacher-student ratios, the results may not be generalizable to public institutions. Sampling methods should involve a defined population from which a sample is randomly selected. When the researcher selects samples on the basis of suitability to the study or because it is convenient, the process is convenience sampling (Gall, Borg, & Gall, 1996). The population selected for this study is composed of pre-service students enrolled at a private university in the state of Texas. The sample obtained is a convenience sample. This will restrict the generalizibility of this study. Most samples of convenience are homogeneous with respect to characteristics that affect generalizibility. Since this study was limited to one university with its methods of training teachers it may not extend to other universities with their methods for training teachers.

This study will employ instruments that use Likert-type scales. A problem associated with Likert-type scales used for instruments is the assumption that participants consider all options provided and select the most appropriate. Studies have shown that students with low motivation tend to choose the first option that is acceptable (Weng & Cheng, 2000). These instruments will be surveys. The respondents will self-report. This may cause some respondents to not answer some questions. The questions on this study's surveys are not of a threatening or personal nature so that should not be a problem.

Another limitation is the fact that the study is looking at complex issues as computer anxiety, innovativeness, and technology integration with one time surveys. These constructs are complex and hard to measure.

Assumptions

The focus of this study is to examine the relationship between a pre-service teacher's level of computer anxiety, their level of innovativeness, and their level of technology integration. The researcher has made the assumption that these three variables are connected. It just seems a natural connection that how innovative a person is would be tied to how much they integrate technology. And how computer anxiety a person had would be detrimental to how much technology they would integrate. The technology integration instrument was developed to measure how much technology integration there is in the in-service teachers' teaching. This study will extend the instrument to pre-service teachers. This study's population of participants has quite a bit of field experience and thus opportunity to integrate technology in their teaching. More than half of the population was just completing their semester of student teaching. They had been in a real classroom teaching for the past two and half months. The student teachers also had completed their methods block where they teach a two week unit in an actual class. The rest of the population had ample classroom experience. They all had done some “tutoring” in an actual classroom. This “tutoring” is 40 clock hours where the pre-service teacher is acting like an aid to the actual teacher. Their tutoring can be in the form of actual tutoring of students. It can be grading papers for the teacher. It can be actual teaching of the class. Most of the participants also had also completed their methods block the semester of data gathering. This methods block is a two week unit where the pre-service teacher goes into an actual classroom and teaches a specific unit for two weeks. The early-childhood to fourth grade certification level seekers have also had to take a computer course entitled “Instructional Technology.” In this class the students are required to make lesson plans that are technology rich. They have to create a self-contained, stand-alone PowerPoint lesson. They also have to create a multimedia website that teaches a complete lesson. At this study’s location, the pre-service teachers have ample exposure to technology being used and being required in an instructional environment. One of the classrooms where the pre-service teachers take classes is an Interactive Television room, ITV. Through this room the instructor can connect to other ITV rooms across the globe. Some of the student teachers are located a considerable distance from the home campus. The faculty will use the ITV room to observe them student teaching without having the expense of traveling to the actual destination. The faculty also has access to rooms equipped with Smart Boards. Smart Boards are electronic white boards that behave like huge touch screens. You can “write” on the white board and save your work to the computer. You can pull up Excel spreadsheets and input data and do calculations. You can play solitaire while only touching the Smart Board. So it is not a big stretch taking an instrument developed for in-service teachers and applying it to pre-service teachers. More than half of the population will have change titles from pre-service to in-service in as little as 3 months, graduation in May to first day on job in August.

Definition of Terms

This study incorporates the following terms:

- computer anxiety – the fear or apprehension felt by individuals when they used computers, or when they considered the possibility of computer utilization
- information technology - includes traditional computer applications (CAI, tools) and communication tools such as e-mail and www resources
- innovativeness - the degree to which an individual is relatively earlier in adopting new ideas
- organizational innovativeness - the degree to which an organization is relatively earlier in adopting new ideas
- pre-service teachers - students in a teacher education preparation program
- Rogers' Adopter Categories
    - Innovators, the first 2.5% of people in a society to adopt an innovation
    - Early Adopters, the next 13.5% to adopt an innovation
    - Early Majority, the next 34% to adopt an innovation
    - Late Majority, the next 34% to adopt an innovation
    - Laggards, the last 16% of individuals to adopt an innovation.
- teacher training - instruction that can include pre-service or in-service teachers

- technology integration education - instruction in how to use information technology to enhance classroom curricula

CHAPTER TWO

LITERATURE REVIEW

Introduction

Now that technology is available on most campuses and even given away on some (The Campus Computing Project, 2001) the integration of this technology has become more and more important. Most researchers agree that more technology training is needed for teachers. Numerous suggestions exist in the literature regarding the content of the training and the methods for delivering the training. The U.S. Congress (1995) said that all teachers should be confident about applying technology appropriately. The foundation for that confidence starts during their pre-service training. This chapter is a review of literature on (a) the history of teacher preparation, (b) educational technology for pre-service teachers, (c) technology integration, (d) competency model, (e) Rogers' diffusion, adoption, and innovativeness theory, (f) computer anxiety, and (g) the future of teacher preparation. These literatures were chosen because the study focuses on pre-service teacher preparation and technology integration. They will help to answer the following research questions.

Questions specific to this study are:

1. Is there a significant relationship between computer anxiety, innovativeness, and technology integration in pre-service teachers?

2. What are the current relationships between: gender, subject area, certification level and computer anxiety and innovativeness?

This study examined pre-service teachers' level of technology integration by examining their responses on some survey instruments.

History of Teacher Preparation

Teacher education has not changed much in the past 50 years and therefore unlikely to do so in the next decade (Navarro and Natalicio, 1999). Historically there have been three discrete parts to teacher preparation: broad based B.A. degree with some education courses near the end, student teacher experience, and the "welcome to the real world" first year of teaching. The gaps between these three areas have been shrinking and some connections have been made in the past few years. Education has seen the teaching of computers evolve over the last 20 years. In the 1980's most teaching was concerned with computer science topics, such as operating systems and programming. Computers were used for drill and practice and/or electronic flash cards. In the 1990's when research showed technology had the greatest impact on student achievement when used in a collaborative, student-centered environment, the focus shifted to curriculum integration and the use of computers and technology as tools to support learning (McCoy, 1999). Most schools of education offer courses whose purpose is to prepare students to use information technologies. Seeing technology used in a few university courses is insufficient for preparing knowledgeable consumers of technology. Pre-service teachers must have many models of effective technology use, because they usually do not see advanced technologies used in their own K-12 education (Hunt, 1995). Indeed, Electronic Learning surveyed the 15 largest U.S. schools of education and concluded that, "technology does not permeate a student's typical pre-service education experience, and that is a major impediment to technology use once they become teachers" (pg. 4) (Wetzel, 1993). Just putting computers into the old school system is like transplanting an organ. The host body and the organ must have the same chemistry. If the support system is different the host will reject it (Hope, 1997). A problem is that the educators of pre-service teachers are products of the old system and therefore tend to teach via the old system. For that pattern to be broken, enough educators are going to have to change the way they teach. This should not be that big of a change due to the fact that recent high school graduates are so use to technology in their lives and expect it to be used. One example is that pre-kindergarteners are inserting cd-roms and running the program without assistance (Taylor and Stuhlmann, 1998). Teacher preparation programs must deliver teachers who can effectively teach to these children.

Schools, colleges and departments of education are considered to be lagging behind in meeting the needs of new teachers to develop technological competencies (Walters, 1992). Critiques of teacher education's performance in training new teachers generally fall into three areas. One, teacher educators do not sufficiently model appropriate use of computers for instructional purposes, either in courses or field experiences. Two, programs do not typically incorporate technology across the curriculum. Finally, the instruction provided to pre-service teachers tend to focus more on the older and simpler instructional applications (e.g., computer assisted instruction, word processing) and less on exposure to and practice with newer, more sophisticated tools (e.g., electronic networks, integrated media, problem-solving applications) which support development of students' higher-order thinking and problem solving (Abdal-Haqq, 1995). Pre-service field experiences, known as "classroom observations", "practice teaching," or "student teaching," are critical components in teacher preparation programs. It is in these experiences that education majors become acquainted with the realities of life in elementary and secondary classrooms, look for real-world connections to content presented in their university foundations and teaching method classes, and develop their instructional and managerial skills (Hunt, 1995).

Educational Technology for Pre-service Teachers

In recent years, there has been growing recognition that changes in teacher education programs are needed to support education reform efforts, including integration of technology into the curriculum. To adequately train teachers to use technology, it must be integrated into all aspects of the teacher preparation program (Goodlad, 1994). Pre-service students have few models provided at the university level. While many colleges of education require preliminary courses on basic computer literacy too few teacher education programs have faculty who are modeling instructional methods that integrate computer technology (Handler, 1993; OTA, 1995, Shelley, et al., 2004). Even after entering the classroom, faculty professional development features one-shot workshops with limited support and follow-up for integration (Hargreaves, 2005). Teacher training programs must recognize the need for training in technology, taught across the curriculum. While scholars have advocated integrating technology in both methods and foundation courses (Berger & Carlson, 1988; Moursund, 2001; Brush and Bitter, 2000). Coursework needs to be redesigned to integrate technology within courses so that computers are used in relevant contexts (Shelley and et al., 2004). Educational reformers have long noted that teachers teach as they were taught (Goldman, Barron, and Witherspoon, 1991). Shelley (2004) pointed out that they also tend to use the technologies they have learned by or observed being modeled in their college classrooms. When people adopt a new technology, they tend to use it in the manner they used the technology they were replacing (McCoy, 1999). Wetzel (1996) indicated that personal use of technology did not transfer to integration of technology into the classroom. For technology to be integrated into teacher preparation programs, it must be a systematic effort which included collaboration by all parties: administrators, faculty, support personnel and students (McCoy, 1999).

Handler and Pigott (1994), conducted a study with 133 teacher education program graduates to determine their perceptions of the "purpose of intentional pre-service computer experiences, the value of these experiences to graduates' professional preparation, and the ways in which they are currently using computers in their classrooms" (p. 386). Significant differences in the graduates' perceptions of their ability to use computers for instruction were found between those students who had and had not seen computers used in their methods classes ($p=.0134$), those who had and had not observed computers used in their field placements ($p=.0040$), and those who had and had not actually used computers for instruction during their student teaching experience (p=.02).

Over the past decade there has been a shift in the learning process from isolated individual work to collaborative work groups. In this new environment, knowledge is acquired from exploration and critical examination of information rather than primarily from teachers and textbooks. Technology, when used as a tool, has the ability to help students solve problems, think independently, and collaborate with others and plays an important role in the new methods of teaching and learning (OTA, 1988; Confrey, Sabelli and Sheingold, 2002; McCoy, 1999). Improving pre-service preparation will require teacher educators who model appropriate instructional use of computers, integrate technology across the pre-service curriculum, and exposure to and practice with newer computer-based tools (Abdal-Haqq, 1995). Showers (1995) and colleagues have argued that teacher development should be innovation-related and continuous over several sessions. One model to help achieve this is the practice-feedback-coaching model. It emphasizes the need for the learner to be shown how the application works, be provided an opportunity to practice with the application, and then receive follow-up support to allow for further practice and feedback (Smith & O'Bannon, 1999). There are several techniques to help achieve technology competency. One is the require use of email to turn in homework, papers, questions, etc. Some other devices are for the students to get assignments online or use electronic reserves. Some other pedagogy could be the required use and modeling of presentation software and the inclusion of spreadsheet and graphing assignments (Hansen, Harris, Borenstein, and Curran, 1997).

There is the question of where and how education students acquire their technology skills. The number of hours of information-technology instruction integrated into other courses has been shown to more effective than the number of formal information-technology hours. This supports the contention that, to increase technology proficiency of new teachers, training institutions should increase technology integration in their own academic programs (Milken/ISTE, 2000). Byrum and Cashman (1993) and Thompson, Schmidt, and Davis (2003) propose that it be mandatory for pre-service teachers to have educational experiences, through out their preparation programs, that show how computers and related technologies can be used for instruction and as learning tools in order to become competent technology using teachers. For this to occur, university faculty must change from traditional methods of delivery to methods and tools that establish new learning environments enriched and supported by technology (El-Amin, Fordham, Hammon, O'Bannon, Vannetta, and Gruber, 2002).

"Typically, professors use software tools, like word processors, but rarely use technology for teaching or require students to use it for assessment" (Schrum, Skeele, & Grant, 2002, p. 258). McKenzie (2001) criticized the standard approach of higher education institutions and schools. The newest technology is bought and made available to the faculty. Hagenson & Castle (2003) argue that "if higher education wants to survive in the expansion of technology, then it must be prepared and prepare its faculty to implement the new technologies within their classrooms" (p. 2). Educators in teacher education have the additional challenge of preparing pre-service teachers to integrate technology in their future classrooms. Faculty should use instructional technology to help their students learn the material and meet the objectives of the course (Cagle & Hornick, 2001). Technology is used less frequently in instruction and more frequently in administration and research (Zhao & Cziko, 2001). This is due to the fact that the integration of technology challenges the thinking “This is how we have always done it!” (Pope, Hare, & Howard, 2002).

This study’s college of education currently uses the competency model in their education program. They are currently looking at making some changes in the future. The results of this study will help guide them in their planning and goal setting.

Technology Integration

The call for teacher educators to integrate technology into pre-service teacher education is not new. MacArthur (1996) found that special education faculty members who were preparing teachers for the K-12 environment lacked the skills and knowledge to teach their students about technology. Researchers have argued that pre-service technology training must become a priority if we are to have teachers who are both comfortable and competent with respect to the use of technology in their teaching (Bausch and Hasselbring, 2004; Office of Technology Assessment (OTA), 1995; Hadley and Sheingold, 1993; Wetzel, 1993). The most common reasons given for the low level of computer use in schools are limited access to equipment and lack of training (Bosch and Cardinale, 1993). The OTA (1995) surveyed graduates and found that more than half reported being prepared to utilize drill and practice, tutorials, games, and word processing. But less that 10% felt competent to use multimedia and presentation packages, electronic network collaboration capabilities, or problem-solving applications. The focus of some courses becomes one of acquiring basic skills using basic tools rather than purposeful integration of technology in the curriculum content areas. Even with carefully designed computer courses in schools of education only 29% of education majors felt prepared to teach with computers (US Congress, 1988). While this study is nearly 20 years old, progress to prepare America's pre-service teachers to integrate technology into curriculum content areas has not been fully realized (Shelley and et. al., 2004). Shelley found that pre-service teachers tend to teach the curriculum by using technologies they have learned or observed being modeled in their college classrooms (2004). Wetzel (1993) found that most college professors simply do not use technology, despite accepting competencies indicating that education majors should learn how to use computer tools for effective instruction.

The technology staff development model was developed to address the need to find out how much teachers understand about technology and how much they use it in the classroom. It took into account the concern of administrators that teachers do not use technology in the classroom well, if at all. And the concern that staff development is not usually immediately transferred to the classroom. It emphasizes three areas: writing and communication skills, information access and management, and construction and productivity (Atkins and Vasu, 2000). The model has three goals for staff development. The first goal is that teachers will use technology to plan and execute learning that is appropriate for the curriculum, relevant to the learners, and based on principles of effective teaching and learning. The second goal is that teachers will use media and technology where appropriate and support learner expression with a variety of media-communication tools. The third goal is that teachers will locate, evaluate, and select appropriate technology resources for the content area and target audience. The Teaching with Technology Instrument (TTI) was developed to assess how much teachers know about and use technology in the classroom (Atkins, 1997). This study will apply that instrument to pre-service teachers.

Several studies have shown that a stand-alone course only develops basic computer skills and does not prepare educators to utilize technology in a variety of instructional settings. These studies have recommended the infusion of technology throughout education courses and the provision of technology-rich field placements (Handler, 1993; OTA, 1995; Wetzel, 1993). Taylor and Thomas (1994) argued that technology must become "an essential part of America's teacher preparation program" if it is to be an integral part of the K-12 education (pg. 9). Hadley and Sheingold (1993) estimated that it takes between 5 and 6 years for teachers to master the use of computers and to find ways to incorporate CAI into their practices. If pre-service teachers were well prepared, this time period would decrease or be started in their college years. Currently distance education and computer assisted instruction affect only a small proportion of students in teacher training institutions (Milken/ISTE, 2000).

Bosch and Cardinale (1993) report that limited access to equipment and lack of training as the two most common reasons for low computer use in schools. A number of studies reveal that both veteran and new teachers feel inadequately prepared to use computers in their classrooms (American Association of College for Teacher Education, 1987; Bosch & Cardinale, 1993; Topp, et. al, 1995). The OTA (1995) found that while more than half of graduates report being able to utilize drill and practice, tutorials, games, and word processing; less than 10% felt competent to use multimedia and presentation packages, electronic network collaboration or problem solving applications.

For years research has noted gender bias with respect to learning technologies (Cockburn & Ormrod, 1993). Campbell notes that "Female learning may occur first and foremost in relation to other human beings and living things, whereas males may arrive at an understanding in relation to things as symbols, a framework on which much computer-based technology is based" (2000, p. 133). Gahn comments on gender bias early in the popularity of the Internet. The point was made that "… the internet is male territory. Considering [that] its roots are sunk deep in academic and the military-industrial complex that's hardly surprising" (1995, p. 3). Cooper (2006) studied the digital divide based on gender. He concludes that females are at a disadvantage relative to men when learning about computers or learning other material with the aid of computer-assisted software. He found that the digital divide is fundamentally a problem of computer anxiety. Liff and Shepherd (2004) looked at the gender digital divide also. They found the gender divide to be closing among those using the Internet and other information and communication technologies. They report that in 2002 data from the USA showed no gender difference in Internet use. They also report that in China during the years from 1997 to 2002 that the percentage of female Internet users went from 12 to 39%. They argue that the Internet is being shaped by the early adopters and that the later majority will have to learn how to use a tool that may or may not fit their learning styles.

The inability to stay current with the technology or in other words lack of time is an obstacle for technology integration. Beginning teachers embark on their new teaching assignments and expect to apply newly acquired computer knowledge and skills in their classrooms. Yet the complexities of surviving the first year teaching with new content, materials, resources, and classroom management leaves little time and energy for using computers in teaching and learning (Novak & Knowles, 1991; Shelley, et. al, 1999). This first year experience is not likely to change. Everyone's rookie year at a new job leaves little time to "think out of the box." Most of your time is spent just learning the ropes of the new job.

The Milken/ISTE report of 2000 found that the technology infrastructure of education has increased more quickly than schools of education ability to incorporate new tools into teaching and learning. It reports the infrastructure as "adequate" but many faculty do not model technology use and certain activities, Internet sessions and computer presentations, are not possible in a large number of classrooms. But they also mention deficiencies in their technology facilities as a limitation to their integration plans. They conclude that it may not be the infrastructure but a lack of professional development or course-development time. Most institutions that prepare teachers have not invested significant resources and time into teaching teachers how to teach with technology (OTA, 1995). Hancock (1992) makes the comment that people are reluctant to trade the time-tested and proven methods for alternatives that have not proven to be superior to what teachers presently do to accomplish tasks and meet student objectives. This researcher would argue that those “time-tested and proven methods” were at some time looked at with the same disdain as technology is today.

Barron, Kemker, Harmes, and Kalaydjian (2003) found that high school science teachers used technology more than other subject area teachers in secondary education. They also found that elementary school educators were nearly twice as likely to use computers as a decision-making or problem-solving tool as high school teachers. They also used technology as communication more than both middle school and high school teachers.

Competency Model

The competency model is used in teacher education programs through out the United States. This approach makes use of a basic course to introduce pre-service teachers to basic technologies. Specific course content, titles, departments which teach the course and pedagogies used in the course vary from place to place. However all courses tend to emphasize topics relating to computer use in K-12 classrooms. This study’s department of education current course is called Educational Software Applications. It is designed for K-4 education majors. The administration also puts some non-traditional non-education majors in this class. The catalog describes the course as: “A software application course for educators. Students will learn to select, manipulate, maintain, evaluate, and manage application software and educational software for use in content areas" (LCU Catalog, pg. 153). The current syllabus has the following objectives:

- Demonstrate the ability to operate programs using Windows-based OS.
- Understand how to enter and/or relate the use of computer software into the planned curriculum
- Perform basic word processing, spreadsheet, and database functions using Microsoft Office XP(2002).
- Know the basic parts, characteristics, and operations of a microcomputer.
- Demonstrate simple troubleshooting techniques.
- Evaluate and plan for teaching in the content area.
- Become proficient in the use of electronic mail w/attachments.

This class is a pre-requisite for a course entitled "Instructional Technology." The 4-8 education major and the 8-12 education major do not have such a course. They are still taking the general computer class that is required for all degrees at this study's university.

Integration Model

This study's department of education is looking at moving toward the integration model as can be seen from some of the objectives of the aforementioned syllabus. The results of this study will help them in making the decision. Bialo and Sivin-Kachala found that technology rich environments had a positive effect on achievement in all major subject areas. Also student's attitudes toward learning and their self-concept improved when computers were used for instruction (1996). These findings lead teacher training programs to recognize the need for training in technology, taught across the curriculum. For over the last decade scholars have advocated integrating technology in both methods and foundation courses (Berger & Carlson, 1988; Moursund, 1996; Brush and Bitter, 2000). Most faculty do not model use of information technology skills in teaching (Milken/ISTE, 2000). Pre-service teachers learn to teach the curriculum by using technologies by which they have learned or ones they have observed modeled in their college classrooms (Shelley and et al., 2004). As Novak & Knowles (1991) said, "Teacher educators will do well to model the use of computers in instruction so as to provide realistic examples from which these future teachers can later build" (pg. 49). In order to improve the modeling of technology integration in education courses, faculty should do the following: model technology integration themselves, require assignments that integrate technology, and have students develop lessons that integrate technology (Beyerbach and Vannata, 1999). Beyerbach and Vannata (1999) also found that students perceive technology focus as an "add-on" to the class that lacked connection to the course, instructor, and assignments. Stand-alone information technology coursework does not correlate well with technology skills and the ability to integrate technology into teaching (Milken/ISTE, 2000). Moving technology instruction to an integrated model would take a substantial effort by all those involved with teacher preparation. It would require faculty to model technology use and to increase their personal level of technology use in teaching.

Rogers Diffusion, Adoption, and Innovativeness Theory

Everett Rogers (1971) defines diffusion as the process by which an innovation is communicated through certain channels overtime among the members of a social system. The definition contains 4 elements that are present in the diffusion of innovation process. (1) An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption. (2) Communication channels are the means by which messages get from one individual to another. (3) Time has three factors: innovation decision time, relative time with which an innovation is adopted by an individual or group, and the innovation's rate of adoption. (4) The social system is a set of interrelated units that are engaged in joint problem solving to accomplish a common goal.

The original diffusion research was done as early as 1903 by French sociologist Gabriel Tarde who plotted the original s-shaped diffusion curve. Tarde's 1903 s-shaped curve is of importance because "most innovations have an s-shaped rate of adoption" (Rogers, 1971). The variance lies in the slope of the s. The "s" is steeper when the rate of adoption is fast and a more gradual slope when it is slow. The rate of adoption has become an important area of research to sociologists and advertisers.

In 1943, 2 sociologists Bryce Ryan and Neal Gross did a study of Iowa farmers and their adoption of hybrid corn seed. The adoption rate of the farmers was similar to the s-curve graphed by Tarde 40 years earlier. They classified the Iowa farmers into 5 segments: innovators, early adopters, early majority, late majority, and laggards. Rogers identified several characteristics for each of the 5 segments (1971). The innovators are venturesome, have a desire for the rash and daring. They can withstand financial loss from an unprofitable innovation. They have the ability to understand complex technical knowledge. And they have the ability to cope with a high degree of uncertainty. Early adopters are an integral part of the social system. They serve as role models for other members of the society. They are successful and respected by their peers. They hold the biggest percentage of opinion leadership. The early majority is one of the largest segments of the population, about one-third. They seldom hold positions of leadership opinion but frequently interact with their peers. They deliberate some time before adopting a new idea. The late majority is about the same size as the early majority. They are skeptical and cautious. They will adopt an innovation due to economic necessity or peer pressure. They are unwilling to risk scarce resources. The laggards are the last sixteen percent of the population. They hold on to traditional values. They are usually isolated. Their point of reference is in the past. They have very limited resources. Sahin and Thompson (2006) studied the faculty of the Anatolian university in Turkey. They found the faculty fell into Rogers' categories nicely. They exhibited the same characteristics that Rogers' theory says they should.

Rogers breaks the adoption process down into five stages: (1) awareness or knowledge, (2) interest or persuasion, (3) evaluation or decision, (4) trial or implementation, and (5) adoption or confirmation. In the awareness stage an individual is exposed to the innovation but doesn't have the complete picture. At the interest stage the individual becomes interested in the new idea and seeks more information. In the evaluation stage, the individual mentally applies the innovation to his present and anticipated future situation, and then decided whether or not to try it. During the trial stage the individual makes full use of the innovation. And at the adoption stage the individual decides to continue the full use of the innovation (Rogers, 1971, 2004).

A wide range of areas has used Rogers as a model. Stuart (2000) and Dooley (1999) mention several of these areas as political science, communications, history, public health, economics, technology, and education. Medlin (2001) and Parisot (1995) have suggested that Rogers' diffusion of innovations theory is the most appropriate for the investigation of technology in all educational environments. Even Rogers (2004) uses the terms "innovation" and "technology" as synonyms.

Computer Anxiety

Many pre-service teachers view computing as stressful and are anxious about using computers in teaching. They also fear that computers will interfere with teacher-student relationship. Williams (2006) found significant differences between teachers' attitudes as related to their teaching level but not with their teaching fields. They see computers as less relevant for schools and more relevant for problem solving and work environments (Laffey, et. al, 1998). Bosch and Cardinale (1993) surveyed 186 pre-service teachers and 25 cooperating teachers. Seventy-one percent (71%) of the pre-service teachers reported that neither they nor their teachers ever used a computer for instruction. Out of the 25 cooperating teachers, 15 reported that student teachers need to see "real teaching" not computers. Teachers and teacher education faculty experience difficulty in developing a vision of a technology-rich classroom (Beyerbach and Vannata, 1999).

King (2002) used the computer-anxiety index, the CAIN, in a study. His aim was to test its unidimensionality. He tested it with 910 seventh, ninth, and eleventh grade students. He found that the 7^{th} and 9^{th} graders were measurably different in computer anxiety than the 11^{th} graders. He found a small difference in computer anxiety when it came to gender. He found the males to be a bit more anxious than the females.

Wood et al. (2005) studied 54 elementary and secondary teachers in focus group discussions to examine the barriers and supports to computer integration. They found that familiarity with computers predicted greater comfort with technology and greater comfort was related to greater integration in the classroom. Rovai and Childress (2003) studied computer anxiety among pre-service teachers. They say that "Although teachers may believe that computers will lead to improved teaching and learning, they may choose not use this technology if they have low confidence in their abilities to use computers (low computer self-efficacy), or if they fear computers (computer anxiety), or if they simply do not like computers" (pg. 226). Their results indicated that computer confidence, computer knowledge, and trait anxiety were the best predictors of retained computer anxiety. They suggest that any effort to treat retained computer anxiety in pre-service teachers should focus on building computer confidence and expanding the students' knowledge of computers.

Christiansen (2002) studied sixty kindergarten through fifth grade teachers in north Texas. She found that a teacher's attitude toward computers is an important factor affecting the quality of a student's experience with computers. She cites Collis et al. (1996) and says that the teachers are the gatekeepers in educational innovations and that adequate training of teachers is a key factor in technology integration. Her results of her study showed that teachers who received computer integration education tended to exhibit more positive attitudes toward technology than those teachers who did not receive computer integration education. She proposed a model that teacher training would influence teacher use which in turn would influence student computer importance. She also found that the greater positive perception of computer importance among the students raised the teachers' computer anxiety. The conclusion she draws is that they need ongoing education that will keep their anxiety down as the skill level of their student's increases.

Hong and Koh (2002) studied computer anxiety among two hundred rural secondary teachers in Malaysia. Over all they found the teachers to have low computer anxiety and positive attitudes toward computers. They found that females to be more anxious than male teachers when it came to computer hardware.

Future of Teacher Preparation

Teacher preparation programs in the state of Texas currently have to deal with some decisions made by the State Board for Educator Certification (SBEC). At its November 7, 2003 meeting, SBEC voted to allow college graduates with no prior experience or training to become high school teachers through a proposed back door route to certification (SBEC, 2007). This will force the current 115 university teacher education and alternative certification programs statewide to do some retooling. What the future of teacher preparation programs will look like is any one's guess but one thing is certain, technology training and integration will be a big part. Teacher candidates will use electronic portfolios to track student progress, email for communication between students, their parents, and the teachers (Navarro and Natalicio, 1999). Textbooks will no longer be the dominant source of knowledge in the classroom. There are several sources of pressure to produce K-12 teachers that can utilize instructional technology. The first source is to provide "real world" instruction that models contemporary and future social and economic demands (Thornburg, 1992). It is obvious that in the 21^{st} century, almost all jobs will involve computers in some way. It is crucial for teachers to have appropriate technology training during their pre-service education, if they are to meet their students' need for the next century (Dusick and Yildirim, 2000). Other sources of pressure are the guidelines and mandates from federal, state, district and professional bodies (Ramirez and Bell, 1994; Taylor and Thomas, 1994; Widmer, 1994). Some of these guidelines include: providing technology using sites for field placements, placing student teachers with cooperating teachers who have expertise with technology, encouraging computer-mediated communication among student teachers, cooperating teachers, and university supervisors (Hunt, 1995).

Chapter Summary

The goal of this study was to examine pre-service teachers' technology training, their concerns, knowledge, and integration of technology. This chapter was a review of literature on (a) the history of teacher preparation, (b) educational technology for pre-service teachers, (c) technology integration, (d) competency model, (e) Rogers' diffusion, adoption, and innovativeness theory, (f) computer anxiety, and (g) the future of teacher preparation.

CHAPTER THREE

METHODOLOGY

Introduction

The focus of this study was to determine if there existed significant relationships between the level of computer anxiety, innovativeness, and the level of technology integration in pre-service teachers. Teachers are under a great deal of pressure to acquire skills in instructional technology and to integrate these skills across the curriculum. Although the number of computers and access to the Internet in K-12 classrooms has grown intensely over the last decade, there seems to be some barriers that prevent the majority of teachers from using computers in their classrooms.

Research Questions

Questions specific to this study are:

1. Is there a significant relationship between computer anxiety, innovativeness, and technology integration in pre-service teachers?
2. What are the current relationships between: gender, subject area, certification level and computer anxiety and innovativeness?

Hypotheses

The following null hypotheses are derivative of the research questions.

H_{o1}: There is no significant relationship between computer anxiety, innovativeness, and technology integration.

H_{o2}: There is no significant relationship between gender and computer anxiety or innovativeness.

H_{o3}: There is no significant relationship between subject area and computer anxiety or innovativeness.

H_{o4}: There is no significant relationship between certification level and computer anxiety or innovativeness.

Research design

The design of this study was causal-comparative and correlational. Gall, Borg, and Gall(1996) state that causal-comparative research seeks to discover possible causes and effects of a behavior pattern. The main reason to do the causal-comparative method is that many of the cause-and-effect relationships in education are not amenable to experimental manipulation. Causal-comparative and correlational are closely related. Correlation coefficients will give the researcher the degree and direction of the relationship between two or more variables. The correlational method is used for exploration of the relationships between variables and to predict scores on one variable from subjects' scores on other variables. This study will use a survey design. Surveys are often conducted because it is the only way to get the information. Even when the information could be gathered by other means, surveys are easier, quicker, and less expensive. The purpose of this research is to understand human behavior and possibly create or modify the training of pre-service teachers (Alreck and Settle, 1995).

Instrumentation

There are three main variables: individual innovativeness, computer anxiety, and technology integration. Individual innovativeness will be measured using the innovativeness scale (IS). Computer anxiety will be measured by the CAIN, computer anxiety index. The Teaching with Technology Instrument, TTI, will be used to measure technology integration. The demographic variables will be collected by a fourth instrument.

The Innovativeness Scale (IS) was first introduced by Hurt, Joseph, and Cook (1977). They found innovativeness to be normally distributed. The IS can be found in appendix A. The IS is a 20-item measure using a 7-point Likert-type scale. The more innovated an individual believes they are the higher a score on the IS they will have. An example question is: I frequently improvise methods for solving a problem when the answer is not apparent. An innovative person will score a 6 or 7 on each item. They reported that the IS had a mean of 102, a standard deviation of 14 and range of scores from a low of 22 to a high of 139, the actual range is from 20 to 140. The IS had a reliability of .94. They also reported the procedure they used to determine the construct and predictive validity. It was reported that the IS was highly valid. They found that the IS was unidimensional. Their population was 231 college students enrolled in a communication course and 431 public school teachers. Pallister and Foxall (1998) studied the innovativeness scale using a population of 308 British consumers. They also found a high reliability of .88 and high validity. Simonson (2000) administered the IS to 1693 teachers, administrators, and college students during 1997. He found the mean to be 105.1 with standard deviation of 14.46. The IS was found to have an internal consistency reliability of .88. For this study the Innovativeness Scale was used as originally written, there were no changes made in the wording of the questions. This study's population was pre-service teachers. This matches nicely with the population of Hurt et al. (1977) and Simonson (2000). This researcher ran factor analysis to determine if there were any cofactors in the scale. The unidimensionality of the IS was confirmed. Therefore the IS is measuring a single construct of innovativeness. The results of this study were coded according to the findings of Hurt (1977) and Simonson (2000).

The CAIN was developed by Maurer and Simonson in 1984. They were interested in developing a measure of the trait of computer anxiety and not the state of computer anxiety. This study used the terminology computer anxiety because that is the wording the authors of the computer anxiety survey used. On the instrument it self they use the terminology computer opinion to avoid answer bias. A better wording might be computer comfort. The CAIN can be found in appendix B. It is a 26-item measure using a 6-point Likert-type scale. The scores can run from a low value of 26 (the highest level of computer anxiety) to a high value of 156 (the lowest level of computer anxiety). The lower the score the more computer anxiety a participant has. An example question is: I avoid using computers whenever I can. The internal consistency method for reliability was reported by Maurer and Simonson (1984) as .94. The test/retest reliability was .90.

Concurrent validity for the CAIN was determined by correlating it to Speilberger's state portion of the State/Trait Anxiety Measure (STAI; Speilberger and Gorsuch, 1983). Additionally, observers rated computer users' anxiety levels by direct observation. The CAIN was found to correlate significantly to both the STAI and the observation score (r =.32 and .36 respectively). They found a mean of 95.77 with standard deviation of 18.5. Montag, Maurer, and Simonson (1984) found the CAIN to be unidimensional. This researcher ran factor analysis to confirm that the CAIN is unidimensional. No subscales were found. Simonson (2000) administered the CAIN to 1127 persons. This group included strata of teachers participating in telecommunications training, a group of randomly selected students from a mid-western state's population of teachers, second semester college freshmen at a 2-year liberal arts college, and a group of entering freshmen at the same 2-year college. The average for this group was 105.4 with a standard deviation of 19.11. The CAIN was found to still have an internal consistency reliability of .94. This study did not make any changes to the instrument. In scoring the CAIN you have to reverse code some of the questions that are worded in the negative. The researcher did reverse code those questions.

The Teaching with Technology Instrument (TTI) was developed by Atkins and Vasu in 1998. The TTI can be found in appendix C. The authors of the TTI designed it for use in North Carolina. The TTI is based on the technology staff development model. It accesses how much teachers know about and use technology in the classroom. It was validated using 155 middle school teachers at 3 schools in North Carolina. The TTI has 46 yes or no questions that correspond to basic computing competencies recommended by ISTE and North Carolina. It focused on three areas of technology: writing and communication, information awareness and management, and construction and multimedia. The TTI total score for an individual ranged from 0 to 46, and was considered interval for data analyses. The total score for an individual is the number of yes answers. The questions within each area are listed from simple to complex so that the higher the score the more technology a person has integrated into their teaching. It was developed to determine the types of technology training that a school or district needs to offer its teachers. An example question is: I understand how writing/communication technology can be used to meet the learning styles of students. The Teaching with Technology Survey was published in Integrating Technology and Multimedia in the Classroom (Robyler & Edwards, 2000) as the Teaching with Technology Instrument and is listed in that text as a "copy me" instrument by the International Society of Technology for Educators (ISTE) (Atkins and Vasu, 1998). Publication and acknowledgement by ISTE of this instrument as a tool for professional development trainers validates its usefulness in evaluating technology integration practices by teachers. They report a reliability of .95. They did not do any factor analysis to support their three area focus. This researcher did factor analysis to determine if there were three subscales. The factor analysis did not support the existence of three subscales. The factor analysis showed a unidimensional construct. The researcher of this study made some changes to the original instrument. The wording "North Carolina Computer Skills Curriculum" was replaced with "Texas Essential Knowledge and Skills (TEKS) for Technology Application." This change was made because this study took place in Texas. This change did not affect the reliability of the test. It only made it make sense to pre-service teachers in Texas who are becoming familiar with the TEKS. The original population for the instrument was middle school teachers in North Carolina. The population in this study is pre-service teachers in the state of Texas. The TTI should be applicable to this population due to the fact that the North Carolina Skills Curriculum and the Texas Essential Knowledge and Skills for Technology Application are very similar. The pre-service teachers in this study were at most one year away from being called in-service teachers. The majority of the participants had just finished their semester of student teaching and would be graduating in a couple of days from data gathering. Quite a few of them all ready had jobs for the fall.

The participants will also answer some demographic questions which will serve as the independent variables. They are age, gender, academic classification, certification level, teaching field(s), number of education classes taken and which ones, undergraduate or graduate classification, and their student id number for clerical purposes. This instrument can be found in appendix D.

Participants and Procedures

The participants are undergraduate education majors at a small Southwest private university enrolled during the spring semester of 2005. The participants were assured of confidentiality. The only personal information gathered will be their student ID number, which is not their social security number. This number will be used to make sure no participant’s information is used more than once. This could happen when a participant is in two or more classes where the surveys will be administered. The investigator does not have access to a list of students and their corresponding ID number. They will be asked to volunteer to fill out the instruments. Their consent will consistent of them putting their student ID number (not social security) on the demographic instrument There were 357 undergraduate participants listed in the administrative software as education majors in the spring of 2005. This includes students who have recently graduated and who have enrolled in the past semesters but are currently not taking any classes. According to the dean of the college there are around 240 active students. Krejcie and Morgan (1970) report that a population of 240 requires a sample size of 148. The objective for this study is to administer the instruments to the entire population of 240. The instruments will be distributed to the participants by the investigator. He will go to each education class and hand out the instruments personally to the participants and inform them of the importance of the study and direct them on how to fill out the instruments. They were given 15-20 minutes to fill out the instruments. By going to each class the investigator will accomplish the following:

- Control for nuisance variable of delivery of the instructions.
- Make sure no participant fills out the instruments twice.
- And since a census is the objective of this study, an accurate count of those missing can be kept.

The data collection took place from Monday, May 2, 2005 through Thursday, May 5, 2005. This was the last week of the semester. All the pre-service teachers that were on their field assignments had to come back to campus during this time for an exit counseling session. The investigator was given time during this to collect data. The participants were told that they did not have fill out the surveys. It was voluntary and would affect their grade in the course. They were told that they were participating in the researcher's data collection for his dissertation. They were given the directions for the instrument. The researcher put all four surveys together in one packet. The instruments were in the following order: Teaching with Technology Instrument (TTI), Computer Opinion Survey (CAIN), Innovativeness Survey (IS), and the demographic questions. No class took more than twenty minutes to fill out the instruments. At the institution where the data collection took place the pre-service teachers are afforded ample opportunities to use technology and see technology being used. In their first semester of taking pedagogy classes the pre-service teachers are required to do forty clock hours of "tutoring" in an actual classroom. This "tutoring" involves them doing actual tutoring with students, grading papers, observing the teacher teach, and possibly being in charge of the class. They some times get to teach a topic. They can observe a real teacher and what kind of technology they use and how they use it. After that, the pre-service teachers are required to do a two-week methods unit. They are required to do all the teaching for that unit. They are totally in charge of the unit. They could use technology to whatever extent they wanted. During their student teacher semester they are totally in charge of the whole classroom. They are free to do whatever they need to do. The pre-service teachers are exposed to technology in the classes they take. All students are required to have passed the basic computer skills class offered at the university. Early-childhood through fourth grade certification are required to take a course called "Instructional Technology." In this class the students are exposed to technology in use. They are required to produce units involving technology. Some things they have to make are a stand alone Power Point that has branching and they have to make a webpage that also teaches a unit and has multimedia on it. They have to shoot some video and record audio for that web page. The middle school and eighth grade through twelfth grade certification seekers do not have to take this class and do not have a corresponding class. They are exposed to technology being used in their content areas and in their pedagogy classes. In the pedagogy classes they are exposed to Power Point, Internet, class home pages, Smart Boards, and interactive television. In their content area classes, they are exposed to Power Point, Excel, class home pages, Internet, graphing calculators, and on-line classes. All this exposure to technology makes the target population having the characteristics that the study requires. All data collected will be organized in an electronic spreadsheet format and statistical analyses conducted using SPSS 11.0.

Data Analysis

Descriptive statistics will be computed on the demographic variables; averages and standard deviation will be reported, along with frequencies of demographic categories, i.e. the number of males, number of elementary majors, etc.

Descriptive statistics will be calculated on the responses on the TTI, IS, and CAIN. These descriptive statistics will include the mean, standard deviation, and frequencies of the responses from the instruments. ANOVA’s, correlation and multiple variable regression will be used to determine if any relationship exists between computer anxiety, innovativeness, and technology integration. Factor analysis will be run on the TTI, IS and CAIN. Correlation statistics only show relationships between variables they do not and can not show cause and effect. The ANOVA will find any differences between groups as measured on the dependent variable. An underlying assumption for these statistical tests is that the cases be independent, in this study the cases are individual participants and therefore should be independent of each other. One participant's computer anxiety should not have an effect on another participant's computer anxiety. Another assumption is that the underlying constructs be from normal distributions. The fact is that we can never know this for sure, but the distributions of the variables are very slightly negatively skewed. None of the skewness is significant so that will not violate the normality assumption. These methods are pretty robust when it comes to their assumptions. That means that you can have some violations and still get reliable results.

Chapter Summary

The goal of this study was to examine pre-service teachers' technology training, their concerns, knowledge, and integration of technology. This section describes the various data collection procedures, the instrumentation, and statistical analyses utilized in the study. Treatments for this study are four survey instruments. The two independent variables are individual innovativeness and computer anxiety, and the dependent variable is technology integration.

CHAPTER FOUR

RESULTS

Introduction

The focus of this study was to determine if there existed significant relationships between the level of computer anxiety, innovativeness, and the level of technology integration in pre-service teachers. Teachers are under a great deal of pressure to acquire skills in instructional technology and to integrate these skills across the curriculum. Although the number of computers and access to the Internet in K-12 classrooms has grown intensely over the last decade, there seems to be some barriers that prevent the majority of teachers from using computers in their classrooms.

Research Questions

Questions specific to this study were:

1. Is there a significant relationship between computer anxiety, innovativeness, and technology integration in pre-service teachers?
2. What are the current relationships between: gender, subject area, certification level and computer anxiety and innovativeness?

Hypotheses

The following null hypotheses are derivative of the research questions and were tested at an alpha level of 0.05.

H_{o1}: There is no significant relationship between computer anxiety, innovativeness, and technology integration.

H_{o2}: There is no significant relationship between gender and computer anxiety or innovativeness.

H_{o3}: There is no significant relationship between subject area and computer anxiety or innovativeness.

H_{o4}: There is no significant relationship between certification level and computer anxiety or innovativeness.

Demographic Descriptive Statistics

The causal-comparative and correlational study was conducted in the spring term of 2005. The study used convenience sampling and aimed at getting a census. The sampling took place at a small private university in the Southwest of the United States. The instruments were administered by the investigator in the spring semester of 2005 to pre-service teacher preparation classes. The investigator went to each class and administered the surveys. The data consisted of 201 surveys completed and returned. This represents a percentage of 83.75% of the entire population. Only one survey was not filled out correctly or completely, therefore the data analysis used 200 participants.

There were 153 (76.5%) female responses and 47 (23.5%) males. The participants' ages ranged from 18 to 55, with one participant not reporting an age. Figure 4.1 shows the distribution of the ages. The average age was 24.94 years with standard deviation of 6.43. The mode age was 22. There were 165 participants, 82.9%, under the age of 30. Thirty-four participants, 16.6%, were between the age of 30 and 50 and only one participant, .5%, was older than 50 years.

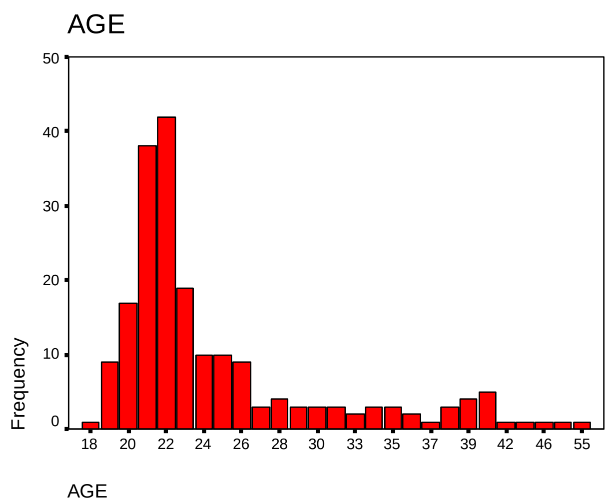

Figure 4. 1 Distribution of participant's age

There were 4 (2%) freshmen, 18 (9%) sophomores, 51(25.5%) juniors, 124 (62%) seniors, and 3 (1.5%) post-baccalaureate participants in the sample. Figure 4.2 shows the classification distribution. This heavy distribution of juniors and seniors was due to the restriction that students are usually not allowed to take pedagogy classes until they have completed the general university core of 60 credit hours.

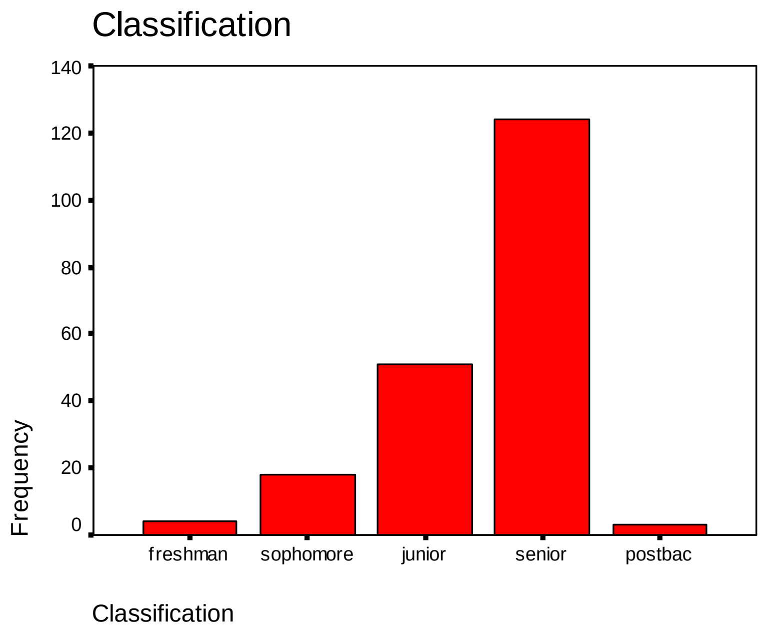

Figure 4. 2 Distribution of participants' classification

The participants' certification levels are shown in figure 4.3. Two (1%) people did not respond with a certification level. Of the 21 middle school certifications, 10 were generalists, 4 were social studies specialists, 3 were math specialists, 2 reading/language arts specialists, 1 was a science specialists and 1 left it blank. Figure 4.4 shows the break up of the secondary specialists by teaching fields. The total of the frequencies of the teaching fields is more than 49, the number of 8^{th}-12^{th} specialists, because the majority of them have two teaching fields. Twenty of the participants were seeking all-level certification in the following fields: art (5), music (1), and physical education (14). Two of these participants are also seeking certification in composite social studies and are counted as secondary certification pre-service teachers.

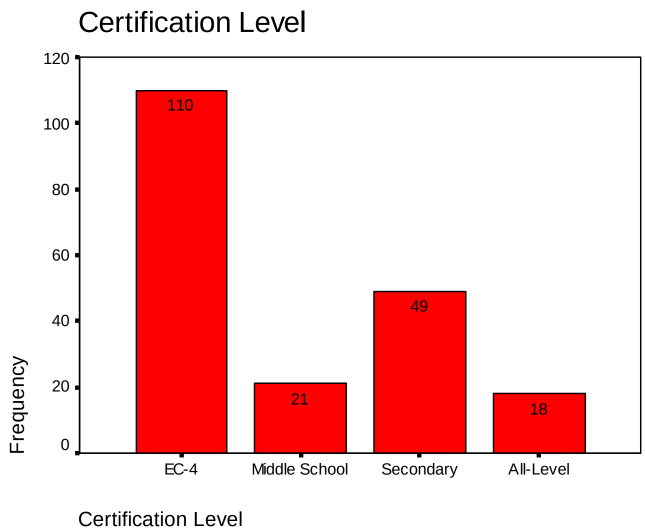

Figure 4. 3 Participants' distribution of Certification Level

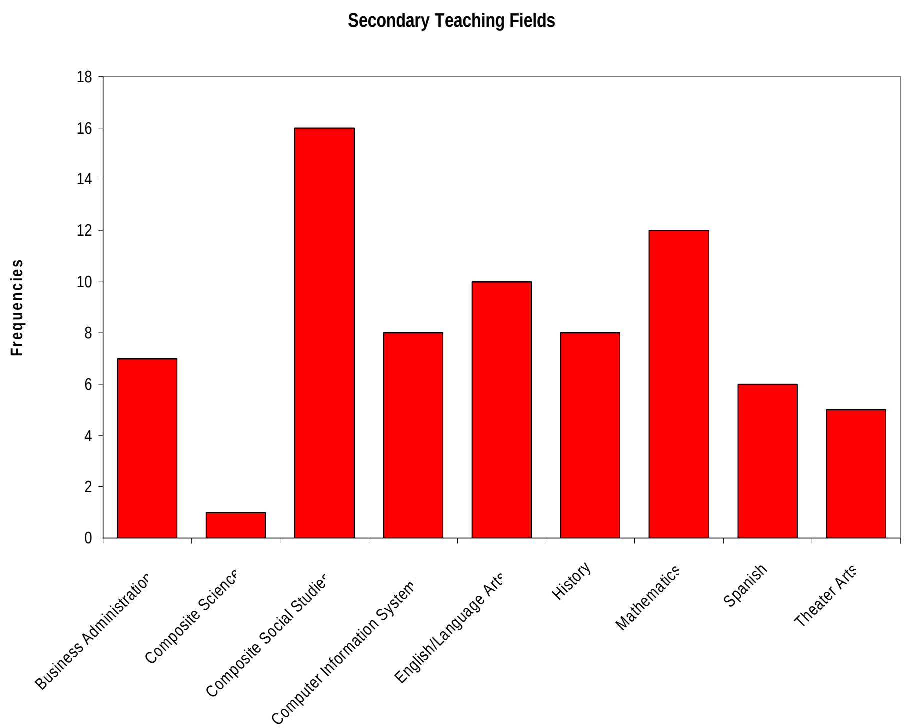

Figure 4. 4 Secondary Teaching Fields Distribution

Descriptive Statistics of Survey Instruments

The Teaching with Technology Instrument, TTI, had forty-six (46) yes or no questions. A yes response was coded as a one and a no response was coded as a zero. Each participant's responses were summed. The lowest possible score is zero and the highest possible score is 46. The scores ranged from a low of nine to a high of forty-six. The average score was 33.93 with standard deviation of 8.91. The higher the score the more integrated technology is in the participant's educational life. The frequencies of the responses are displayed in figure 4.5. Factor analysis showed that the TTI was unidimensional. The results of the TTI had a slight, non-significant skewness of -.668 (standard error = .172).

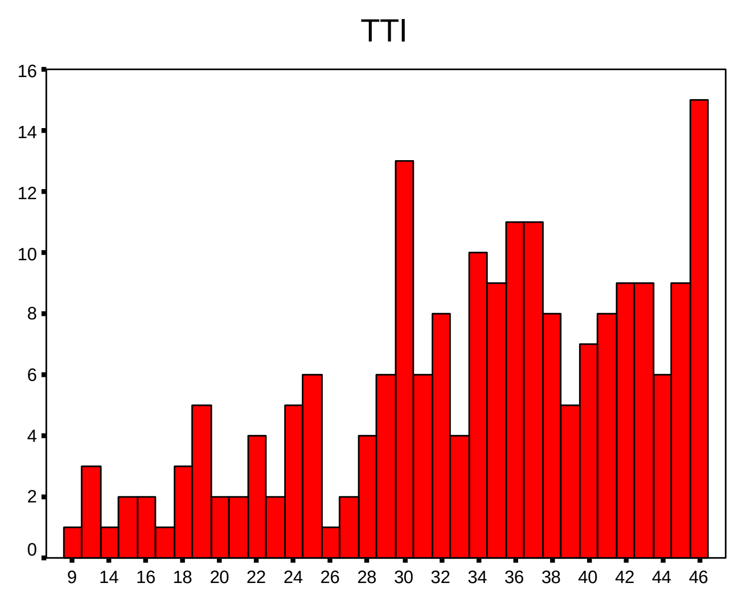

Figure 4. 5 Distribution of Teaching with Technology Integration Scores

The Computer Anxiety Index, CAIN, had twenty-six (26) Likert-type questions with a 6-point scale. The scale was strongly disagree (1), disagree (2), slightly disagree (3), slightly agree (4), agree (5) and strongly agree (6). The total score is the sum of the 26 individual responses. The lowest possible score is 26 which would be the measure of greatest computer anxiety. The highest possible score is 156, which would be the measure of least computer anxiety. The scores ranged from a low of seventy-five to a high of one hundred fifty-one. The average score was 126.61 with standard deviation of 15.232. The frequencies of the responses are displayed in figure 4.6. You can see from the histogram that it is skewed to the left. The median is 128. The participants in this study had a low level of computer anxiety. The lowest score possible is a 26 and the lowest score in the study was 75, nearly 50 points above that. Factor analysis showed that the CAIN is unidimensional. The CAIN showed some skewness of -1.157 with standard error of .172.

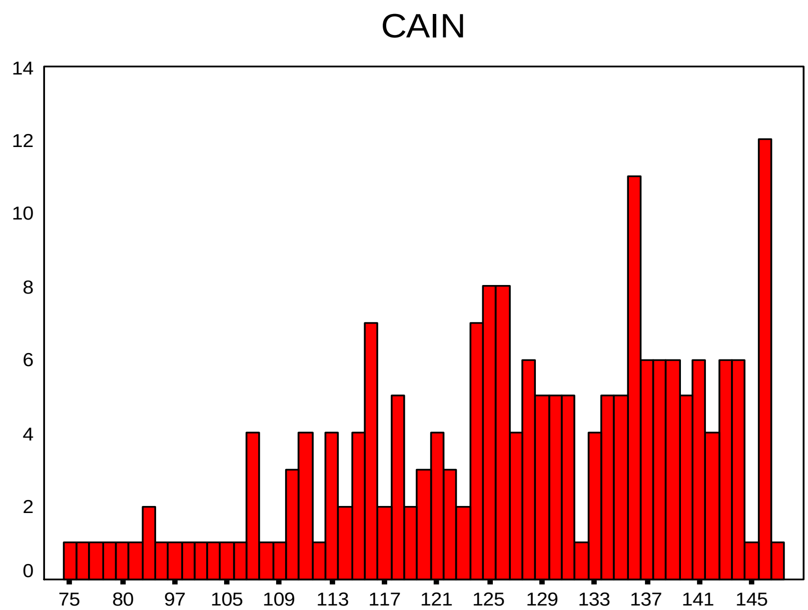

Figure 4. 6 Distribution of Computer Anxiety Scores

The Innovativeness Scale, IS, had twenty (20) Likert-type questions with a 7-point scale. The scale was strongly disagree (1), disagree (2), mildly disagree (3), uncertain (4), mildly agree (5), agree (6), and strongly agree (7). The total score is the sum of 20 responses. The lowest possible score would be 20 which would be the measure of least innovativeness. The highest possible score would be 140 which would be the measure of greatest innovativeness. The scores ranged from a low of sixty-eight to a high of one hundred forty. The average score was 102.69 with standard deviation of 13.874. The frequencies of the responses are displayed in figure 4.7. When you look at the cumulative frequencies, the lower 16% of scores are made up of 33 participants. The next 34% of the scores are from 68 participants, the next 34% are from 67 participants.

The next 13.5% are from 27 scores and the final or highest scores, 2.5%, are from 5 people. Factor analysis showed that the IS is unidimensional. The IS scores have a skewness of .127 with standard error of .172.

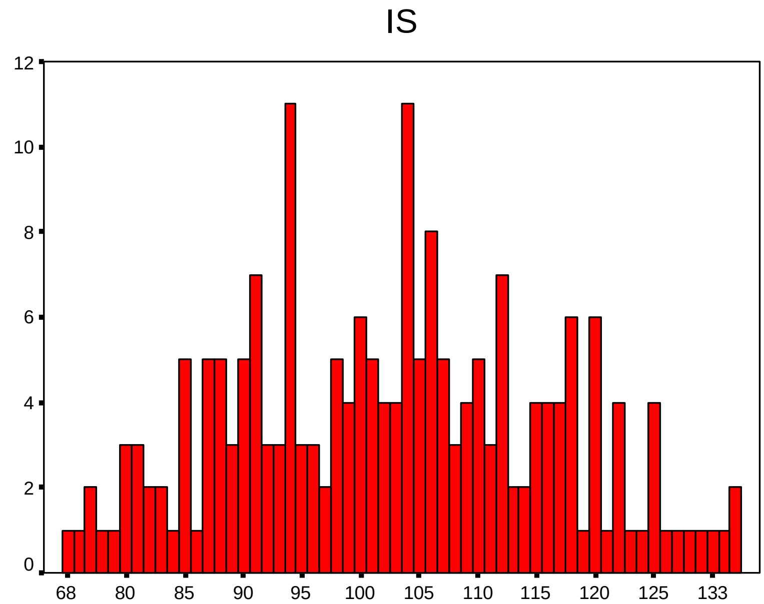

Figure 4. 7 Distribution of Innovativeness Scores

Inferential Statistics

Hypothesis One

Hypothesis one was there is no significant relationship between computer anxiety, innovativeness, and technology integration. All the intercorrelations between the TTI, IS, and CAIN were found to be significant with $p<.001$. The correlation coefficient between the TTI and IS was .324. The correlation coefficient between the TTI and the CAIN was

.504. The correlation coefficient between the IS and the CAIN was .41. Using the CAIN and IS as independent variables and the TTI as the dependent variable, multiple regression and correlations statistics were run and the results are summarized in tables 4.1 and 4.2. The ANOVA has a significant $F(2,197) = 36.54$, $p<.001$. Thus the variation explained by the linear regression model is not by chance. The multiple R has the strength of the relationship between the model and the dependent variable at .520, $p<.001$. The R squared is .271. The model looks like TTI = .441*(CAIN) + .142*IS - 8.426. The CAIN coefficient has significance < .001, the IS coefficient has significance < .05, and the constant term does not have statistical significance, sig.> .10. Hypothesis one was rejected based on these findings.

Table 4. 1 Intercorrelations between IS, CAIN, and TTI

	IS	CAIN	TTI
IS	--	0.41	0.324
CAIN		--	0.504
TTI			--
Significance	--	.000	.000
		--	.000
			--

Table 4. 2 Summary of regression analysis for predicting TTI

Variable	B	SE of B	β
(Constant)	-8.426	5.122	
CAIN	0.261	0.039	0.446**
IS	0.009	0.043	0.142*

*p<.05
**p<.001

Hypothesis Two

The second hypothesis was there is no significant relationship between gender and computer anxiety or innovativeness. There was no correlation between gender and computer anxiety, $r = .104$, $p > .10$. There was no correlation between gender and innovativeness, $r = -.007$, $p > .9$. The F statistic was $F(1,198) = 2.154$, $p > .10$ for the difference between gender and computer anxiety. The F statistic was $F(1,198) = .009$, $p > .90$ for the difference between gender and innovativeness. Based on these results hypothesis two was not rejected.

Hypothesis Three

The third hypothesis was that there is no significant relationship between subject area and computer anxiety or innovativeness. The correlation coefficient between innovativeness and subject area was -.072 with significance of .63. The correlation coefficient between computer anxiety and subject area was -.129 with significance of .531. Subject area was found to be not statistically different on either innovativeness or on computer anxiety, $F(5,12) = .855$, $p > .20$ and $F(5,12) = 1.594$, $p > .50$ respectively. So the third hypothesis was not rejected.

Hypothesis Four

The fourth hypothesis was that there is no significant relationship between certification level and computer anxiety or innovativeness. No significant difference was found between certification level and innovativeness. The correlation coefficient was r = -0.83, p>.20. The F statistic was F(3,194) = 1.171, p>.30. There was a significant difference between certification level and computer anxiety. The Pearson correlation was r = -.187, p<.01. The F statistic was F(3,194) = 4.705, p<.01. Sidak (or Dunn-Sidak) tests were run to find where those differences were between certification level and computer anxiety. Sidak tests were used because the researcher knew coming in to the study that if there was a significant difference found between certification level and computer anxiety that there would be the need for running tests to discover where those differences were. Sheffe post hoc tests yielded the same results as the Sidak a priori tests. Early Childhood to 4^{th} grade differed significantly from All-Level. The mean difference between the two groups was 13.20, sig. = .003. The early childhood to 4^{th} grade teaching level had the lower level of computer anxiety. The secondary certification level computer anxiety was found to be significantly lower than the all-level certification level by 11.73 points, sig. = .027. These results are summarized in table 4.3. Hypothesis four was rejected due to the finding of differences between early childhood to 4^{th} grade certification and all-level certification and the finding of differences between secondary certification level and all-level certification.

Table 4. 3 Sidak test results for the differences in Certification level on CAIN

Dependent Variable	(I) Certification Level	(J) Certification Level	Mean Difference (I-J)	Std. Error	Sig.
CAIN	EC-4	Middle School	6.35	3.52	0.367
		Secondary	1.467	2.54	0.993
		All-Level	13.2*	3.77	0.003
	Middle School	EC-4	-6.35	3.53	0.367
		Secondary	-4.88	3.86	0.754
		All-Level	6.85	4.76	0.627
	Secondary	EC-4	-1.47	2.54	0.993
		Middle School	4.88	3.86	0.754
		All-Level	11.73*	4.08	0.027

Chapter Summary

The goal of this study was to examine pre-service teachers' technology training, their concerns, knowledge, and integration of technology. The participants in this study were 200 pre-service teachers at a small private university in the southwest region of the United States. Four hypotheses were tested. A significant relationship was found between technology integration and computer anxiety and innovativeness. Gender was not found to be significantly related to computer anxiety or innovativeness. Subject area was also not significantly related to computer anxiety or innovativeness. Certification level and innovativeness were found to be not significantly related. Computer anxiety and certification level were found to be significantly related. The next chapter will discuss the results of this study in relationship to previous related research.

CHAPTER FIVE

DISCUSSION

Introduction

The purpose of this study was to answer the following questions. Is there a significant relationship between computer anxiety, innovativeness, and technology integration in pre-service teachers? And what is the current relationships between: gender, subject area, certification level and computer anxiety and innovativeness? To get at the answers of these questions four hypotheses were developed and tested:

H_{o1}: There is no significant relationship between computer anxiety, innovativeness, and technology integration.

H_{o2}: There is no significant relationship between gender and computer anxiety or innovativeness.

H_{o3}: There is no significant relationship between subject area and computer anxiety or innovativeness.

H_{o4}: There is no significant relationship between certification level and computer anxiety or innovativeness.

Hypothesis one and four were rejected while hypothesis 2 and 3 were not rejected. This chapter will look at the results in relation to previous research.

Discussion

Demographics

The study population's demographics were evidence of a representative sample of the population. More than 75% of the sample was female (n = 153). There was a heavy representation of upperclassmen, 87.5% were juniors or seniors. This agrees with the study's College of Education's requirements that students have had completed the university core of 60 hours before being allowed to take pedagogy classes. The age distribution was also typical with 82.9% of the sample being under the age of 30. The average age was 25 years with a mode of 22, your typical four to five year tenure through a college degree. The majority of respondents (n = 110) were seeking certification in early childhood to fourth grade.

The IS, innovativeness, distribution of scores was nearly equivalent to what Rogers (1971) discovered. Rogers said that 2.5% of the people were innovators; they adopted the innovation first and were rash and daring. The results of this study had 5 people in the top 2.5%, a perfect match. The next category in Rogers' classification is the early adopters. Rogers said that they make up 13.5% of the population. This study had 27 out of 200 in that category which is 13.5%. The next classification is the early majority. Rogers describes them as people who frequently interact with their peers but seldom hold positions of leadership opinion. There were 67 participants in this category which is 33.5%. Rogers said that the early majority make up 34% of the population. The next category is the late majority; another 34% of the population. They are skeptical and cautious. They adopt an innovation due to economic necessity or peer pressure. This study had 68 people, 34%, as late majority. The people in the final group are referred to as laggards and compose 16% of the population. This group of people hold on to traditional values, their point of reference is in the past. There were 33 people, 16.5%, in the study who would be labeled as laggards.

Hypothesis One

The significant relationship found between technology integration and computer anxiety and innovativeness which caused rejection of hypothesis one was very interesting. The correlation coefficient between the teaching with technology variable and the computer anxiety was .504, a middle of the road correlation. So the relationship between the two is significant just not very big. Twenty-five percent of the variation in the TTI score is accounted for by the variation in the CAIN score. The correlation coefficient between the teaching with technology variable and the innovativeness variable was .324. This too was significant but not large. Only ten percent of the variation in the TTI can be attributed to variation in the IS.

The linear model turned out to be: $TTI = .441 * CAIN + .142 * IS - 8.426$. The standard coefficients were chosen because the variables being measured are attitudinal. Standardizing the coefficients puts all the variables on a level playing field. It is easier to compare the effects of the different independent variables. Both the computer anxiety coefficient and the innovativeness coefficient were found to be significant, $p<.05$, while the constant was not significant. Innovativeness is responsible for 14% of the technology integration value and the computer anxiety score is responsible for 44% of the integration value. The multiple R was .520 and squared is .271. The strength of the relationship between the variables is only around 52% and only 27% of the variation in the technology score is explained by the variation in the computer anxiety score and innovativeness score. The low innovativeness coefficient was puzzling. One would think that how innovative a person was would be much more influential on how much technology they integrated into their teaching. But maybe it goes back to what Shelley (2004) and Beyerbach and Vannata (2001) found. Pre-service teachers tend to teach the curriculum by using technologies they have learned or observed being modeled in their college classrooms. Teachers and teacher education faculty experience difficulty in developing a vision of a technology-rich classroom (Beyerbach and Vannata, 2001). The teacher education faculty is probably not very innovative and thus their product, pre-service teachers, is not very innovative.

The computer anxiety coefficient was statistically significant. It is responsible for 44% of the technology integration score. The study's computer anxiety scores were skewed to the left, putting more than 50% of the scores above the average. The participants in this study showed a low level of computer anxiety. For years research has noted a gender bias with respect to learning technologies (Cockburn & Ormrod, 1993). Campbell (2000) notes that "Female learning may occur first and foremost in relation to other human beings and living things, whereas males may arrive at an understanding in relation to things as symbols, a framework on which much computer-based technology is based" (p. 133). Gahn comments on gender bias early in the popularity of the Internet. The point was made that "… the internet is male territory. Considering [that] its roots are sunk deep in academic and the military-industrial complex that's hardly surprising"

(1995, p. 3). This study had more than 75% of the population female this goes against previous research. Maybe the gender gap has been narrowed over recent years. Pre-service teachers are use to technology in their daily lives. They email each other, Facebook or My Space each other, the moment they step out of class they are on their cell phones talking or texting each other. They definitely have the communication/collaboration aspect of technology under control. But they seem hesitant to create some electronic presentation or think critically about a problem. They need to be shown how to use technology as a tool. That is, the technology should help the students solve problems, think independently and collaborate with others (OTA, 1995; Confrey, Sabelli, and Sheingold, 2002; McCoy 1999).

Hypothesis Two

Hypothesis two was not rejected. There was not a significant relationship between gender and computer anxiety or innovativeness. No relationship between gender and computer anxiety goes against what Cockburn and Ormrod (1993), Campbell (2000), and Gahn (1995) found. There should have been a relationship between higher computer anxiety values and females. King (2002) used the CAIN with 910 middle school and high school students and found a small difference between males and females on computer anxiety. He found the males to be slightly more anxious than the females. The population of this study is college age participants. Cooper (2006) found that there is still evidence of a gender divide. While Liff and Shepherd (2004) found there to be a closing of the gender divide. This study seems to just add fuel to the fire when it comes to gender and computer anxiety. There is not agreement when it comes to gender and computer anxiety. Rogers (1971) found that innovativeness did not differentiate between genders. There are men and women all along the spectrum of the innovativeness scale. The results of this study agreed with Rogers' findings.

Hypothesis Three

Hypothesis three was not rejected. There was not a significant relationship between subject area and computer anxiety or innovativeness. This agrees with results found by Williams (2006). Williams said found that there was a difference in computer anxiety as related to teaching level but not with teaching field. This should be good news the content area teachers and useful information to the pedagogy teachers. The content area teachers can focus on using the technology without their students having significant computer anxiety. The college of education faculty will need to be aware of the computer anxiety differences between teaching levels. Both need to focus on getting their students to be come more innovative with the technology. They can achieve this by modeling integrating technology into their curriculum in meaningful and useful ways.

Hypothesis Four

Hypothesis four was rejected and certification level was found to have a significant relationship with computer anxiety. The early childhood through fourth grade certification seekers had a significantly lower level of computer anxiety than the all-level certification seekers. This agrees with Williams (2006) who also found significant differences between computers overall and teaching levels. This goes against the findings of Cockburn and Ormrod (1993), Campbell (2000), and Gahn (1995) that identify the gender bias in technology favors males. Barron et al. (2003) found that high school science teachers use technology more than any other subject area in secondary education. They also found that elementary school teachers used computers as problem-solving or decision-making tools at a rate twice that of the secondary teachers. The elementary teachers were more likely to use technology as a communication tool than the middle or high school teachers. This study had all the EC-4th pre-service teachers being female and more than half of the all-level pre-service teachers are male. The same argument would be made for the difference in 8th-12th grade pre-service teachers and all-level certification seekers. Out of the 49 8th-12th grade pre-service teachers 30 are female and only 19 are males. Maybe the differences are due to the subject matter of all-level certification: art and kinesiology. Though there was not a statistically significant relationship between subject matter and computer anxiety which agrees with Williams (2006).

Significance of Study

The university's college of education where this study took place can obviously benefit from this study. The model for technology integration had only 27% of the variation determined by the variation in computer anxiety and innovativeness. The other 73% must be coming from somewhere else. They can do more research to find out where that variation is coming from and then alter their curriculum to enhance technology integration. They should also take note of the result that people are still teaching with the techniques that they have been taught with. The faculty should take it upon themselves to be more innovative and thus help their students be more innovative. They should also go out of their way to use technology in more meaningful ways, to use it as a tool and not just a way to exchange information. The low level of computer anxiety that the participants exhibited should be encouraging to the university. It seems that they do not have to focus on getting the students over a fear of computers. They can focus on getting the participants to use the technology in more meaningful ways.

Any researcher looking into innovativeness could rest easy about Rogers' thirty-six year old results. The participants of this study had innovativeness scores that were nearly identical to Rogers' results in 1971.

This study's university community as a whole can benefit from the knowledge that computer anxiety and innovativeness are not significantly tied to their subject matter. So the whole community can focus on how to make everyone become more innovative. With computer anxiety being low, they can focus on how to elevate innovativeness. By keeping the university's technology up to date, they may help the students to be more innovative. The student's won't be learning on technology that is not used after graduation. There can be a campus wide approach and not have to be individual departmental approaches.

The results of this study will add to the field of instructional technology in the following ways. It has found significant relationships between how innovative a person is and the amount of technology they will integrate in their lives. The instructional designer can use this when creating instruction. The designer can know that some people will just flat out refuse to use the technology and others will be sitting on the edge of their seats just waiting to get into the classroom and start using the material. When it comes to gender the designer can pick that there is a difference and cater to it or think there is not a difference and thus create a single instructional module. The overall low computer anxiety levels should be of great encouragement. The teacher and designer do not seem to have to focus on getting their cliental to use the computer. They can focus on getting them to use the technology in deeper and more meaningful ways.

Recommendations

This study has raised some interesting possibilities for the researcher. Several of these follow.

1. This study found that the computer anxiety scores were low and did not correlate with gender or subject area. This should be good news. The gender gap looks to be closing. There is not a particular subject area that has high levels of computer anxiety. The all-level certification seekers having a greater level of computer anxiety than the EC-4th and 8th-12th certification seekers needs to be studied further. Those seeking all-level certification may be trying to avoid technology or do not see a meaningfully purpose for it in their curriculum.

2. The instrument used to measure innovativeness returned results that were for all statically purposes right on with the theory. But the level of a person's innovativeness had very little to add to the technology integration level. Again this seems to be opposite of what you would think to be true. Perhaps there is something else going on here. It could be a person's self-efficacy and not their level of innovativeness. A further investigation is in order where a researcher could look for a relationship between self-

efficacy and innovativeness and a relationship between self-efficacy and technology integration.

3. The jury still seems to be out when it comes to gender and computer anxiety. Overall the participants in this study had a low level of computer anxiety. This should be investigated further. This researcher could expand the computer anxiety focus from pre-service teachers to a more diverse sample and see if the same low level of computer anxiety is present across the campus.

4. Another factor that needs to be explored is looking at using the technology that the participants are comfortable with and modifying them to be used at a higher-level of thinking. The participants are very comfortable with Facebook, Myspace, and ITunes. Future research could look at ways to make these tools more "educational." ITunes already has ITunes U. This is ITunes' way to allow universities to get audio and video out to their students.

Conclusion

Looking at the future of education, one thing seems to be certain; there will be more technology in the learning process. Students will be demanding to be shown and taught how technology will be used in their major. The world will require a university's output to be proficient in technology and to think technologically without hesitation. In order to accomplish this, the teachers of the future at all levels must become more comfortable with all types of technology. For the teachers of the tomorrow to be more technologically savvy, university's professors of all participants are going to have to become more technologically savvy. Preparing tomorrow's teachers is not just the college of education's job. Every department on a college campus has some sort of role in preparing teachers. Therefore every department has got to integrate technology into their curriculum so that the pre-service teacher has seen it in use and therefore will be more likely to use it in their own classroom. So it is imperative that future research focus on the factors that will encourage and enable an increase in the technology use and integration in the classroom.

REFERENCES

Abdal-Haqq, I. (1999). Unraveling the professional development school equity agenda. *Peabody Journal of Education*. *74*(3&4), 145-160.

Alreck, P. L., & Settle, R. B. (1995). The Survey Research Handbook (2nd edition). New York, NY: McGraw-Hill.

American Association of Colleges for Teacher Education. (1987). *Teaching teachers: facts and figures*. (ERIC Document Reproduction Service NO. ED 292 774).

Atkins, N. E. (1997). Using teacher stages of concern and an assessment of middle school teachers' use of technology in the classroom: a model for technology staff development. Thesis (Ph.D.) North Carolina State University, Raleigh.

Atkins, N. E., & Vasu, E. S. (1998). The teaching with technology instrument. *Learning and Leading with Technology*, 25(8), 35-39.

Atkins, N. E., & Vasu, E. S. (2000). Measuring knowledge of technology usage and stages of concern about computing: a study of middle school teachers. *Journal of Technology and Teacher Education*, 8(4), 279-302.

Atkins, N. E., and Vasu, E. S. (2001). Measuring knowledge of technology usage and stages of concern about computing: a study of middle school teachers. *Educational Administration Abstracts*. *36*(4), 411-568.

Barron, A. E., Kemker, K., Harmes, C., & Kalaydjian, K. (2003). Large-scale research study on technology in K-12 schools: technology integration as it relates to the national technology standards. *Journal of Research on Technology in Education*. 35(4), 489-507.

Bausch, M. E., & Hasselbring, T. S. (2004). Assistive technology: are the necessary skills and knowledge being developed at the preservice and inservice Levels? *Teacher Education and Special Education*. *27*(2), 97-104.

Berger, C. F., & Carlson, E. A. (1988). Measuring computer literacy of teacher trainers. *Journal of Educational Computing Research*, 4(3), 287-301.

Beyerbach, B., Walsh, C., and Vannata, R. (2001). From teaching technology to using technology to enhance student learning: preservice teachers' changing perceptions of technology infusion. *Educational Administration Abstracts*. *36*(4), 411-568.

Bialo, E. R., & Sivin-Kachala, J. (1996). The effectiveness of technology in schools: a summary of recent research. *School Library Media Quarterly : Journal of the American Association of School Librarians*. *25*(1), 51.

Blackhurst, A. E. (1997). Perspectives on technology in special education. *Teaching Exceptional Children*. *29*(5), 41.

Bosch, K. A., & Cardinale, L. (1993). Preservice teachers' perceptions of computer use during a field experience. *Journal of Computing in Teacher Education*, 10(1), 23-27, EJ 492 121.

Bosch, K. A., & Kersey, K. (1993). Teaching problem-solving strategies. *The Clearing House*. *66*(4), 228-230.

Brush, T., & Bitter, G. (2000). In the curriculum - technology education - an innovative approach to high-tech learning. *Learning and Leading with Technology : the ISTE Journal of Educational Technology Practice and Policy*. *28*(1), 22.

Byrum, D. C., & Cashman, C. (1993). Preservice teacher training in educational problems, perceptions, and preparation. *Journal of Technology and Teacher Education*, 1(3), 259-274.

Cagle, A.B. & Hornik, S. (2001). Faculty development and educational technology. *T.H.E. Journal*. 29(3), 92-96.

Campbell, J. R. (2000). *Trends in academic progress three decades of student performance.* [Washington, D.C.]: U.S. Dept. of Education, Office of Educational Research and Improvement.

Christensen, R. (2002). Effects of technology integration education on the attitudes of teachers and students. *Journal of Research on Technology in Education*. 34(4), 411-433.

Cockburn, C. & Ormrod, S. (1993). *Gender and technology in the making.* London: Sage.

Confrey, J., Sabelli, N., & Sheingold, K. (2002). Special section: the meaning of quality in educational technology programs - a framework for quality in educational technology programs. *Educational Technology*. *42*(3), 7.

Cooper, J. (2006). The digital divide: the special case of gender. *Journal of Computer Assisted Learning*. 22(5), 320-334.

Dusick, D. M., & Yildirim, S. (2000). Faculty computer use and training: identifying distinct needs for different populations. *Community College Review*. *27*(4), 33.

El-Amin, C., Fordham, N., Hammond, D. R., O'Bannon, B., Vannetta, R., & Gruber, K. (2002). Infusing technology into the elementary classroom: a school/university partnership model. *Computers in the Schools*. *19*(1), 149.

Gahn, S. W. (1995). *Professional issues of associate faculty at research and doctoral-granting universities by discipline, time-in-rank, and gender.* Thesis (Ph. D.) University of Kansas, Educational Policy and Leadership.

Gall, M. D., Borg, W. R., & Gall, J. P. (1996). Educational Research: An Introduction (6th edition). White Plains, NY: Longman Publishers USA.

Goldman, E., Barron, L., & Witherspoon, M. L. (1991). Hypermedia cases in teacher education: a context for understanding research on the teaching and learning of mathematics. *Action in Teacher Education*. *XIII*(1), 28.

Goodlad, J. I. (1994). Why our schools don't get much better-and how they might. *Journal for the Education of the Gifted*. *17*(4), 422.

Hadley, M., & Sheingold, K. (1993). Commonalities and distinctive patterns in teachers' integration of computers. *American Journal of Education*. *101*(3), 261.

Hagenson, L. & Castle, D. (2003). The integration of technology into teaching by university college of education faculty. In C. Crawford, D. A. Willis, R. Carlsen, I. Gibson, Kl. McFerrin, J. Price, & R. Weber, (Eds), *Proceedings of Society for Information Technology and Teacher Education International Conference* (pp.

947-952). Chesapeake, Va: Association for the Advancement of Computing in Education.

Hancock, C., Kaput, J. J., & Goldsmith, L. T. (1992). Authentic inquiry with data: critical barriers to classroom implementation. *Educational Psychologist*. *27*(3), 337-364.

Handler, M. G. (1993). Preparing new teachers to use technology: Perceptions and suggestions fro teacher educators. *Computer Education*, 20(2), 147-156.

Handler, M.G. & Pigott, T. (1994). *Schools of education and technology preparation. are we doing our job?* Paper presented at the annual meeting of the American Educational Research Association, New Orleans.

Hansen, J., Harris, C., Borenstein, S., & Curran, B. (1997). Research education. *Journal of Geophysical Research*. *102*(D22), 25.

Hargreaves, A. (2005). Educational change takes ages: Life, career and generational factors in teachers' emotional responses to educational change. *Teaching and Teacher Education*. *21*(8), 967-983.

Hignite, M. A., & Echternacht, L. J. (1992). Assessment of the relationships between the computer attitudes and computer literacy levels of prospective educators. *Journal of Research on Computing in Education*. *24*(3), 381-391.

Hochman, A., Maurer, M., & Roebuck, D. (1993). Buttons and cards and fields, oh my: introducing hypermedia in elementary teacher education. *TechTrends : for Leaders in Education & Training*. *38*(2), 25-28.

Hong, K. & Koh, C. (2002). Computer anxiety and attitudes toward computers among rural secondary school teachers: a malaysian perspective. *Journal of Research on Technology in Education.* 35(1), 27-48.

Hope, W. (1997). Resolving teachers' concerns about microcomputer technology. *Computers in the Schools*. *13*(3/4), 147-160.

Hunt, N. (1995). Bringing technology into the pre-service teaching field experience. *Computers in the Schools*. *11*(3), 37-48.

Hurt, H. T., Joseph, K., & Cook, C. D. (1977) Scales for the measurement of innovativeness. *Human Communication Research*, 4(1), 58-65.

International Society for Technology in Education [ISTE] (2007) *National educational technology standards projects.* Web site: http://cnets.iste.org/currstands/cstands-netst.html

King, J. (2002). An investigation of computer anxiety by gender and grade. *Computers in Human Behavior*. 18(1), 69-84.

Kleiman, J. B. (2000). *The Appropriate Technology movement in American political culture*. Thesis (Ph. D.)--University of Rochester. Dept. of History, 2000.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3), 607-610.

Laffey, J., Tupper, T., Musser, D., & Wedman, J. (1998). A computer-mediated support system for project-based learning. *Educational Technology Research and Development : ETR & D.*. *46*(1), 73.

Liff, S., & Shepherd, A. (2004). An evolving gender digital divide? *Oxford Internet Institute*, *Internet Issue Brief*. 2. Web site: http://www.oii.ox.ac.uk-resources-publications/ib2all.pdf

LCU (2007). *Catalog 2007-2008*, 46(1).

MacArthur, C. A., Grahm, S., Haynes, J. B., & DeLaPaz, S. (1996). Spelling checkers and students with learning disabilities: performance comparisons and impact on spelling. *The Journal of Special Education*. *30*(1), 35.

Maurer, M. M., & Simonson, M. R. (1984). Development and validation of a measure of computer anxiety. (ERIC Document Reproduction Service NO. ED 243 411).

Maurer, M. M., & Simonson, M. R. (1994). The reduction of computer anxiety: its relation to relaxation training, previous computer coursework, achievement, and need for cognition. *Journal of Research on Computing in Education*. *26*(2), 205.

McCoy, C. (1999). Focus: crossroads in education - cls: at the crossroads in education. *Clinical Laboratory Science : Journal of the American Society for Medical Technology*. 12(1), 28.

McKenzie, J. (2001). How teacher learn technology best. *From Now On: The Educational Technology Journal*, 10(6). Web site: http://www.fno.org/mar01/howlearn.html

Medlin, B. D. (2001). *The factors that may influence a faculty member's decisionn to adopt electronic technologies in instruction.* Thesis (Ph. D.) Virginia Polytechnic Institute and State University.

Milken Exchange & International Society for Technology in Education [ISTE] *Will new teachers be prepared to teach in a digital age?* Web site: http://www.mff.org/publications/publications.taf?section=Education%20Technology

Montag, M., Simonson, M. R., & Maurer, M. M. (1984). *Test administrator's manaual: for the Standardized test of computer literacy and Computer anxiety index*. Ames: Iowa State University, College of Education, Instructional Resources Center.

Moursund, D. (1996). Funding technology in education. *Media and Methods*. 32(5), 2-5.

National Council for Accreditation of Teacher Education [NCATE] (2007). *Standards* Web site: http://www.ncate.org/institutions/standards.asp?ch=4.

Navarro, M. S., & Natalicio, D. S. (1999). Closing the achievement gap in el paso: a collaboration for K-16 renewal. *Phi Delta Kappan*. *80*(8), 597.

Novak, D. I., & Knowles, J. G. (1991). Beginning elementary teachers' use of computers in classroom instruction. *Action in Teacher Education*. *XIII*(2), 43-51.

Pallister, J.G. & Foxall, G.R. (1998). Psychometric properties of the Hurt-Joseph-Cook scales for the measurement of innovativeness. *Technovation*. 18(11), 663-675.

Parisot, A. H. (1995). *Technology and teaching: the adoption and diffusion of technological innovations by a community college faculty*. Thesis (Ph. D.) Montana State Univeristy.

Pope, M., Hare, D., & Howard, E. (2002). Technology integration: closing the gap between what preservice teachers are taught to do and what they can do. *Journal of Technology and Teacher Education*. 10(2), 191-203.

Ramirez, R., & Bell, R. (1994) *Byting back: policies to support the use of technology in education*. (ERIC Document Reproduction Service NO. ED 378 941).

Robyler, M., & Edwards, J. (2000). *Integrating Educational Technology into Teaching (2nd Edition)*. Upper Saddle River, NJ: Merrill, Prentice Hall

Rogers, E. M. (1971). *Communication of Innovations* 2nd ed. New York: The Free Press.

Rogers, E. M. (2004). A prospective and retrospective look at the diffusion model. *Journal of Health Communication*. *9*(Supplement), 13-19.

Rovai, A. P. & Childress, M. D. (2003). Explaining and predicting resistance to computer anxiety reduction among teacher education students. *Journal of Research on Technology in Education*. 35(2), 226-235.

Sahin, I. & Thompson, A. (2006). Using rogers' theory to interpret instructional computer use by coe faculty. *Journal of Research on Technology in Education*. 39(1), 81-104.

Schrum, L., Skeele, R., & Grant, M. (2002). One college of education's effort to infuse technology: a systematic approach to revisioning teaching and learning. *Journal of Research on Technology in Education*. 35(2), 256-271.

Shelley, M., Thrane, L., Shulman, S., Lang, E., Beisser, S., Larson, T., & Mutiti, J. (2004). Digital citizenship: parameters of the digital divide. *Social Science Computer Review*. *22*(2), 256-269.

Showers, B., Joyce, B., Scanlon, M., & Schnaubelt, C. (1998). A second chance to learn to read. *Educational Leadership : Journal of the Department of Supervision and Curriculum Development, N.E.A.*. *55*(6), 27.

Simonson, M. (2000). Personal innovativeness, perceived organizational innovativeness, and computer exciety: updated scales. *Quarterly Review of Distance Education*,1(1), 69-76.

Smith, S. J., & O'Bannon, B. (1999). Faculty members infusing technology across teacher education: a mentorship model. *Teacher Education and Special Education*. *22*(2), 123.

Speilberger, C. D., & Gorsuch, R. L. (1983). Manual for the State-Trait Anxiety Inventory. Palo Alto, CA: Consulting Psychologists Press.

SPSS 11.0. [Computer software]. (2001). Chicago. Web site: www.spss.com

State Board for Educator Certification [SBEC] (2007). Web site: http://www.sbec.state.tx.us/SBECOnline/default.asp

Taylor, H. G., & Stuhlmann, J. M. (1998). The clovis project: enhancing student learning and teacher training with telecommunications. *International Journal of Instructional Media*. *25*(4), 357.

Taylor, J., & Thomas, N. (1994). A knowledge-engineering approach to accounting education. *Accounting Education*. *3*(3), 237-248.

Texas Education Agency [TEA] (2007). *TEA Curriculum Technology Applications*. Web site: http://www.tea.state.tx.us/technology/ta/

The Campus Computing Project. (2001). *The 2001 national survey of information technology in U.S. higher education*. Encino, CA: Green, K. C.

Thompson, A. D., Schmidt, D. A., & Davis, N. E. (2003). Development - technology collaboratives for simultaneous renewal in teacher education. *Educational Technology Research and Development : ETR & D.. 51*(1), 73.

Todd, N. (1993). A curriculum model for integrating technology in teacher education courses. *Journal of Computing in Teacher Education*, 9(3), 5-11.

Topp, N. W., Mortenson, R., & Grandgenett, N. (1995). Goal: technology-using teachers; key: technology-using education faculty. Technology and Teacher Education Annual 1995, 3, 840-843.

Thornburg, L. (1992). Training in a changing world. how four successful companies are thinking about training in today's fast-paced environment. *HRMagazine*. *37*(8), 44.

U.S. Congress, Office of Technology Assessment [OTA]. (1988). Educating Scientists and Engineers: Grade School to Grad School (Report No. PB88-235973) Web site: http://www.princeton.edu/~ota/disk2/1988/8811_n.html

U.S. Congress, Office of Technology Assessment [OTA]. (1995). Teachers and technology: Making the connections (Report No. OTA-EHR-616) Web site: http://www.princeton.edu/~ota/disk1/1995/9541_n.html

Walters, R. (1992). The office of technology assessment of the US congress: a model for the future? *Government and Opposition*. *27*(1), 89-108.

Wetzel, K. (1993). Models for achieving computer competencies in pre-service education. *Journal of Computing in Teacher Education*, 9(4), 4-6.

Wetzel, K., Zambo, R., Buss, R., & Arbaugh, N. (1996). Innovations in integrating technology into student teaching experiences. *Journal of Research on Computing in Education*. *29*(2), 196.

Wetzel, K. (1996-97, December / January). Teacher technology training: Curriculum-based or personal? *Learning and Leading with Technology*. 24 (4) 58-59.

Wiburg, K. (2003). Technology and the new meaning of educational equity. *Computers in the Schools*. *20*(1/2), 113-128.

Widmer, J. (1994). Science teachers must use measurement and control devices. *The Australian Science Teachers' Journal*. *40*(1), 65.

Williams, C. K. (2006). *An investigation of attitudes of K-12 teachers toward computer technology use in schools in a rural Mississippi district.* Thesis (Ph. D.) Mississippi State University.

Weng, L.-J., & Cheng, C.-P. (2000). Effects of response order on likert-type scales. *Educational and Psychological Measurement*. *60*(6), 908-924.

Wood, E., Mueller, J., Willoughby, T., Specht, J., & Deyoung, T. (2005). Teachers' perceptions: barriers and supports to using technology in the classroom. *Education, Communication, & Information*. 5(2), 183-206.

Zhao, Y., & Cziko, G. A. (2001). Teacher adoption of technology: a perceptual-control-theory perspective. *Technology and Teacher Education*. 9(1), 5-30.

APPENDIX A

Individual Opinion Survey (IS)

Individual Opinion Survey

Instructions: Please circle the number that most closely relates to your opinion.
SD= Strongly Disagree D = Disagree MD = Mildly Disagree U = Uncertain MA = Mildly Agree A = Agree SA = Strongly Agree

		Strongly Disagree	Disagree	Mildly Disagree	Uncertain	Mildly Agree	Agree	Strongly Agree
1	My peers often ask me for advice or information.	1	2	3	4	5	6	7
2	I enjoy trying out new ideas.	1	2	3	4	5	6	7
3	I seek out new ways to do things	1	2	3	4	5	6	7
4	I am generally cautious about accepting new ideas	1	2	3	4	5	6	7
5	I frequently improvise methods for solving a problem when the answer is not apparent.	1	2	3	4	5	6	7
6	I am suspicious of new inventions and new ways of thinking.	1	2	3	4	5	6	7
7	I rarely trust new ideas until I can see whether the vast majority of people around me accept them.	1	2	3	4	5	6	7
8	I feel that I am an influential member of my peer group.	1	2	3	4	5	6	7
9	I consider my self to be creative and original in my thinking and behavior.	1	2	3	4	5	6	7
10	I am aware that I am usually one of the last people in my group to accept something new.	1	2	3	4	5	6	7
11	I am an inventive kind of person.	1	2	3	4	5	6	7
12	I enjoy taking part in the leadership responsibilities of the groups to which I belong.	1	2	3	4	5	6	7
13	I am reluctant about adopting new ways of doing things until I see them working for people around me.	1	2	3	4	5	6	7
14	I find it stimulating to be original in my thinking and behavior.	1	2	3	4	5	6	7
15	I tend to feel that the old way of living and doing things is the best.	1	2	3	4	5	6	7
16	I am challenged by ambiguities and unsolved problems.	1	2	3	4	5	6	7
17	I must see other people using new innovations before I will consider them.	1	2	3	4	5	6	7
18	I am receptive to new ideas.	1	2	3	4	5	6	7
19	I am challenged by unanswered questions.	1	2	3	4	5	6	7
20	I often find myself skeptical of new ideas.	1	2	3	4	5	6	7

APPENDIX B

Computer Opinion Survey (CAIN)

Computer Opinion Survey

Instructions: Please indicate how you feel about the following statements. Select the appropriate circle after each question to indicate your feelings.

		strongly disagree	disagree	slightly disagree	slightly agree	agree	strongly agree
1	Having a computer available to me would improve my productivity.	1	2	3	4	5	6
2	If I had to use a computer for some reason, it would probably save me same time and work.	1	2	3	4	5	6
3	If I use a computer, I could get a better picture of facts and figures.	1	2	3	4	5	6
4	Having a computer available would improve my general satisfaction.	1	2	3	4	5	6
5	Having to use a computer could make my life less enjoyable.	1	2	3	4	5	6
6	Having a computer available to me could make things easier for me.	1	2	3	4	5	6
7	I feel very negative about computers in general.	1	2	3	4	5	6
8	Having a computer available to me could make things more fun for me.	1	2	3	4	5	6
9	If I had a computer at my disposal, I would try to get rid of it.	1	2	3	4	5	6
10	I look forward to a time when computers are more widely used.	1	2	3	4	5	6
11	I doubt if I would ever use computers very much.	1	2	3	4	5	6
12	I avoid using computers whenever I can.	1	2	3	4	5	6
13	I enjoy using computers.	1	2	3	4	5	6
14	I feel that there are too many computers around now.	1	2	3	4	5	6
15	Computers are probably going to be an important part of my life.	1	2	3	4	5	6
16	A computer could make learning fun.	1	2	3	4	5	6
17	If I were to use a computer, I could get a lot of satisfaction from it.	1	2	3	4	5	6
18	If I had to use a computer, it would probably be more trouble than it was worth.	1	2	3	4	5	6
19	I am usually uncomfortable when I have to use computers.	1	2	3	4	5	6
20	I sometimes get nervous just thinking about computers.	1	2	3	4	5	6
21	I will probably never learn to use a computer.	1	2	3	4	5	6
22	Computers are too complicated to be of much use to me.	1	2	3	4	5	6
23	If I had to use a computer all the time, I would probably be very unhappy.	1	2	3	4	5	6
24	I sometimes feel intimidated when I have to use a computer.	1	2	3	4	5	6
25	I sometimes feel that computers are smarter than I am.	1	2	3	4	5	6
26	I can think of many ways that I could use a computer.	1	2	3	4	5	6

APPENDIX C

Teaching with Technology Instrument (TTI)

Teaching with Technology Instrument (TTI)

Instructions: The purpose of these questions is to examine the current status of your beliefs, understanding, and use of technology in your pre-service training. Please read each statement and indicate whether you possess that skill by placing a check mark in either the yes or the no box to the left.

Yes	No		
☐	☐	1.	Use a word processor to enter text, edit, change the format of a document, save and retrieve documents, check spellings, print documents and use graphics tools.
☐	☐	2.	Use desktop-publishing software to import text, format text and layout, and import graphics by producing a class newsletter.
☐	☐	3.	Demonstrate how word processing enhances the writing process.
☐	☐	4.	Compose and send e-mail to support classroom projects.
☐	☐	5.	Understand the social, legal, and ethical issues related to telecommunication use.
☐	☐	6.	Use writing/communication technology in the discipline/subject for learning.
☐	☐	7.	Understand how writing/communication technology can be used to meet the learning styles of students.
☐	☐	8.	Plan writing/communication activities for computer labs and/or classrooms with one or multiple computer resources.
☐	☐	9.	Demonstrate a knowledge of installation of writing and telecommunication hardware/software and appropriate troubleshooting techniques.
☐	☐	10.	Explore how higher order thinking skills and problem solving can be enhanced by writing/communication technology.
☐	☐	11.	Apply understanding of physical settings, organizational and classroom management strategies that support active student involvement, inquiry, and collaboration.
☐	☐	12.	Apply understanding of the Texas Essential Knowledge and Skills for Technology Applications as related to writing and communication.

13. For the title of a document, I can vary the typeface and size (e.g., I can use 18 point Times rather than 10 point Helvetica).
14. Explain how to insert a forced page break into a document.
15. Use a spreadsheet by accessing an existing spreadsheet and creating a new spreadsheet to manage and interpret information.
16. Create a bar graph on the computer that is linked to a spreadsheet.
17. Enter a function in a spreadsheet cell.
18. Use a database by sorting an existing database and creating a new database to manage and interpret information.
19. Use telecommunications by accessing bulletin boards, online services, and the Internet
20. Access resources for planning instruction available through telecommunications (e.g., experts, lesson plans, authentic data, and curriculum materials).
21. Understand differences between public domain, freeware, shareware, and commercial sources of software.
22. Understand the role of media in effective communication.
23. Understand social, legal, and ethical issues related to information access and management.
24. Demonstrate the use of information access and management in the discipline/subject for learning and as a medium for communication.
25. Understand the characteristics, strengths, and weaknesses of media-communication tools and techniques.
26. Demonstrate effective and appropriate use of computers and other technologies to communicate information in a variety of formats on student learning to colleagues, parents and others.
27. Understand how information access and management can be used to meet the various learning styles of students.
28. Plan information access/management activities for computer labs and classrooms with one or multiple computer resources.
29. Demonstrate a knowledge of installation of hardware/software and appropriate troubleshooting techniques as related to information access and management.
30. Explore how information access/management technology can enhance higher order thinking skills and problem solving.

		31. Explain what WWW means within the telecommunication context.
		32. Demonstrate or explain to another person how to access an e-mail account.
		33. Understand how to set up and manage a telecommunications project between schools in different geographical areas.
		34. Effectively use distance learning, online conferences relevant to professional information needs, desktop teleconferencing, and tele-teaching technologies.
		35. Demonstrate development of performance tasks that require students to locate and analyze information as well as draw conclusions and use a variety of media to communicate results clearly.
		36. Apply understanding of the Texas Essential Knowledge and Skills for Technology Applications as related to information access and management.
		37. Demonstrate a knowledge of installation of hardware/software and troubleshooting techniques as related to CD-ROMS, LCD panels, television monitors, video equipment, scanners, digital cameras, and teleconferencing equipment.
		38. Understand differences between public domain, freeware, shareware, and commercial sources of software and review copyright laws to ensure compliance with copyright law, fair-use guidelines, security, and child protection.
		39. Understand social, legal, and ethical issued related to multimedia production.
		40. Use and understand the difference between linear multimedia presentation and a nonlinear multimedia presentation. Understand terms such as media, multimedia, hypermedia, and clip media.
		41. Demonstrate multimedia use in the discipline/subject for learning and a medium for communication.
		42. Understand how multimedia production can be used to meet the various learning styles of students.
		43. Plan multimedia activities for computer labs and/or classrooms with one or multiple computer resources.
		44. Plan a lesson incorporating appropriate technology that includes use of productivity software, online resources, or both.
		45. Explore how multimedia production can enhance higher order thinking skills and problem solving.

☐ ☐ 46. Apply understanding of the Texas Essential Knowledge and Skills for Technology Applications as related to multimedia production.

APPENDIX D

Demographic Information Survey

Demographic Information

Please answer each question truthfully and to the best of your knowledge

1. What is your age? __________
2. What is your gender? Circle one female male
3. What is your classification? Circle one
   Freshmen Sophomore Junior Senior Graduate Student

Early Childhood (EC-4)	Middle School (4-8)	Secondary (8-12)	All-Level	Graduate
	Generalist			
	Specialist • Math • Science • Reading/language arts • Social Studies	• Business Administration • Computer Information Systems • English/language arts • History • Life Science • Mathematics • Physical Science • Composite Science • Composite Social Studies • Theater Arts • Spanish • Speech	• Art • Music • Physical Education	• Early Childhood • Secondary • Special Education • Education Administration

4. What is your certification level? Circle your level or teaching field(s).

5. For how many college hours do you have credit? ________

6. Put an x in column A if you have taken or are currently enrolled in any of the following courses.
   Put an x in column B if the professor used technology to teach the course.

Put an x in column C if you were required to use technology on your assignments or field placements for that course.

	Column A	Column B	Column C
	Taken the Course	Technology was used by the professor to teach the course	You used technology in the assignments or field placements
Secondary Education			
EDS 3310 Foundations of Education			
EDS 3320 Instructional Technology			
EDS 4330 Managing Diverse Classrooms			
EDS 4340 Reading, Writing and Thinking in Secondary and Middle Schools			
EDS 4350 Design, Delivery and Assessment			
EDS 4360 Seminar in Education			
EDS 4660 Student Teaching			
Elementary Education			
EEL 2302 Educational Software Applications			
EEL 2310 Teachers, Schools, and Society/Tutoring			
EEL 3310 Instructional Technology			
EEL 3320 Early Childhood Education			
EEL 4160 Teaching Certification I			
EEL 4170 Teacher Certification II			
EEL 4210 Classroom Management and Organization			
EEL 4301 Social Studies Methods/Practicum			
EEL 4302 Mathematics/Science Methods			
EEL 4320 Assessment and Evaluation in the Elementary School			
EEL 4340 The Elementary/Middle School			
EEL 4660 Student Teaching in the Elementary/Middle School			

Special Education			
ESP 3382 The Exceptional Child			
Reading			
REA 2210 Critical Reading			
REA 2310 Introduction to Reading			
REA 3330 Literacy and the Young Child			
REA 3340 The Reading Writing Connection/Observation			
REA 4350 Practical Applications to Reading			
REA 4360 Reading Across the Curriculum/Practicum			
English			
ENG 3300 Literature for Children and Young Adults			
Computer Information Systems			
CIS 1100 Basic Computer Literacy			
CIS 1300 Micro Applications I			
CIS 2300 Microcomputer Applications II			
CIS 2302 Computers for Teachers			
Graduate Education			
EDU 5101 Action Research A			
EDU 5102 Action Research B			
EDU 5103 Action Research C			
EDU 5301 Action Research for the Educator			
EDU 5302 Advanced Learning Theory and Human Development			
EDU 5303 Integrating Educational Technology			
EDU 5304 Theory and Design of Instruction and Assessment			
EDU 5310 Elementary School Science and Math			
EDU 5311 Elementary School Language Arts and Social Studies			
EDU 5312 Exceptionality			

EDU 5313 Topics in Education			
EDU 5314 Seminar in Reading			
EDU 5315 Instructional Leadership			
EDU 5320 Educational Law			
EDU 5321 Principles of Supervision			
EDU 5322 Educational Business Management and Finance			
EDU 5323 Administrative Theory and Educational Leadership			
EDU 5324 Administration of Special Programs			
EDU 5325 Advanced Curriculum Design and Development			
EDU 5326 The Principalship			
EDU 5327 Administrative Internship			
EDU 5328 Integrating for Enrichment			
EDU 5329 Content Area Literacy			
EDU 5330 Issues in Education			
EDU 5331 Business and Personnel Management			
EDU 5332 Teaching with Merging Technologies			
EDU 5333 School and Community Leadership			
EDU 5334 Internet Curriculum Integration			
EDU 5335 Educational Technology Resource Management			
EDU 5336 Technology Tools for Critical Thinking			
EDU 5337 Leadership in the Technology Program			
EDU 5344 Working with Parents and Families of Disabled Children			
EDU 5345 Language Development in Children			
EDU 5346 Behavior Management of Disabled Students			
EDU 5347 Assessing the Disabled			

Child			
EDU 5348 Adapting the Curriculum for Students with Disabilities			
EDU 5349 Internship			

If you do not have specific teaching fields/content areas skip to question **10.**

7. How many hours have you earned in your teaching field(s)/Content Area?
   Teaching field 1 ______________ Teaching field 2 _________________
8. In your content area classes, did your professor use technology to teach the class? Yes No
   If yes, how many classes? ______________
9. In your content area classes, were you required to use technology? Yes No
   If yes, how many classes? ______________

10. What is your Student ID # (not your social security number but the number on your student ID card)? This is only being used for clerical purposes, IT WILL NOT BE USED TO IDENTITY YOU AND YOUR RESPONSES TO THESE SURVEYS!
    Student ID # ____________________

APPENDIX E

IRB Form

Institutional Review Board (IRB) Form

Claim for Exemption
from Review by the
Human Subjects Protection Committee

Notice
Advertising, recruitment of subjects, mailing or distribution of surveys, and the collection of data may begin only after this claim has received approval (allow 10 days for processing). The Committee may, upon review of this claim, deny the request for an exemption and route the proposal for review.

Faculty PI's Last Name: Maushak Abbreviated Title Computer Anxiety and Innovativeness
First 4 words of title

BASIS OF CLAIM FOR EXEMPTION. Federal regulations and/or University policy require that in order for research to be exempt from review at least one of the following blocks (1-4) must be checked.

Note: Limitations for exemptions for children: Exemptions cannot be granted for: (a) projects with children as subjects that involve interview or survey procedures or (b) research where public behavior is observed and the investigator participates or interacts with the children. These projects require expedited or full review.

X 1. The research will be conducted only in established or commonly accepted educational settings (like classrooms) **AND** it involves normal educational practices such as research on regular and special educational instructional strategies, or research on the effectiveness of, or the comparison among, instructional techniques, curricula or classroom management methods.

X 2. The research involves the use of only the following techniques Check the applicable technique(s):

___ educational tests (cognitive, diagnostic, aptitude, achievement), or

X survey or interview procedures, or

___ observing the public behavior of subjects,

AND (one of the following must be checked):

X the information obtained will be recorded in such a manner that subjects *cannot* be identified *directly or through identifiers linked to the subjects*, or

_ if any disclosure of the subjects' responses outside the research could not reasonably place the subject at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation (e.g., information regarding illegal or immoral conduct, drug or alcohol use, sexual behavior, mental illness, or other possibly personally embarrassing subjects), or

___ the subjects are elected officials or candidates for public office.

_____ 3. The research is limited to the collection or study of existing data, documents, records, pathological or diagnostic specimens under one of the following conditions: (one of the following must be checked):

_____ they are available to the public or

_____ they recorded *by the investigator* in such a manner that subjects *cannot* be identified, *directly or indirectly*, through identifiers linked with the subjects.

4. Another provision of 45 CFR 46.101 (2). Please identify the subsection and describe in detail how the category applies to the proposed research.

STATEMENT OF RISK:

The undersigned certify that they believe that the conduct of the above described research creates no risk of physical or emotional harm or social or legal embarrassment to any subject. Any modifications that (a) change the research in a substantial way, (b) might change the basis for exemption, or (c) might introduce any additional risk to subjects should be reported to the IRB, before they are implemented, in the form of a new claim for exemption or a proposal for expedited or full board review.

Signature of TTU Faculty Principal Investigator **Date**

Signature(s) of Co-investigators Including Students **Date**