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Integrating Technology: Influences on Attitudes and Self-Efficacy Beliefs in Preservice Education Technology Courses

A Dissertation

Submitted in Partial Fulfillment of the Requirements for the

Doctor of Education Degree

Union University

Karolyn E. Parchman

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"The element of discovery is very important. I don't repeat myself well. I want and need that stimulus of walking forward from one new world to another." (Margaret Bourke-White)

This dissertation was a collaborative effort by many. Yes, I may have written the words on the pages, but without the help of many people this journey in my life would have never have come to fruition. I must first give praise to my Lord. Whenever I questioned my ability to survive or complete this process, I was reminded of the strength that only He provides and, when called, He will give you strength to survive and succeed. I am forever in debt to my husband, Adrian. Without his support, abundant sacrifice, and encouragement, I never could have made it. I would like to thank my parents for their unending love and support, always pushing me to whole-heartedly give my all when involved in anything. I also wish to express gratitude to Dr. Dottie Myatt, my chair, Dr. Monte Tatom, Dr. Anna Clifford, and Dr. Michele Atkins, who were always helpful and offered invaluable assistance and guidance. To the cohort of 2012, life will never be the same after spending every Saturday for two and a half years with you. The knowledge gained and support given from each member was life-changing personally, professionally, and academically. In addition, a thank you to Kerri Anne Kimery-Breeden, whose enthusiasm for life's simple pleasures had lasting effects.

My destination is yet to be determined, but as I travel along this journey I know the choices I make will affect where I'll go – and who I will become by the end of it. My journey will require many decisions, and along the way I'll meet new people, brush up against new ideas, question old assumptions, and make hard decisions. The education I received at Union University will become helpful in making choices that will affect the quality of this wonderful journey. So, I'll plan carefully and stay alert for that intersecting path that may lead me to unexpected opportunities as we "Never brag about the day to come, because you don't know what it might bring." (Proverbs 27:1)

ABSTRACT

The purpose of this study was to investigate the attitudes and beliefs of technology integration of preservice teachers before and after completing a stand-alone technology class within their program of study at three Southern, faith-based and public institutions whose licensure programs have been approved by the Tennessee Department of Education. Specifically, the attitudes and beliefs that were studied were the preservice teachers' self-efficacy when using technology in general and in integrating technology into classroom instruction. Additionally, the purpose was to study the preservice teachers' comfort level when using technology in general and in classroom instruction and their perceived usefulness of technology in general and in classroom instruction. This was a quantitative study using a pre- and post-Likert-type survey design. Participates were enrolled in a stand-alone instructional technology course within their teacher education program of study at three universities in West Tennessee. The independent variable for all three research questions was the grouping variable of students before and after technology instruction. The dependent variables for the research questions were the perceived comfort toward computer technology, the teacher candidate's self-efficacy in using computer technology, and lastly, the teacher candidate's perceived usefulness of computer technologies in teaching. Three different tests were utilized to measure the difference in each teacher candidate's perceived comfort level, self-reported self-efficacy level, and usefulness toward computer technologies in instruction to enhance student

learning prior to and after completion of the instructional technology class. A repeated measures ANOVA was used to compare responses from all participants who took the presurvey to responses from all participants who took the postsurvey. A nonparametric Wilcoxon test was used to compare responses from participants who took both the presurvey and postsurvey. Lastly, a MANOVA was used to compare responses from participants by location.

The ANOVA revealed that, overall, no significant difference was found between the presurvey and postsurvey results when evaluating the relationship of the attitudes and beliefs of technology integration of preservice teachers before and after completing a stand-alone technology class within their program of study, specifically their feeling of overall comfort levels, self-efficacy, and usefulness. However, when disaggregating the data into pre/post participant match-up, institution, and pre/post overall using a Wilcoxon data treatment, significance levels positively increased. There was a significant difference in self-efficacy beliefs of students at a significance level of .005. A parametric paired sample t-test confirms the Wilcoxon.

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CHAPTER 1

INTRODUCTION

How people learn has changed over time. Early accounts of education were highly personal. Even before the evolution of language and written words, mankind found that storytelling was the best way to educate others. With the advent of the spoken word, stories were often developed and used to explain why things are the way they are. Even after the development of the written language, oral storytelling was still the primary conveyance of information, history, and entertainment. Many of the classic pieces of literature originated from the form of storytelling. The oral stories passed from adults to children were both informational and educational. Stories were a kind of one-to-one tutoring with a personalized outcome in mind. This style of teaching or one-to-one tutoring proved beneficial for generations. Bloom (1984) found that students who were tutored one-to-one outperformed 98% of students who were learning via conventional methods. However, one-to-one learning is not cost effective, so today, students are educated in classrooms of 20 or 30 students.

The National Education Association (NEA) considers 15 students to be the optimum class size, especially in regular programs of teaching in kindergarten and first grade. NEA also states that studies show smaller classes continue to reap academic benefits through middle and high school, especially for minority and low-income students. While it may be true that smaller class size is more beneficial to students and

teachers, there are few schools in the nation that meet this suggested guideline. A school's operating budget, governed by the state, simply does not allow for classrooms of a smaller size. In fact, many schools consider themselves lucky if they are able to keep classroom sizes under 25 or 30 students.

Classroom size is important because if a teacher has too large of a student-to-pupil ratio, he/she is unable to give each student the much needed one-to-one time. Previous methods of teaching such as storytelling proved beneficial in literacy development and increased student knowledge of self and others (Mello, 2003). Teachers with smaller class sizes are able to meet the needs of each individual student, which, in turn, helps the students to better succeed in school. Students prefer smaller class sizes, too. In smaller classes, students feel it's easier to learn and receive the one-to-one instruction they need to grasp the skill being taught in great depths. Yet, instead of education driving the budget, the budget drives education.

As technology advances, classrooms are moving online, and students all across the world are watching lectures. One educator can teach hundreds or thousands of students at one time. Therefore, educational technology, for the most part, is being used to educate the masses. Even though education is adapting to this new worldwide culture of educating everyone, personalized learning is not lost forever. Students have a wide range of learning opportunities because of online learning. They are able to personalize their education to meet the needs of their intrinsic and extrinsic learning motivation. Today, the vision of modern education is built around that same personalized learning, addressing the intrinsic motivation to learn (Andersen, 2011).

Learning technologies today share a vision of personalized learning that abandons the traditional lecture-based approach and utilizes resources outside of formal education. Gone are the days of a diploma signifying the authorization to stop learning. In today's world, careers shift overnight. In order to stay ahead of the game, learning must never stop. Computer programs are replacing people in many occupations. A world where pens, pencils, and paper are collector's items and where every K-12 student will have a laptop or wireless device for reading and writing is not unimaginable (Bromley, 2010).

Statement of the Problem

As the number of computers accessible to students and teachers has increased so has emphasis for integrating technology across the curriculum. Even though schools increasingly invest in new technologies, actual use of technology remains limited. Access to the Internet and digital tools has influenced students' way of thinking, communicating, and learning. Most current preservice teachers know how and are good at communicating and using online technologies. However, the concern is whether these preservice teachers are prepared to integrate these technologies in meaningful and effective ways (Lei, 2009; Sadaf, Newby, & Ertmer, 2012). Lack of preparation for the use of technology to enhance instruction, outdated hardware or software, minimal support, time constraints, and lack of interest are some of the barriers faced when trying to meet the demands of integrating technology into instruction. In light of this, many schools, colleges, and educational departments are rethinking how teachers are prepared to use technology. In the area of preservice teacher education, higher education institutions have an important

responsibility to provide the education needed for successful infusion of technology into the classroom.

Purpose of the Study

The purpose of this study was to investigate the relationship of preservice teachers' technology self-efficacy, comfort level, and perceived usefulness toward technology on those who completed a stand-alone technology class within their program of study at three Southern, faith-based and public institutions that meet the licensure requirements for the state of Tennessee. In 2008, the Tennessee State Board of Education adopted the International Society for Technology in Education (ISTE) National Educational Technology Standards for Teachers (NETS•T) to aid in the support of the board's master plan by helping teachers help students understand how to access information and communications supportive of the curriculum used in Tennessee schools (Tennessee State Board of Education, 2008). Given the technology-driven nature of our global, information-based society and the state-mandated technology integration adoption, previous research indicates in the area of preservice teacher education, higher education institutions have an important responsibility to provide the education needed for successful infusion of technology into the classroom. However, there are few studies that have researched the relationship of teachers' self-efficacy and the programs they completed.

Research Questions

1. Will students who complete the Influences on Attitudes and Self-Efficacy Beliefs Survey instrument in an instructional technology class prior to and after

completion of the course show significant change in their perceived comfort and anxiety level toward computer technologies?

2. Will students who complete the Influences on Attitudes and Self-Efficacy Beliefs Survey instrument in an instructional technology class prior to and after completion of the course show significant change in their confidence and self-efficacy in using computer technology in teaching?
3. Will students who complete the Influences on Attitudes and Self-Efficacy Beliefs Survey instrument in an instructional technology class prior to and after completion of the course show significant change in their perceived usefulness of computer technologies in teaching?

Definitions of Terms

The following meanings will provide a clearer understanding of the terms used in this study:

Self-efficacy. According to Wikipedia, "how one judges one's own competence to complete tasks and reach goals" ("Self-efficacy," July, 2012).

Technology use. Demonstrating one's ability to manipulate and work technology hardware and software.

Technology integration. Demonstrating the ability to use technology effectively to support instruction in new and innovative ways.

ISTE. The International Society for Technology in Education is a membership association for educators and education leaders engaged in improving learning and teaching by advancing the effective use of technology in PK-12 and teacher education.

ISTE standards. The standards for learning, teaching, and leading in the digital age.

21st century learning. A growing global movement to redefine the goals of education, to transform how learning is practiced each day, and to expand the range of measures in student achievement in order to meet the new demands of the 21st century" ("How do you", 2010, para. 1).

One-to-one. When a school environment has one computer device per student and teacher.

Pedagogy. The method and practice of teaching.

Significance of the Study

As modern education becomes more user-generated and technology-focused, rapid advances in technology are putting new demands on educators and students. Faltos (2002) stated that "over the last fifteen years American schools have dramatically increased spending on classroom technology to more than $5 billion annually because there has been a widely held belief by governmental, business and educational leaders" (para. 1) that wiring classrooms for Internet and installing technology such as computers, smartboards, document cameras, and LCD projectors will improve teaching and learning. This implies a belief that the more we are invested in the wiring, buying hardware and software, and distributing of equipment, the more we will see an increase in the improvement of teaching and learning. As the number of computers accessible to teachers increases, so does the emphasis on integrating technology across the curriculum. While researchers agree that a key objective to academic success is technology

integration, efforts must be made to ensure that new teachers have the skills necessary to select and use technology effectively. In a 2010 survey conducted by Project Tomorrow (2012) preservice teachers were surveyed about their views on technology use. Participants were asked what type of technology they would use to enhance student achievement. Three of the top four responses were digital media tools, interactive whiteboards, and computer projection devices. All three support a teacher-centric classroom. "The obvious indication is the gap between the rudimentary technology skills that colleges of education are instilling in new teachers and the high-level tech savvy K-12 students are exhibiting in schools" (Fletcher, 2010, para. 5). In order to rethink our current beliefs about technology and prepare teachers to teach with 21st century skills and tools that go far beyond just disseminating technology into the classrooms, educational institutions must prepare teachers who are capable of creating and delivering high-quality, technology-enhanced lessons to improve student learning (O'Bannon & Judge, 2004).

CHAPTER 2

REVIEW OF LITERATURE

To achieve the types of technology uses required for 21st century learning, teachers need to understand how to use technology in meaningful ways and create lifelong learning opportunities that allow both the student and the teacher to construct deep and connected knowledge. Effective use of technology makes it possible to adopt new and better approaches to learning, instruction, and assessment. It is no longer appropriate to suggest that the lecture, worksheets, and utilization of the knowledgebase of a single classroom educator are adequate to meet the needs of the 21st century learner. Using technology to support lecture-based instruction falls short of best practices (Ertmer & Ottenbreit-Leftwich, 2009). Student-centered, constructivist practices, and technology integration uses are particularly powerful and vital to achieve the level of education required to stay competitive in an ever-changing global market (Ertmer & Ottenbreit-Leftwich, 2009). The teaching process is fundamentally changing; technology integration is central to any discussion of teacher change. According to Rockman (2004), at least 1 in every 6 U.S. school districts has a laptop initiative program. Two of the largest initiatives, Microsoft Anytime, Anywhere and Apple's One-to-One, allow for teacher and student use of wireless technology at school and often at home. Technology is routinely incorporated into teaching in familiar ways such as by using word processing, spreadsheet building, and research. Electronic portfolios have replaced paper and pencil

assessments, allowing students to demonstrate learning in multiple ways (Allsopp, McHatton, & Cranston-Gingras, 2009). With preparing students for the 21st century in mind, technology is not the key to change; teachers are the agent of change.

Rapid Change in Technology and Teacher Education

Historically, compared to K-12 schools, university-level teacher education programs have been slower to incorporate instructional technology, unlike in the business sector, where one must adapt to emerging technologies to remain in business. Education, a necessary part of society, has been isolated from the demands that technological change has made on other areas (Blake, Holcombe, & Foster, 2000). A recent push to increase the integration of technology into teacher education programs has intensified (Kay, 2006). "National teacher education organizations have called for increased attention to technology in the curriculum, and many colleges of education across the country have begun to embrace the use of laptops as a mechanism for integrating technology in teaching" (Allsopp et al., 2009, p. 337).

In 1999, the National Center for Education Statistics (NCES) reported professional development desires of teachers using the Schools and Staffing Survey (SASS; Choy, Chen, & Bugarin, 2006). Approximately 4,700 public school districts, 12,000 public and private schools, 12,300 public and private school principals, and 52,000 public and private school teachers responded to the 1999–2000 survey. The survey reported that most (79%) teachers believe their greatest professional development need concerning technology was information about technology integration. Moreover, the

NCES found that only 33% of teachers surveyed felt ready to use computer-related tools, and even fewer (20%) felt well prepared to integrate technology into instruction (Choy, Chen, & Bugarin, 2006).

To combat the illiteracy in educational technology training, the U.S. Department of Education (2000) funded a program intended to enhance the capabilities of teachers and their use of technology. The program, Preparing Tomorrow's Teachers to Use Technology (PT^3), was designed to guide the implementation of a planned strategy that could assist in the development of such teachers. PT^3 began in 1999 during a time of massive technological growth throughout the nation in schools, businesses, and government areas. Efforts were put forth to upgrade computer and network systems to connect all businesses, schools, and universities. Since 1999, PT^3 has awarded over 400 grants to education consortia to help address the challenge of teachers feeling uncomfortable using technology in their teaching. These grants include projects designed to transform teaching and learning through:

- Faculty development
- Course restructuring
- Certification policy changes
- Online teacher preparation
- Enriched Virtual Network
- Video case studies
- Electronic portfolios
- Mentoring triads
- Embedded assessments

Support innovations developed by consortia of higher education institutions, state agencies, school districts, nonprofit organizations, and others transformed teacher preparation programs into 21st century learning environments. Grants supported campus-

wide program improvements by infusing technology throughout the teacher education programs. The goal was to see changes in: pedagogy, curriculum and faculty development, incentives and rewards, professional assessment and credentialing, budgeting and support for a new information technology infrastructure, and the formation of new organizational partnerships that transcend the boundaries of traditional classrooms and schools (U.S. Department of Education, 2000).

The University of Kansas utilized PT^3 funding to create a systematic model for fostering technology integration into teacher education programs. The model, Learning Generation, used teacher education students, university faculty, and K-12 teachers to work together in a group to discover solutions for integrating technology to meet the needs of teaching and learning. According to Aust, Newberry, O'Brien, and Thomas (2005), an educational technology course was essential and a more comprehensive strategy was needed to prepare preservice teachers to integrate technology throughout their teaching careers. Learning Generation's basic design developed a model for integrating technology that includes ongoing collaboration and innovation. The goal of the model was to assess the teacher education candidates' perceptions and abilities concerning technology; improve the technology literacy of teacher education faculty; empower faculty, students, and cooperating teachers with the tools, skills, and technical support needed to integrate technology into teaching; engage cohorts in adopting and developing innovative approaches for integration; improve communication and collaboration; and use a variety of strategies for disseminating innovation in integrating technology in teacher education. Participants consisted of 244 students, 16 professors,

and five graduated teaching assistants. The group was surveyed using a 30-item questionnaire that covered various technology skills. Participants received a total score as well as scores on five subcategories: basic computers skills, online activities, presentations, software use, and work processing. A one-way repeated measures ANOVA was used to compare the scores on the six subscales, and survey responses were used on a 5-point Likert scale with a possible total score range of 30-150.

Out of 15 pair-wise comparisons, all were significant except for one, the spreadsheet/database and presentations comparison. Overall, the faculty and students had more confidence in their ability to use word processing than in their ability to use spreadsheet and database programs. Most of the participants scored a 3 or higher on the word processing (87%), online activities (75%), and basic computer skills (82%). A follow-up interview of 20 professors and six graduate teaching assistants asked about the advantages of using information technology in teaching. Nearly all of the participants (89%) felt that information gathered using technology was easier than other methods, and many (49%) felt that teacher graduates should be able to teach effectively with technology and know-how to find appropriate resources and information (Aust et al., 2005). The model is viewed as an important component for fostering technology integration in teacher education by faculty and students. The interviewer also asked professors about the influence modeling technology had on creating a positive influence on their students' use of technology, and some faculty (37%) felt it was important. The Learning Generation model supports the structure, goals, and culture of teacher education

programs' attempt to integrate technology through working with and observing teachers and students during classroom activities.

Allsopp et al. (2009) examined a university department of special education's attempt to integrate technology within its undergraduate teacher education program. Specifically, this department implemented a one-to-one laptop initiative. The philosophy behind this initiative advocated that systematic technology integration and continuous support across the students' program of study must be provided for effective use of technology in teaching. The initiative was structured such that preservice teachers received support from faculty and other staff across three semesters to become proficient in using technology skills in their own teaching. Faculty modeled the integration of technology for teaching by emphasizing technical skills and processes needed to successfully infuse technology in teaching. Presurveys and postsurveys were categorized into three quantitative measures: self-perception of ability to use technology for teaching, attitudes toward integration of technology in teaching, and perceptions of how faculty integrated technology into their teaching for special education courses.

Significant differences were found from pretest to posttest for each semester of the study. Skills for which preservice teachers showed the greatest gains were in self-perception of ability (+1.62 - +2.15). Attitudes toward the use of technology in teaching did not change across Semesters 1 and 2; however, participants' attitudes about technology were positive from the start. At the end of Semester 3, participants felt more confident with their use of technology and had a sense of accomplishment with minimal barriers (logistical and hardware issues). Descriptions of how they would use technology

in their teaching were limited to a particular software or hardware application. Little discussion was related as to how they would use the software or hardware to enhance students' learning. In general, the results of this study suggest that a systematically structured technology plan can positively affect preservice teachers' self-perception of instructional technology abilities (Allsopp et al. (2009).

The Readiness for Change in Teacher Education Programs

An additional study (Iding, Crosby, & Speitel, 2002) supports the need for a developmental model for effective technology integration strategies for preservice teachers. This model would equip teachers to fight the multiple barriers presented by rapid technology growth and implementation in business and society in general. Lack of funding, no access to the Internet at home, slow Internet connection at school, and old equipment are just a few of the barriers that prevent students from being college and career ready when they graduate. The model will prepare teacher candidates to not only utilize what is available to them when they enter the education workforce but will also equip them with the knowledgebase to successfully integrate technology within their future classroom environment (Iding, Crosby, & Speitel, 2002). To help institutions overcome these obstacles, the International Society for Technology Education (ISTE), a professional organization dedicated to increasing the effective use of technology, has identified 10 prerequisite factors that need to be present in preservice education. These essential conditions enable teachers to create learning situations that incorporate the use of instructional technology in the classroom (Iding et al., 2002). These conditions are: shared vision, access, skilled educators, professional development, technical assistance,

content standards and curriculum resources, student-centered teaching, assessment, community support, and support policies. As preservice teachers learn about and create these conditions, research shows (Abbitt & Klett, 2007; Iding et al., 2002; Wang, Ertmer, & Newby, 2004) that preservice teachers' proficiency with computers continues to rise as does interest in learning more about technology for educational purposes.

Nonetheless, Iding et al. (2002) found that the majority of preservice and practicing teachers in their study were unaware of any educational software or hardware that could be helpful with their teaching and did not use not use technology in many teaching-related tasks. The authors examined the recent goals and purposes of computer resources and support, self-assessment of level of computer proficiency, and beliefs about the importance of including computers in instruction and showed that though effective learning and pedagogy are typically the most important consideration, technology serving the teachers' needs is the foundation upon which teachers and preservice teachers can expand or develop their own criteria regarding instructional technology.

Participants were 78 preservice and practicing teachers of diverse ethnicities enrolled in special education and science education courses. Results of a 25-item questionnaire resulted in 76 (97%) respondents reporting having a computer at home and over half (82%) having access to the Internet. The majority (65%) of respondents described themselves as having average computer experience, with e-mail and educational research being listed as the top type of activity for which they use technology. However, large numbers of respondents indicated that they never use technology for a wide range of activities. Among these were: tutorials (72%), remediation

(78%), enrichment for advanced students (65%), and demonstrations and simulations (73%). Despite high levels of personal use, nonuse for educational purposes suggests that learning how to use technology for educational purposes may be crucial for teachers and preservice teachers (Iding et al., 2002).

As accessibility to technology continues to grow, effective and meaningful assessment of the learning activities that attribute to the development of technology integration of both teachers and students will determine the success or failure of the understanding of technology in realistic settings. "Increasingly, many concepts and ideas cannot be taught without the aid of technology to represent and manipulate them" (Molnar, 1997, p. 67). For more than a decade, researchers have agreed that the success or failure of technology integration depends upon teacher training and that the training must have certain characteristics (O'Bannon & Judge, 2004). O'Bannon and Judge (2004) add that society cannot have a one-day, one-shot workshop and expect teachers to use technology as instructional tools. Teachers need to experience technology in a wide variety of settings, including site-based trainings that include authentic learning tasks. Likewise, training must be consistent and spread over time so that exploring the technology, reflecting, and collaborating will promote knowledge and confidence. Teachers need to feel comfortable with technology before they can include it in instructional practice. Having a plan in place for integrating technology into the educational environment is the basic piece for successful and fundamental integration.

Research indicates that only having technology training efforts is not enough (Collier, Rivera, & Weinburgh, 2004). Many schools, colleges, and departments of

education are rethinking the manner in which they prepare teachers to use technology. Higher education institutions are looking for new models to support technology integration (Rowley, Dysard, & Arnold, 2005). Research indicates that technology training can increase self-confidence in the use of instructional technology, but it is less supportive in creating competent teachers who are capable of choosing and integrating instructional technology effectively (Collier et al., 2004). According to Collier et al. (2004), time must be spent focusing on the skill level and disposition of the school educator's use of appropriate technologies. With the implementation of ISTE's National Education Technology Standards for teachers (NETS•T), teacher education programs have made the training of instructional technology a priority. The U.S. Department of Education in 2000 supported this by reporting that new graduates from teacher education programs are more likely to report that they are prepared to use computers in the classroom (Collier et al., 2004).

In 1999, the U.S. Department of Education granted the Early Childhood Education program funding to revisit its curriculum in an effort to be more critical and systematic in how colleges prepare their teachers to meet the ISTE NETS•T standards. Based upon the reflection, the Department of Early Childhood Education personnel built technology seminars that aligned to each of the standards into professional development courses each semester to ensure that all certified preservice teachers were comfortable using technology. A unique part of the U.S. Department of Education's program was the integration technique of the technology. There were no stand-alone technology courses. Technology was totally integrated into courses. The technology skill was taught in

conjunction with other course work and in technology seminars. After the skills were modeled, students were required to utilize the skill taught in assignments and presentations. As students mastered simple use of technology, other skills were introduced using the previously learned skill as a scaffold. Basically, as the students grew in their capability of technology use, so did the challenge of technology assignments given (Collier et al., 2004).

The overarching purpose of the study was to assess the effectiveness of technology infusion into Early Childhood Education (Collier et al., 2004). The participants of the study were 43 early childhood/elementary education teachers that participated in three 16-week terms in a fixed group, or cohort, and all were between the ages of 20-25. Both quantitative and qualitative data were collected through the use of surveys and the course syllabi. Through the development of technology-enhanced educational programs, teachers were produced that have the ability to acquire, select, and use instructional technologies effectively (Collier et al., 2004). Evidence from the course syllabi supported the effectiveness of deliberately scaffolded hands-on experiences and increased modeling by reporting that preservice teachers' levels of proficiency increased. "A supporting recommendation for teacher educators is to design programs that provide preservice teachers with multiple, real-world opportunities to learn and apply technology skills systematically and constructively in order to scaffold the mastery of more sophisticated technologies" (Collier et al., 2004, p. 466). Increasing the ability of choosing appropriate technology integration techniques in the classroom results in a

program that has technology skill development integrated seamlessly with required course material, producing technology-ready teachers.

Teacher Preparation and Implementation

As preservice teachers are required to utilize technology in coursework, the mindset of technology is changing. Confidence is being built through a support system of professors and cohort members. The ability to troubleshoot minor technology problems is increased with the practice of using technology. The mindset is changing from a fear or defiance of technology use to a group of beginning teachers who are much more likely to continue using learned technology skills and build upon skills that they have become accustomed to using at the preservice level. Dawson (2006) conducted a 4-year study that suggested "teacher inquiry counters many of the shortcomings associated with traditional strategies designed to promote reflective activity, focuses prospective teachers' attention on student learning outcomes rather than the logistical and managerial aspects of technology integration" (pp. 265-266). The study allowed prospective teachers the opportunity to integrate technology firsthand in K-5 classrooms and structured reflection time. During the experience, teachers collaborated with practicing teachers with an outcome of activities, lessons, and projects that all incorporated technology and focused on student achievement. Dawson's research supported not only that field experiences allowed for authentic learning and implementation of knowledge and skills, but that it also created a vehicle reflection that focuses on student outcome in technology-enhanced lessons and data collection strategies. "The use of computer-aided technology in the classroom will, no doubt, inspire the teachers to approach their tasks with a greater sense

of purpose and, more importantly, a sense of play to make the learning process fun for students" (Kumar, Rose, & D'Silva, 2008).

Field experiences infused with technology promote experience, connection, preparedness, and modeling (Bucci & Petrosino, 2004). Those categories will become the base for building upon technology skills while in the field. Once teachers know how to use educational technology, they build upon it by utilizing reflection, mentoring, and field experiences that all work together to meet the challenge of the 21st century, the successful integration of the National Education Technology Standards that promote student learning to create global citizens that are capable of competing in a global market and economy. Because of this, teachers not only need to know how to use technology in their teaching, but also how to use it in appropriate and meaningful ways (Bucci & Petrosino, 2004). Collaboration with all stakeholders is vital to providing a rich technology experience for teachers. Teachers have a responsibility to be prepared for the information age. Teachers have the professional responsibility to develop the full potential of existing and emerging technologies and model the appropriate uses for the common goal of creating a body of technology-savvy teachers. Bucci and Petrosino (2004) add that if the integration of technology is not modeled into the methods courses and field experiences, future teachers will not include technology in their own classrooms. The goal, therefore, is to not only teach technology but to infuse it into curriculum and field experiences so that teachers are connected to technology by using it appropriately, enhancing the learning environment.

To illustrate the effects of the challenge being met, Bucci and Petrosino (2004) gave an overview of the first six educational programs that model integration of ISTE standards in the field. These institutions modeled consistency in infusing technology throughout field experiences. Arizona State University West, University of Texas: UTeach, Curry School of Education, The University of Virginia, Ohio State University at Mansfield, Hope College, and Wake Forest University all provided training before and during the semester they spent with their practicum students and provided a mentor teacher who collaborated and helped to create technology-rich lessons for implementing while student teaching. The use of electronic portfolios, collaboration between colleges, philosophy, and assessment technologies were added to enhance classroom practice with emerging technologies. Bucci and Petrosino (2004) concluded that when technology is integrated into course content, objectives, and assignments, it is found that that integration of technology is fundamental. It provides preservice teachers with the foundation and confidence needed to use computers in the classroom.

Bucci (2003) found that given time, technology, assistance, and experience, students could create technology-rich lessons. Bucci showed that the lab provides preservice teachers with the structure and opportunities to build a knowledgebase for meeting the challenge, the ISTE standards. The purpose of the lab is to give students the experiences necessary to integrate technology into their classrooms. The lab provides students with instruction, equipment, and opportunities to take their technology into the classroom. It allows students to experiment with technology while giving them the experience from a student's perspective. While the lab encourages the use of technology

in an experimental way, it is building confidence in preservice teachers. This confidence in turn gives the student the experience necessary to integrate technology into the classroom and ultimately become a part of their pedagogy.

While observing two San Francisco area high schools, education researcher Larry Cuban (1993, 2009) observed that most teachers generally adhered to more traditional, teacher-centered practices and did not attempt to enhance their teaching practices with technology. Furthermore, the study noted that colleges could do a better job in technology training, but with an already full plate of course offerings, most have struggled with finding ways to bring their instructors up to speed in both the use of technology and observation of the use of technology. The purpose of the study was to gain a deeper understanding of teachers' technology perceptions of technology integration. Preservice teachers were given a framework to help guide classroom activities. The framework is best described by the acronym STAIRS:

- **S**ocial Studies Content
- **T**echnical Skills
- **A**ssessment
- **I**ntegration
- **R**eadiness
- **S**tandards

In conjunction with the 'T' in the acronym, technical skills, students were required to complete assignments that were technology based and easily applied to the classroom while improving their confidence in the use of technology. The research indicated that while the STAIRS model seems to be an excellent way to teach the

required social studies skills while integrating technology skills, there could be an issue arising with the technology ability of the preservice teacher coming into the class.

Organization and Implementation Support

Universities must provide opportunities for preservice teachers to engage with technology. Teaching them to work with emerging technology and adapt as needed is of increasing importance. While universities are providing adequate opportunities for connecting with technology, teacher educators must also consider the attitudes preservice teachers have toward technology. As teachers are encouraged to reflect in their classroom pedagogy, higher levels of reflection via a range of technology are desirable. It is a measure for showing that preservice teachers are still growing intellectually and emotionally during their preparation and are able to integrate and apply technology to their daily routine. Shoffner (2009) conducted a study on preservice teacher attitudes toward technology. In this study, preservice teachers showed a positive attitude toward reflecting with technology and were competent with computers, allowing them to adapt and apply to their use of technology in the classroom. Moore and Berry (2010) stated that

> The connective power of the Internet is breaking down the traditional locus of control in the school-learner relationship, and students will soon have endless learning options. This trend presents both opportunities and challenges. Because students will have easy access to information, the education delivery systems of the future will demand intensely individualized learning. The scarcest commodity will be attention, and successful educators will be those who can attract and hold students' interest while helping students develop the habits of mind and the digital

> facility they need to process and evaluate relevant information. Teachers who can customize learning experiences and facilitate them in both physical and virtual environments will be highly sought after (p. 37).

Teacher education programs are faced with the challenge of preparing teacher candidates with technology-rich skills for the 21st century. With innovative technology growing exponentially and current research in teaching and learning advancing, planning and implementation by teacher education programs must go beyond obtaining the latest equipment to consciously analyzing the knowledge, skills, and attitudes related to technology by preservice teachers. The triad model provides experiences to preservice teachers to ensure their success in PK-12 teaching. Universities must give opportunities for preservice teachers to integrate technology into their experience to effectively use it in teaching and learning.

Teacher Training and Development Initiatives

Now that universities are offering more opportunities for technology integration in coursework and field practice, the question becomes, What technology preparation is needed? Lei (2009) stated that teacher technology preparation is the most important step to integrating technology into education. Having the skill and positive attitude toward integration from both the digital native and immigrant is needed to prepare students to use technology in their future classroom. Not only is the ability or skill important in technology integration, but a teacher's beliefs, attitudes, and experience play a vital role in the strengths and weaknesses of technology competencies. Most preservice teachers fall into the digital native category; they were born with technology within their reach.

Their attitudes, beliefs, and confidence of technology use and integration are very different from a nontraditional student returning to college.

With this in mind, universities create a variety of learning experiences with projects, strategies, and resources for enhancing technology-learning experiences but often have difficulty in maintaining authenticity in the teaching experience. Teachers must have a wide variety of technology experiences to make sure they are equipped with the ability to integrate technology into the classroom with the technology equipment at hand. Strudler, McKinney, Jones, and Quinn (1999) showed findings are consistent with the evidence that beginning teachers are not being adequately prepared to teach with technology. The extremely complex educational environment to which a first-year teacher must adjust prompted Strudler et al. (1999) to survey teachers at the end of their first year regarding their general concerns, the problems they encountered, the support they desired and received, and the degree to which they felt prepared to implement various teaching management strategies (including the integration of technology). Using a 5-point Likert scale, teachers identified what they perceived as their greatest problems encountered during their first year. From the list of 23 possible items, obtaining adequate access to computer resources was rated eighth on the list in 1994 and fourth in 1995. Teachers also reported that in coursework and student teaching, their preparation for teaching with computers was lower than any other aspect of teaching listed in the survey, including instruction plan, working with other teachers, dealing with misbehavior, and managing classroom environment. The dilemma is common and must be addressed in partnership with school districts, universities, and departments of education. As

universities prepare teachers for their careers in education, technology ability must be assessed alongside other curriculum necessities.

Preparation for using technology in schools would best be viewed as the initial phase of a continuum that requires ongoing professional development and support (Strudler et al., 1999). Blankson, Keengwe, and Kyei-Blankson (2010) encouraged the use of portfolios in university education programs for the support of teacher technology competencies. They stated that the benefits of portfolios are twofold. Not only do they promote higher order thinking, they also meet the International Society of Technology Education's National Educational Technology Standards for Teachers. The purpose of the study was to see if university classes teach above students' skill level. This proves that preservice teachers are being challenged above their entering skill level and are given the opportunity to practice and refine technology integration techniques.

With the assistance of a grant, the University of Illinois at Urbana-Champaigns' preservice teachers participated in working sessions that were designed to build upon one another to produce teachers who value and feel comfortable integrating technology into the classroom (Basham, Palla, & Pianfetti, 2005). Thirty-four preservice special education teachers were used and their perceived ability determined prior to the tutorials. Their final ability and value of technology education was evaluated according to NETS•T standards after completing the tutorials. There was a great significance on the use of ISTE's NETS•T as a baseline for teachers' technology ability. It also noted, which is very important, that neither the students' age nor year in school could be used to predict their technology ability level.

The Technological Pedagogical Content Knowledge (TPACK) is a framework for understanding teachers' technological pedagogical knowledge. It is the overall knowledge teachers need in order to integrate technology into their curriculum. Schmidt et al. (2009) provided an instrument for measuring preservice teachers' TPACK knowledge and integration abilities. The TPACK framework supports the relationships and complexities of technology, pedagogy, and content. It could become a guideline for measuring technology readiness of preservice teachers.

The New Meaning of Educational Change

Although many preservice teacher education programs have sought to improve the preparation of preservice teachers' use of technology, many teacher educators have realized that technology training alone does not create an effective technology-using teacher. Research has found that the personal beliefs or self-efficacy of teachers may relate to or predict successful technology integration (Inskeep & Hall, 2009; Rakes, Fields, & Cox, 2006; Vannatta & Fordham, 2004). The concept of self-efficacy refers to the beliefs about oneself, and specifically, people's beliefs about their capabilities to produce designated levels of performance on a goal or outcome (Bandura, 1977). Abbitt (2011) found the following:

> Whether teacher preparation programs integrate technology throughout the curriculum or use stand-alone courses focusing on educational uses of technology, there is a persistent challenge to understand the knowledge, beliefs, and attitudes of preservice teachers and how these factors influence further teaching practices when these students become professional educators. (p. 134)

National and international reports paint a positive picture for teachers' technology use in the classroom (Ertmer & Ottenbreit-Leftwich, 2009). Teachers have increased their personal and professional use of computers. Alongside this increase in teachers' personal use of computers is the increase of using computers in the classroom. Teachers are using technology to drive both teacher-focused and student-focused instruction. Teachers are asking students to complete assignments on the computers, enhancing instruction with software and hardware technology supplements. However, "it is no longer appropriate to suggest that these types of uses are adequate to meet the needs of the 21st century learner" (Ertmer & Ottenbreit-Leftwich, 2009, p. 1). Using technology to support lecture-based instruction falls short of the best practices needed to prepare students. To achieve the kinds of technology uses required to meet 21st century teaching and learning skills, teachers need to understand how to use technology to facilitate meaningful learning. New and better approaches to instruction that include technology integration are vital to positive educational change. Preservice teachers not only need to be equipped with a knowledgebase of how technology can be used as an innovative teaching tool, but some degree of change is required in beliefs, attitudes, and ideologies of technology in personal and professional life. Teachers must assume the role of technology innovator.

Teachers' thinking is directly influenced by their knowledge. Their thinking determines their actions in the classroom. For more than 20 years, knowledge has used the framework that includes classroom management, differentiating instruction, and knowledge of the subject. "One of the unintended consequences of this definition, then, is that when teacher educators and inservice and preservice teachers think about what they

need to know to be good teachers, technology is not even considered" (Ertmer & Ottenbreit-Leftwich, 2009, p. 3). As technology advances and becomes more education focused, good teaching now needs to include the idea that technology is effective when teachers are equipped with additional knowledge and skills that build on, and intersect with, the past framework of thinking. Although most teachers graduating today are likely to be digital natives (comfortable using a variety of technology tools), simply knowing how to use a piece of hardware or software application isn't enough to enable teachers to use the technology effectively in the classroom. Knowing how to use the tools is only the foundation. There should be no gap between teachers' personal and instructional uses of technology. Teaching with technology requires teachers to expand their knowledge of pedagogical practices across multiple aspects of professional and personal processes. In fact, according to Hew and Brush (2007), lack of technology-related management skills can inhibit technology integration.

As stated above, attitudes toward technology also influence teachers' classroom use of technology (Myers & Halpin, 2002). Teachers are role models for all things educational to their students and fellow teachers, including preservice teachers. Teacher educators prepare them to use technology in their future professional practices. Ertmer (1999) described two types of barriers to integrating technology: first-order barriers and second-order barriers. First-order barriers are uncontrollable factors such as access to hardware and software, time, and support. Second-order barriers are controllable or intrinsic and include teachers' beliefs about teaching and learning. This type of barrier is harder to overcome since it is ingrained and personal. Teachers and teacher candidates

have deep-seated beliefs about teaching and learning, which are formed early in their experiences as students (Bai & Ertmer, 2008). Teacher education programs inspire teachers to think more critically about teaching and learning. Education courses create environments that help shape preservice teachers' teaching strategies.

A study conducted by Bai and Ertmer (2008) used 96 preservice teachers and 14 instructors (teacher educators) to find out the relationship between teacher educators' beliefs and preservice attitudes toward technology. It was suggested that if teacher educators' belief of teaching and learning are shaping preservice teachers' own theories, then what about attitudes when applied to technology use? Data were collected through online surveys. The study showed a significant predictive relationship between teacher educators' technology use and preservice teachers' technology attitudes related to education. While this may be true, the study found that teacher educators' technology uses did not positively predict preservice teachers' technology attitudes. The preservice teachers tended to have positive technology attitudes before they entered the program. Teacher education programs should help preservice teachers identify and develop their beliefs about teaching and technology, tapping into their confidence already in place with personal technology use. Attitudes toward technology are expected to predict one's uses of technology. Therefore, teacher educators "help preservice teachers obtain technology skills and understanding so they, in turn, can provide meaningful technology-based learning experiences for their future students" (Bai & Ertmer, 2008, p. 93).

Pitler (2011) reported a study conducted by Mid-continent Research for Education and Learning (McRel) in 2011 that focused on over 60,000 classrooms across 34 states.

Power Walkthrough, a form used by administrators when observing teachers, has a technology use component. When teachers were observed using the form, a checkmark was placed if the teacher used any technology at all including calculators, Web 2.0 tools, document cameras, or multimedia. Researchers reviewed the data and concluded that 63% of all observations contained little to no technology use. The data included a range of schools, from those with limited technology to those schools with one-to-one laptop programs. Motivating teachers to use technology tools includes many factors. These factors include computer self-efficacy, personal technology use, and positive teacher attitudes toward technology. Teachers that use technology in their classroom have been influenced by a variety of factors either in their preservice training, their personal lives, or during their K-12 educational experience. One of the major factors that influences teacher technology use in the classroom is whether a teacher received technology training in his or her undergraduate coursework. If teachers are properly taught how to use technology before they enter a real classroom, the likeliness of technology integration will improve. Another major factor is a teacher's personal computer use outside of school. Research indicates that this is the most consequential indicator of a teacher's technology use in the classroom (Pitler, 2011). In the Hernandez-Ramos study (2005), teachers were asked how long they had owned a personal computer. The teachers were shown an assortment of software applications and asked to rate their knowledge of each one. The study showed that teachers who possessed high amounts of knowledge in regards to the software applications let their students use computers one more day per

week on average than teachers who were less proficient. These same groups of teachers were regularly using technology at home.

"Given the technology driven nature of our global, information based society, lack of technology integration among teachers in American classrooms is a major concern in education today" (Zhao & Bryant, 2006, p. 53). Each university has its own way of measuring the technology ability of preservice teachers. Each measure is unique in its presentation, requirements, and assessment. In addition, state educational technology directors in partnership with school districts all over the country continue to lead in transforming pre-K-12 education to meet the challenges and goals of the 21st century (SETDA, 2011). As teachers move from preservice to service level, they must take with them an inherent passion for technology along with their current ability to implement, maintain, and grow in their integration practices of classroom technology. Universities need an assessment model that measures preservice teachers' technology ability based on the ISTE NETS•T model, which most states have adopted as their technology expectations for both teachers and students. The 21st century is a world that is constantly in motion racing to the top, fighting to be the top country that produces world leaders and global businesses. Having technology ability will help our students have an opportunity in that competition. Teachers must have not only the ability to model but also a passion to spread to their students to make that change happen.

CHAPTER 3

RESEARCH METHODS

As the number of computers accessible to students and teachers has increased, so has emphasis for integrating technology across the curriculum. Research on the effectiveness of teacher preparation programs has become more prevalent in recent years. Despite this rise in research, there are still gaps in the body of knowledge. This study will add to the body of knowledge by examining teacher candidates' perceived comfort and anxiety level toward computer technologies, confidence, and self-efficacy in using computer technology in teaching, and the perceived usefulness of computer technologies. This chapter will describe the purpose of the study, research questions, participants, instrumentation, variables, research procedures, statistical methods, and limitations of the proposed study.

Purpose of the Study

The purpose of this study was to investigate preservice teachers' technology self-efficacy, comfort level, and perceived usefulness toward technology on those who completed a stand-alone technology class within their program of study at three higher education institutions in the South, one public and two faith-based, that meet the licensure requirements for the state of Tennessee. In 2008, the Tennessee State Board of Education adopted the International Society for Technology in Education (ISTE) National Educational Technology Standards for Teachers (NETS•T) to aid in the support

of the board's master plan by helping teachers help students understand how to access information and communications supportive of the curriculum used in Tennessee schools. Higher education institutions have an important responsibility to provide the education needed for successful infusion of technology into the classroom, especially considering the technology-driven nature of our global, information-based society. However, there are few studies that have researched the relationship of teachers' self-efficacy and the programs they completed. Bandura (1977) described self-efficacy as "belief in one's capabilities to organize and execute the course of action required to produce given attainments" (p. 193). When applied to the integration of technology, self-efficacy beliefs toward technology can be a determining factor on how well a teacher is able to effectively utilize technology to improve teaching and learning.

Research Questions

This study addressed the following research questions:

1. Will students who complete the Influences on Attitudes and Self-Efficacy Beliefs Survey instrument in an instructional technology class prior to and after completion of the course show significant change in their perceived comfort and anxiety level toward computer technologies?
2. Will students who complete the Influences on Attitudes and Self-Efficacy Beliefs Survey instrument in an instructional technology class prior to and after completion of the course show significant change in their confidence and self-efficacy in using computer technology in teaching?

3. Will students who complete the Influences on Attitudes and Self-Efficacy Beliefs Survey instrument in an instructional technology class prior to and after completion of the course show significant change in their perceived usefulness of computer technologies in teaching?

Participants

Participants for the study were teacher candidates from three universities in the private and public sector in the state of Tennessee enrolled in an educational technology course within their program of study. The researcher used both male and female subjects, ranging in age from 18-21. Subjects who are under 18 were not included in this study. All students who met the criteria and responded to the invitation were included. Ideally, all students enrolled, 50-60 subjects, would participate in the study; however, actual participant numbers totaled 49. A list of students registered for the technology class was obtained prior to the first day of class. The survey instrument was sent to all teaching professors for the class prior to ensure the Web site with survey instrument linked worked with each university's network infrastructure. Registrants were asked to complete the survey within the first two weeks of class to ensure similar prestudent and poststudent population due to course and schedule changes. Upon completion of the course, students were invited to complete the survey again to measure any change from the survey given prior to the class. Each university's department chair and class instructor were asked to approve the use of instruction time to complete the survey.

Prior to the semester of the study, the researcher contacted the school of education deans at participating universities to inform them of the details of the study and request

their permission to participate. Each department chair was asked to provide insight to personnel within the university who could be of assistance in gathering necessary information on student registrants for the course and the contact information for the professor teaching the class. Among those recommended by the chair to contact to obtain permission were the director of programs and the dean for traditional and internship programs. Further, the professor for the assigned class that was surveyed was contacted to obtain permission and assist in delivering survey materials to participants. To ensure class curriculum was similar at each location, an agreement was signed by each department chair. The agreement stated that the curriculum from the proposed class to be surveyed aligned with the Tennessee Professional Education Standards, specifically Standard 11: Technology.

The three universities served are located in West Tennessee. Demographics varied greatly by university. According to 2011 student undergraduate enrollment for degree seeking students, demographics for Institution A, a private faith-based university, was majority Caucasian (1,312). The African American population was 83 students, with Other races including Asian, Two or More races, and Hispanic accounting for approximately 92 students. The average 6-year graduation rate for Institution A was 58%, well above the U.S. average of 40.1% of the first-time (nontransfer), full-time students who began their studies in 2005 (Wecker, 2012). Nationally, 4-year colleges graduated an average of 53% of entering students within 6 years (Marklein, 2009). The teacher education program awarded 48 teacher candidates education degrees in 2011.

Institution B had a similar racial makeup but was much larger in size and was a public institution. Compared to the 1,490 students enrolled in 2011 at Institution A, Institution B had 7,913 undergraduate students enrolled as degree seeking in 2011. Caucasian students made up the majority of the student population with 5,898 students, and African American students were totaled at 1,194. Institution B's 6-year graduation rate was 48% and in 2011, 526 degrees were awarded from the teacher education program department.

As with Institution A, Institution C was a private, faith-based university. With a student body of 2,220 in 2011, demographic classifications were represented by a majority of Caucasian (718) and African American (65) students. Other races made up the remaining portion of the student population along with 24 students that were listed as Unknown for demographic information.

Instrumentation

As modern education becomes more user-generated and technology-focused, rapid advances in technology are putting new demands on educators and students. Faltos (2002) stated that over the last 15 years, schools have increased spending on classroom technology because of the belief by government, business, and education leaders that wiring classrooms for Internet and putting technology such as computers, smartboards, document cameras, and LCD projectors will improve teaching and learning. When educational leaders adopt a belief that technology is a vital component of the learning process (i.e., continual investment in wiring, hardware, software, and distribution of equipment), there will be an improvement in the quality of teaching and learning (Faltos,

2002). As the number of computers accessible to teachers increases, so does the emphasis on integrating technology across the curriculum.

The purpose of the 2008 International Society of Technology in Education National Education Standards for Teachers (ISTE NETS•T) was to ensure priority of technology integration adoption among teachers in education. The survey used in the current study sought to seek behavior information on the self-efficacy among teacher candidates within three teacher education programs at three universities. The survey targeted two factors: the teacher candidate's perception of the need to integrate technology in instruction to enhance student learning and the teacher candidate's perception of his or her ability to integrate instructional technology effectively.

The survey instrument utilized included validated surveys from two published authors. To protect the reliability and validity of the survey instruments, permission to use each survey instrument was obtained from the original authors (see Appendix A). The Attitudes Toward Computer Technology (ACT) survey (Kinzie, Delcourt, & Powers, 1994; Milbrath & Kinzie, 2000) includes 19 items that form two subscale measurements for (a) comfort and anxiety with computer technology, and (b) perceived usefulness of computer technology. The Computer Technology Integration survey (CTIS) instrument (Wang et al., 2004) includes 21 statements relating to perceived confidence in successfully integrating technology into teaching. Each item is rated on a 4-point positive Likert-type scale. The response range is listed as *strongly disagree, slightly disagree, slightly agree,* and *strongly agree* on the ACT survey and is listed as *strongly disagree, disagree, neither agree nor disagree,* and *strongly agree* on the CTIS survey. To further

validate the survey questions and to ensure the questions are still pertinent to technology integration in the classroom, two experts in the field of technology education reviewed each question to verify the current relevance of the survey items and to add any new technology applications that should be included. The signed "Review of Questionnaire for Validity and Current Relevance" from each reviewer is included (see Appendix B).

Even though the instruments being utilized and some of the supported research is dated, it is still relevant today because responsiveness to integrating new ideas into teaching is a basic design rule that's dictated by student needs, not by individual technologies. The researcher and chair examined the Tennessee Professional Education Standard 11, which is the basis for the technology classes being taught, to ensure the questionnaire addressed all three parts of the standard (see Appendix D). This further validates its current relevance in preparing today's teachers for a career in education. Educators and students need to be fluent in new technologies as they are increasingly becoming woven into our daily lives. Educators need to understand how technology affects their role in the classroom. The basic understanding of how educational institutions are greatly influenced by the impact of technology has not changed in the last 10 years. What has changed is the diverse challenges teachers are faced with when meeting the needs of all their students and having the tools and resources available to provide the best possible learning environment for students.

Variables

Research Question 1. The independent variable was the grouping variable of students before and after technology instruction. The dependent variable was the

perceived comfort and anxiety level toward computer technology. Students who completed both the presurvey and postsurvey at all locations were compared to answer the initial research question. The data for each institution were aggregated and compared for a stronger sample size. For further analysis, the data was also disaggregated and compared by institution.

Research Question 2. The independent variable was the grouping variable of students before and after technology instruction. The dependent variable was the teacher candidate's confidence and self-efficacy in using computer technology. Students who completed both the presurvey and postsurvey at all locations were compared to answer the initial research question. The data for each institution were aggregated and compared for a stronger sample size. For further analysis, the data was also disaggregated and compared by institution.

Research Question 3. The independent variable was the grouping variable of students before and after technology instruction. The dependent variable was the teacher candidate's perceived usefulness of computer technologies. Students who completed both the presurvey and postsurvey at all locations were compared to answer the initial research question. The data for each institution were aggregated and compared for a stronger sample size. For further analysis, the data was also disaggregated and compared by institution.

Research Procedures

Before this study began, the Institutional Review Board (IRB) at Union University approved all protocols. At each proposed university location, the program

dean and department chair approved the study design. Additionally, the assigned professor for each selected class facilitated the process for the individual universities in regards to date, time, and place for survey administration.

All of the students enrolled in the educational technology course within the program of study for traditional and internship programs during the fall 2012 semester were invited to participate. These students were notified through official university channels. Since department chairs decided how possible participants would be informed, specific notification channels varied by university. Each institution asked students to participate within the first 2 weeks of course instruction. Students may have been offered incentives for participating, but no student was penalized for refusing to participate.

Participants completed the technology self-efficacy survey during the fall semester of 2012 at the beginning and end of an educational technology course that is part of the student's program of study. The survey was administered during the first 2 weeks of class. The survey was an electronic survey administered through an online survey company, Qualtrics. Answers were recorded utilizing the Web site's database. Survey administrators varied by school, but wherever possible, the assigned class professor administered the instrument. This encouraged students to both take the survey seriously and answer honestly. To minimize the survey administrator's effect on student responses, survey administrators utilized a script when giving survey instructions. To ensure the protection of all subjects, this script instructed students not to supply their name or any identifying information on the survey. The script informed students that completion of the survey was voluntary and that the questions would not affect their

grades in the class. Participants were asked to use their university provided student ID as an identifier on both surveys. This is so the researcher can compare the presurveys and postsurveys of each participant. The researcher also asked participants to mark their age range and initial teaching endorsement being sought. These were the only identifying descriptors asked on the survey and were used for data analysis only.

Statistical Design and Analysis

Information collected by the survey was coded and entered into the Statistical Package for Social Sciences (SPSS) to perform multiple statistical analyses.

Research Question 1. A nonparametric repeated measures test, Wilcoxon, measured the difference in the teacher candidate's perceived comfort and anxiety level toward computer technologies in instruction to enhance student learning prior to and after completion of an instructional technology class.

Research Question 2. A nonparametric repeated measures test, Wilcoxon, measured the difference in the teacher candidate's confidence and self-efficacy in using computer technology in teaching prior to and after completion of an instructional technology class.

Research Question 3. A nonparametric repeated measures test, Wilcoxon, measured difference in the teacher candidate's perceived usefulness of computer technologies in teaching prior to and after completion of an instructional technology class.

Limitations

The sample for this study was limited to three universities within the same region of the United States. Therefore, these findings are not necessarily inclusive to the general population. Since the data collected in this study were student self-reported surveys, the accuracy of the data is dependent on the honesty of the students completing the surveys. Additionally, the accuracy of the survey depended on whether or not the students reflected their beliefs and ability with technology honestly. To address this concern, the course professor presented the survey as a very serious matter, encouraging students to follow suit. Additionally, to encourage students to participate and answer accurately, a script was provided for the professor to read that stated the opportunity to add to the body of existing research and its integral part in improving education (see Appendix C).

CHAPTER 4

FINDINGS

The purpose of this study was to investigate the attitudes and beliefs of technology integration of preservice teachers before and after completing a stand-alone technology class within their program of study at three Southern, faith-based and public institutions whose licensure programs have been approved by the Tennessee Department of Education. Specifically, the attitudes and beliefs that were studied were the preservice teachers' self-efficacy when using technology in general and in integrating technology into classroom instruction. Additionally, the purpose was to study the preservice teachers' comfort and anxiety level when using technology in general and in classroom instruction and their perceived usefulness toward the usefulness of technology in general and in classroom instruction.

This research project was designed to measure preservice teachers' perceptions of the usefulness of technology and their ability to integrate it into their future classroom. The preservice teachers were enrolled in an undergraduate instructional technology course and were surveyed prior to and at completion of the course. The survey required students to rate how confident they felt about integrating technology into classroom teaching and their perceived usefulness of technologies learned.

This was a quantitative study using a pre- and post-Likert-type survey design. The study used data collected via a survey derived from two existing survey instruments. The

first was the Attitudes Toward Computer Technology (ACT) survey (Kinzie et al., 1994; Milbrath & Kinzie, 2000), which included 19 items that form two subscale measurements for (a) comfort with computer technology, and (b) perceived usefulness of computer technology. Each item is rated on a 4-point and 5-point positive Likert-type scale, respectively. The response range was listed as *strongly disagree, slightly disagree, slightly agree*, and *strongly agree* on the ACT survey. The second survey, The Computer Technology Integration survey (CTIS) instrument (Wang et al., 2004), included 21 statements relating to perceived confidence in successfully integrating technology into teaching. The response range was listed as *strongly disagree, disagree, neither agree nor disagree, agree*, and *strongly agree* on the CTIS survey. The new survey, Influences on Attitudes and Self-Efficacy Beliefs Survey (see Appendix D), resulted. Questions were left exactly as original authors wrote them. They were simply combined into a part 1 and 2 sequence with demographic questions before part 1.

Potential subjects asked to participate were enrolled in a stand-alone instructional West Tennessee. This particular population was needed because the students had not yet completed the student teaching or internship experience within their program of study. The research questions that guided the study were examined through quantitative methods. The independent variable was the grouping variable of students before and after technology instruction. The dependent variable was the perceived comfort level, usefulness, and self-efficacy toward computer technology.

Participant Demographics

The study was conducted at three faith-based and public institutions in the Southern United States. All students over the age of 17 enrolled in the same semester in a stand-alone instructional technology class within the School of Education were asked to participate. Over 90 students were asked to participate and 49 students chose to volunteer their time and complete the survey. Thirty-four students completed the presurvey and 28 completed the postsurvey. Thirteen students took both the presurvey and postsurvey. All participants fell within the 18-25 age range and all but one participant held only a high school diploma. One participant held an associate's degree. The majority of participants (17 in the presurvey and 14 in the post) were seeking a secondary endorsement. Additionally, the majority of participants had Internet service at home. Table 1 (Presurvey) and Table 2 (Postsurvey) provide additional details of participant information.

Table 1

Presurvey Statistics for Participants

Variable	Response	Percentage
Age Range		
18-20 years	26	76
21-25 years	8	24
26-30 years	0	0
30+ years	0	0
Sex		
Male	8	24
Female	26	76
Degree Held		
High School Diploma	33	97
Associate's Degree	1	3
Teaching Endorsement		
Early Childhood PreK-3	4	12
Elementary K-6	9	26
Middle Grades 4-8	4	12
Special Education	0	0
Any secondary endorsement 7-12, 9 12, K-12, or PreK-12	17	50
Internet Access at Home		
I don't have Internet access at home	1	3
Dial-up	0	0
Cable	9	26
DSL	18	53
Cellular	1	3
I am not sure	5	15

Table 2

Postsurvey Statistics for Participants

Variable	Response	Percentage
Age Range		
18-20 years	19	68
21-25 years	9	32
26-30 years	0	0
30+ years	0	0
Sex		
Male	6	21
Female	22	79
Degree Held		
High School Diploma	28	100
Associate's Degree	0	0
Teaching Endorsement		
Early Childhood PreK-3	4	14
Elementary K-6	9	32
Middle Grades 4-8	1	4
Special Education	0	0
Any secondary endorsement 7-12, 9 12, K-12, or PreK-12	14	50
Internet Access at Home		
I don't have Internet access at home	2	7
Dail-up	0	0
Cable	5	18
DSL	15	54
Cellular	1	4
I am not sure	5	18

Data and Statistical Results

The Likert scale survey design study used the latest version of the Statistical Package for Social Sciences (SPSS) to analyze the data and answer the research questions. The participants completed the presurvey digitally within the first 2 weeks of their study at the university during the fall semester of 2012. Participants completed the postsurvey within the last 2 weeks of their study during the same semester. The subjects were asked to identify themselves on the survey with only their university-provided student identification number. All survey results were viewed only by the researcher and were accessed through an online database, Qualtrics. Based on responses from this survey, students were categorized in three groups: all survey participants, institution, and pre/post paired (participants that took both the presurvey and postsurvey). The following questions supported this study.

Research Question 1. Will students who complete the Influences on Attitudes and Self-Efficacy Beliefs Survey instrument in an instructional technology class prior to and after completion of the course show significant change in their perceived comfort and anxiety level toward computer technologies?

To analyze the specific participants that completed both the presurvey and postsurvey, the nonparametric test, Wilcoxon, was used. Thirteen participants completed both the presurvey and postsurvey. Results of the Wilcoxon test were not significant, (z [.074], $p < .05$). A parametric paired sample t-test was run to confirm the results.

To further evaluate the participants, a nonparametric test was used according to the disaggregation of the data. Participants were examined according to which institution

they attended. A Kruskal-Wallis test was used to compare the participants from location to location. Significance levels show there was no significant difference (.310) in the postsurvey results on their perceived comfort and anxiety level toward computer technologies. Since the presurvey and postsurvey participant data did not match for all particpants, only the postsurvey data was used to compare location. The Kruskal-Wallis test was used due to the small sample sizes. Ten participants at institution A, 6 at institution B, and 12 at institution C for a total of 28 participants completed the postsurvey as compared to the 13 that took both the presurvey and postsurvey. Therefore, each dependent variable was compared as a stand-alone dependent variable.

Research Question 2. Will students who complete the Influences on Attitudes and Self-Efficacy Beliefs Survey instrument in an instructional technology class prior to and after completion of the course show significant change in their confidence and self-efficacy in using computer technology in teaching?

To analyze the specific participants that completed both the presurvey and postsurvey, the nonparametric test, Wilcoxon, was used. Thirteen participants completed both the presurvey and postsurvey. Results of the Wilcoxon test shows there is significance, (z [.005], $p < .05$).

To further evaluate the participants, a nonparametric test was used according to the disaggregation of the data. Participants were examined according to which institution they attended. A Kruskal-Wallis test was used to compare the participants from location to location. Significance levels show there was no significant difference (.136) in the postsurvey results on their confidence and self-efficacy in using computer technology in

teaching. Since the presurvey and postsurvey participant data did not match for all particpants, only the postsurvey data was used to compare location. The Kruskal-Wallis test was used due to the small sample sizes. Ten participants at institution A, 6 at institution B, and 12 at institution C for a total of 28 participants completed the postsurvey as compared to the 13 that took both the presurvey and postsurvey. Therefore, each dependent variable was compared as a stand-alone dependent variable.

Research Question 3. Will students who complete the Attitudes Toward Computer Technology survey instrument in an instructional technology class prior to and after completion of the course show significant change in their perceived usefulness of computer technologies in teaching?

To analyze the specific participants that completed both the presurvey and postsurvey, the nonparametric test, Wilcoxon, was used. Thirteen participants completed both the presurvey and postsurvey. Results of the Wilcoxon test showed no significance, (z [.420], $p < .05$).

To further evaluate the participants, a nonparametric test was used according to the disaggregation of the data. Participants were examined according to which institution they attended. A Kruskal-Wallis test was used to compare the participants from location to location. Significance levels show there was no significant difference (.193) in the postsurvey results on their perceived usefulness of computer technologies in teaching. Since the presurvey and postsurvey participant data did not match for all particpants, only the postsurvey data was used to compare location. The Kruskal-Wallis test was used due to the small sample sizes. Ten participants at institution A, 6 at institution B, and 12 at

institution C for a total of 28 participants completed the postsurvey as compared to the 13 that took both the presurvey and postsurvey. Therefore, each dependent variable was compared as a stand-alone dependent variable.

Closing Statement

Overall, no significant difference was found between the presurveys and postsurveys when evaluating the relationship of the attitudes and beliefs of technology integration of preservice teachers before and after completing a stand-alone technology class within their program of study, specifically their feeling of overall usefulness and comfort levels. However, there was a significance in the self-efficacy beliefs of preservice teachers. Participants' self-efficacy beliefs toward integration were positively significantly different after the course materials were delivered when analyzing all participants' presurveys and postsurveys. Furthermore, when data was analyzed by institution, no significant differences were found in any category: self-efficacy, usefulness, or comfort level.

CHAPTER 5

CONCLUSIONS AND DISCUSSIONS

Opening Statement

This chapter provides a discussion and interpretation of the findings of the research from the study. The purpose of this study was to investigate the attitudes and beliefs of technology integration of preservice teachers before and after completing a stand-alone technology class within their program of study at three Southern, faith-based and public institutions whose licensure programs have been approved by the Tennessee Department of Education. Specifically, the attitudes and beliefs that were studied are the preservice teachers' self-efficacy when using technology in general and in integrating technology into classroom instruction. Additionally, the purpose was to study the preservice teachers' comfort and anxiety level when using technology in general and in classroom instruction and their perceptions of the usefulness of technology in general and in classroom instruction.

Conclusions

The data in this study revealed mixed results. While some participants' self-reported level of self-efficacy and usefulness changed, the level of comfort when integrating technology remained stagnant from presurvey to postsurvey. Because self-efficacy, comfort, and usefulness with technology integration are so closely tied to how technology is used in teaching, examining usage patterns and general attitudes toward

technology in education provided a better understanding of how those beliefs emerge and what factors have influence on those beliefs. While the course participants took is the first course focused solely on technology integration, self-efficacy, comfort, and usefulness levels were measured in order to assess the potential of future technology integration.

According to Ertmer and Ottenbreit-Leftwich (2009), the integration of technology in today's classroom must be connected to the learning experience. Therefore, teachers require the knowledge and confidence to create meaningful learning opportunities that allow both the student and the teacher to construct deep and connected knowledge. Effective use of technology makes it possible to adopt new and better approaches to learning, instruction, and assessment. It is no longer appropriate to suggest that the lecture, worksheets, and utilization of the knowledgebase of a single classroom educator are adequate to meet the needs of the 21st century learner. Furthermore, the use of technology only to support lecture-based instruction falls short of best practices. Ertmer and Ottenbreit-Leftwich argued that student-centered constructivist practices and technology integration are particularly powerful and vital to achieve the level of education required for graduates to stay competitive in an ever-changing global market.

Research Questions

1. Will students who complete the Influences on Attitudes and Self-Efficacy Beliefs Survey instrument in an instructional technology class prior to and after completion of the course show significant change in their perceived comfort and anxiety level toward computer technologies?

2. Will students who complete the Influences on Attitudes and Self-Efficacy Beliefs Survey instrument in an instructional technology class prior to and after completion of the course show significant change in their confidence and self-efficacy in using computer technology in teaching?
3. Will students who complete the Influences on Attitudes and Self-Efficacy Beliefs Survey instrument in an instructional technology class prior to and after completion of the course show significant change in their perceived usefulness of computer technologies in teaching?

Implications and Recommendations

Comfort toward technology integration. The first research question concerned the difference in comfort toward technology integration before and after the technology course. Of particular note in this study were the results of the comparisons among the groups on comfort toward technology integration. Based on the analysis of both data disaggregations, comfort did not show any significant difference. The results suggest that any of the groups may have had a level of comfort with technology that was believed to be beneficial to completing all coursework within the class, and therefore there was little movement in that opinion over the course of the semester. Gronseth et al. (2010) suggested that teacher preparation programs are having difficulty maintaining a level of authenticity in technology experiences. In addition, faculty failing to provide many methods may be from lack of best practices due to themselves struggling to keep up with current technology integration methods (Gronseth et al. (2010). The skill level of the

professors could have been on a lower level than that of the survey participants, making the self-reporting level of comfort stagnant throughout the duration of the course.

Self-efficacy toward technology integration. When comparing those students who took both the presurvey and postsurvey, there was significance difference in self-efficacy beliefs of students at a significance level of .005. A parametric paired sample t-test confirms the Wilcoxon. Abbitt and Klett's (2007) study showed significant positive changes in self-efficacy ratings occurred in all groups. Abbitt and Klett used the same group of students from four classes as participants for both the presurvey and postsurvey. Therefore, the results from this study are somewhat similar to Abbitt and Klett's study, even though the sample size was much smaller. According to Becker and Riel (1999), teachers' practices and beliefs are continually shaped by their experiences as teachers, by the environmental factors expressed by those around them, and by the expectations of others.

Usefulness toward technology integration. The second research question involved no significant difference between the presurvey and postsurvey participants. Abbitt and Klett (2007) showed that perceived comfort with computer technology increased by 1.93 points from pre to post survey, and the mean score of usefulness rose from 45.62 to 48.29. Further, participants' self-efficacy belief ratings mean rose from 83.00 to 89.68. Based on previous research (Kinzie et al., 1994; Milbrath & Kinzie, 2000) before Abbitt and Klett's 2007 study, this result was unexpected. Just as Abbitt and Klett suggested in their study, the data from this study supports that perceived usefulness of computer technology is more directly related to the beliefs about one's ability to use

computer technology. However, in looking at the paired participant data, there is no significant difference in the perceived usefulness. This may indicate that participants already believed technology to be useful in the classroom and there was little movement in the opinion over the course of the semester.

Discussion

Despite the importance of technology integration in the classroom, it appears that teachers are still in need of professional development in this area. In 2011, a national survey of more than 380 district technology directors was conducted by Interactive Educational Systems Design (IESD) to help schools maximize learning opportunities afforded by Web 2.0 tools. IESD reported a growing acceptance of Web 2.0 and collaborative technologies among school leaders and educators. The survey showed levels of use have improved since 2009 across several categories of Web 2.0 tools. Additionally, the surveys showed lack of teacher knowledge about how to use Web 2.0 technologies effectively remains a barrier for many districts. The group first surveyed district technology directors in 2009 to examine the current status, future plans, and ongoing challenges of Web 2.0 and collaborative technologies in K-12 education. The follow-up survey in 2011 reported an increase in teachers' familiarity with technology (71%) and improved resources for teaching in the content areas (62%) after educators utilized Web 2.0 technologies, but lack of teacher knowledge about how to use effectively was the most frequently identified (70%) human factor barrier to use of student-generated online content (IESD, 2011).

As accessibility to technology in education continues to grow, so does the availability of learning activities. Teachers and students must determine which technologies contribute to the development of effective and meaningful assessment of the learning activities. Both teachers and students must determine the success or failure of the understanding of technology in realistic settings. "Increasingly, many concepts and ideas cannot be taught without the aid of technology to represent and manipulate them" (Molnar, 1997, p. 67). O'Bannon and Judge (2004) added that teachers cannot be expected to use technology as an instructional tool after a one-day, one-shot workshop. Rather, teachers need to experience technology in a wide variety of settings, including site-based trainings that include authentic learning tasks. Likewise, training must be consistent and spread over time so that exploring the technology, reflecting, and collaborating will promote knowledge and confidence. Teachers need to feel comfortable with technology before they can include it in instructional practice. In addition, having a plan in place for integrating technology into the educational environment is a key component for successful and fundamental integration.

Recommendations for Further Research

There were a few areas out of the scope of the current study that would be interesting endeavors for future research; the first recommendation is to include a qualitative portion of research. This study looked at self-reported behavior outcomes. By gathering professor perceptions and perhaps even administrative perceptions of program effectiveness, one could get a clearer picture of the presence of a program and its

effectiveness. Researchers might explore whether student perceptions of program effectiveness correlate with actual behavioral outcomes.

The same questions explored in this study could be examined with online programs. This study only surveyed programs that were taught in person. Additional studies might analyze if students who elect to take an online course initially place a greater importance on technology integration or whether there is any gain in the self-efficacy, comfort, and/or usefulness of technology when the course is taken online.

The current study involved schools from the same geographical area. Further studies could compare universities that offer the same type of technology course within their program of study. While the researcher used participants from within the same geographical region, comparable schools from other geographical areas would make for a stronger research model. Another option would be examining the three variables at several schools that integrate the technology standards throughout the program instead of a stand-alone technology class. Students could be surveyed prior to starting and after completing the methods courses.

In an age where the focus of the entire society is on technology and its usage, it would be interesting to explore if the rate of technology use personally affects the attitudes and beliefs of integrating technology into the classroom.

Closing Summary

The teaching process is fundamentally changing; technology integration is central to any discussion of teacher change. According to Rockman (2004), at least 1 in every 6 U.S. school districts has a laptop initiative program. Technology is routinely incorporated

into teaching in familiar ways such as using word processing, spreadsheet building, and research. Electronic portfolios have replaced paper and pencil assessments in many K-12 classrooms, postsecondary classrooms, and entire programs of study, allowing students to demonstrate learning in multiple ways (Allsopp et al., 2009). As noted by Allsopp et al., in considering the preparation of students for the 21st century, technology is not the key to change; teachers are the agent of change.

The current study presents encouraging results for change in the education community. As national digital testing models, such as the Partnership for Assessment of Readiness for College and Careers (PARCC; 2013), are being developed and implemented, an ever-increasing need for technology in education is present. PARCC is a consortium of 22 states working together to develop a common set of K-12 assessments. These tests, geared toward English and math, are anchored with Common Core standards and meet the level of rigor required for students to be college and career ready. All PARCC tests will be given digitally via computers and the internet. Therefore, teachers must know how to model and utilize technology so that students can perform successfully within the educational realm, making sure that they are ready to be globally competitive citizens. Likewise, training must be consistent and spread over time so that exploring the technology, reflecting, and collaborating will promote knowledge and confidence. Teachers need to feel comfortable with technology before they can include it in instructional practice. In addition, having a plan in place for integrating technology into the educational environment is a key component for successful and fundamental integration. For individuals to utilize computer tools for learning effectively, they must

obtain the knowledge and confidence to create meaningful learning opportunities that allow both the student and the teacher to construct deep and connected knowledge. Effective use of technology makes it possible to adopt new and better approaches to learning, instruction, and assessment.

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APPENDICES

APPENDIX A

Original Email sent to both survey instrument authors:

Dr. Wang,

I am a graduate student at Union University developing a research proposal for my doctoral dissertation. I recently read and cited the article/study, *Identifying influences on attitudes and self-efficacy beliefs towards technology integration among pre-service educators* within my literature review. My proposed study will be very similar in design. Is it possible for me to review and possibly to utilize the same survey used in the pilot study by Dr Abbitt? From the literature, I see that it was a blend of two surveys: the ACT (Kinzie) and your survey, CTIS. If possible, I am requesting your permission to review and possibly utilize the same survey. I am finding it difficult to find a copy of the survey so if you have an available copy it would be helpful to attach it if you are willing to let me utilize the survey in my research.

If needed, I will have a formal letter that describes my intentions in more detail, along with a copy of my IRB proposal available but before I send this information to you, I wanted to find out casually if it were a possibility to utilize the survey instrument.

If you are not the person in charge of approving this type of request I would very much appreciate if you would forward the name and contact information of the person I should communicate with. I would welcome the opportunity to discuss this with you by phone if that would be helpful. In addition, I would be happy to provide any further information you may require in order to make a decision.

Thank you for your time.
Sincerely,
Karolyn Parchman
Union University Graduate Student

Reply from Dr. Mable Kinzie:

Friday, April 13, 2012 12:51 PM
Kary, it's fine with us to use or modify the ACT instrument. We ask only that you cite the source, with the citation below.

Kinzie, M. B., Delcourt, M. A. B., & Powers, S. M. (1994). Computer Technologies: Attitudes and Self-Efficacy Across Undergraduate Disciplines. Research in Higher Education, 35(6), 745-768.

I am attaching the instrument.

Good luck with your research!
Mable Kinzie

Reply from Dr. Ling Wang:

Kary,

Please feel free to use the CTIS survey in the way it fits for your study. I do have a Word version of the survey, and it is attached here.

Good luck with your study.

Ling

Kary,

Yes, it is ok to include it as an appendix item.

Thanks,
Ling

Permission from both authors to print survey in Appendix:

Dr. Wang,

Thank you for giving me permission to utilize your CTIS survey. My committee, however, wants me to specifically ask you, is it OK if they survey is printed in the Appendix of my dissertation? I have attached my dissertation here for you to review. Please look at page 82 to see the survey and credit to the authors. Please let me know if you are OK with it being printed as a part of the final manuscript within the appendicies.

Thank you,
Karolyn Parchman

Graduate Student
Union University

Reply from Dr. Mable Kinzie:

Kary, thank you for your conscientiousness. It is fine to reproduce/print the survey (with the reference citation).
Congratulations on your near-completion!

Best,
Mable Kinzie

Reply from Dr. Ling Wang:

Kary,

Yes, it is ok to include it as an appendix item.

Thanks,
Ling

Computer Technologies Survey References

Survey Authors:

Delcourt, M. A. B., & Kinzie, M. B. (1993). Computer technologies in teacher education: The measurement of attitudes and self-efficacy. *Journal of Research & Development in Education, 27*, 35-41.

Wang, L., Ertmer, P.A., & Newby, T.J. (2004a). Increasing preservice teachers' self-efficacy beliefs for technology integration. *Journal of Research on Technology in Education, 36(*3), 231.

APPENDIX B

Computer Technologies Survey – Verification of Current Relevance Forms

Review of Questionnaire for Validity and Current Relevance

As a graduate student under the direction of Dr. Dottie Myatt in the doctoral program at Union University, I am conducting a research study entitled "Integrating Technology: Influences on Attitudes and Self-Efficacy Beliefs in Preservice Education Technology Courses." The purpose of this study is to investigate preservice teachers' technology self-efficacy on those who completed a stand-alone technology class within their program of study at three higher education institutions in the Southeast, one public and two faith-based, that meet the licensure requirements for the state of Tennessee.

In researching the topic, I found the following two instruments:

Attitudes Toward Computer Technology (ACT) survey
Kinzie, M. B., Delcourt, M. A. B., & Powers, S. M. (1994). Computer Technologies: Attitudes and Self-Efficacy Across Undergraduate Disciplines. Research in Higher Education, 35(6), 745-768.

Computer Technology Integration Survey (CTIS)
Wang, L., Ertmer, P., & Newby, T. (2004). Increasing preservice teachers' self-efficacy beliefs for technology integration. *Journal of Research on Technology in Education, 36*(3), 231-251.

In this age of rapid changes in technology, a few years can greatly impact the relevance of some forms of technology integrated into classroom instruction. Since you have expertise in these areas, would you please review the two questionnaires, then sign and date this letter below indicating either your agreement that the items on the questionnaire measure the variable being examined and are relevant in today's classroom or your suggestions for changes to the questionnaire? I appreciate your assistance in this process.

Sincerely,

Kary Parchman
Doctoral Candidate
Union University

√ I verify that I have reviewed the two questionnaires, "Attitudes Toward Computer Technology" survey and "Computer Technology Integration Survey," and agree that the items measure the variables described above and are relevant in today's classrooms.

□ I verify that I have reviewed the two questionnaires, "Attitudes Toward Computer Technology" survey and "Computer Technology Integration Survey," and suggest that changes be made. These changes are described below or are indicated on my copy of the questionnaire itself.

____ Jul 5, 2012 _____

Jimmy Anderson, Technology Coordinator
Dyersburg City Schools

Suggested changes (if any): _____

_____

_____

_____

_____

Review of Questionnaire for Validity and Current Relevance

As a graduate student under the direction of Dr. Dottie Myatt in the doctoral program at Union University, I am conducting a research study entitled "Integrating Technology: Influences on Attitudes and Self-Efficacy Beliefs in Preservice Education Technology Courses." The purpose of this study is to investigate preservice teachers' technology self-efficacy on those who completed a stand-alone technology class within their program of study at three higher education institutions in the Southeast, one public and two faith-based, that meet the licensure requirements for the state of Tennessee.

In researching the topic, I found the following two instruments:

Attitudes Toward Computer Technology (ACT) survey
Kinzie, M. B., Delcourt, M. A. B., & Powers, S. M. (1994). Computer Technologies: Attitudes and Self-Efficacy Across Undergraduate Disciplines. Research in Higher Education, 35(6), 745-768.

Computer Technology Integration Survey (CTIS)
Wang, L., Ertmer, P., & Newby, T. (2004). Increasing preservice teachers' self-efficacy beliefs for technology integration. *Journal of Research on Technology in Education, 36*(3), 231-251.

In this age of rapid changes in technology, a few years can greatly impact the relevance of some forms of technology integrated into classroom instruction. Since you have expertise in these areas, would you please review the two questionnaires, then sign and date this letter below indicating either your agreement that the items on the questionnaire measure the variable being examined and are relevant in today's classroom or your suggestions for changes to the questionnaire? I appreciate your assistance in this process.

Sincerely,

Kary Parchman
Doctoral Candidate
Union University

☑ I verify that I have reviewed the two questionnaires, "Attitudes Toward Computer Technology" survey and "Computer Technology Integration Survey," and agree that the items measure the variables described above and are relevant in today's classrooms.

☐ I verify that I have reviewed the two questionnaires, "Attitudes Toward Computer Technology" survey and "Computer Technology Integration Survey," and suggest that changes be made. These changes are described below or are indicated on my copy of the questionnaire itself.

Lynn Tucker MS145 July 9, 2012

Signature and Degree Date

Suggested changes (if any): Content of Survey is on target, lay out will make it better.

APPENDIX C

University Permission Letters

THE UNIVERSITY of TENNESSEE MARTIN

Office of Research, Grants & Contracts
100 Administration Building
Martin, Tennessee 38238
Office: 731.881.7015
Fax: 731.881.7018

August 28, 2012

Ms. Karolyn Parchman
220 John Martin Road
Bradford, TN 38316

RE: 13-182-/Parc,Kar
IRB Period: 8/28/2012 to 8/27/2013
Integrating Technology: Influences on Attitudes and Self-Efficacy Beliefs in Pre-Service Education Technology Courses

Dear Ms. Parchman:

We are in receipt of an IRB approval from Union University relating to the above-referenced study. We accept that institution's IRB approval and have assigned a UT Martin IRB number for the project as well. The project period reflects the dates approved by Union University. If that project is extended beyond the current termination date a Change/Termination form must be completed prior to that date for UTM IRB extension as well.

It is the responsibility of the investigator(s) is to abide by the regulations governing research involving human participants, including those provisions specifying the means of obtaining informed consent. In all cases, the standards of respect for persons, beneficence, and justice enumerated by the Ethical Principles and Guidelines for the Protection of Human Subjects of Research (Belmont Report) apply to all research involving human participants conducted at UT Martin. Please note that you are also committed to the other Investigator Responsibilities as stated in the Faculty, Staff and Student Guide to Research involving Human Subjects which is available on our website.

Please remember that it is the responsibility of the Principal Investigator to keep the data that is collected in a secure location for 3 years after the completion of the research project.

We wish you success in your research endeavors.

Scott Parrott

Scott Parrott, Ph.D.
UT Martin IRB Chair

pqf

UNION UNIVERSITY
INSTITUTIONAL REVIEW BOARD

To:	**Karolyn Parchman**
From:	**Randall W. Phillips, Ph.D. - Chair, Institutional Review Board**
Protocol:	**#0812-00583 "Integrating Technology: Influences on Attitudes and Self-Efficacy Beliefs in Pre-service Education Technology Courses"**

This is to notify you that the Institutional Review Board has approved the above referenced protocol. This project was reviewed in accordance with all applicable statutes and regulations as well as ethical principles.

Approval of this project is given with the following obligations:

1. When the project is finished or terminated, the attached Notice of Completion form must be completed and sent to Suzanne Barham, IRB Compliance Officer, UU Box 1815, Jackson, TN 38305 prior to the expiration date. This approval expires one year from the approval date, and must be renewed prior to that date if the study is ongoing.

2. At the end of one year from the approval date, if the project is not finished or terminated, a Continuing Review application must be completed and approved to continue the project. If approval is not obtained, the human consent form is no longer valid and accrual of new subjects must stop.

3. Any adverse effects must be reported to the IRB on the Adverse Effects Form. Adverse events should be reported to the IRB within 10 working days. Examples include unexpected complications in a subject, missteps in the consent documentation, or breaches of confidentiality.

4. No change may be made in the approved protocol without board approval, except where necessary to eliminate apparent immediate hazards or threats to subjects. Such changes must be reported promptly to the board to obtain approval.

5. The stamped, approved human subjects consent form must be used (if applicable). Photocopies of the form may be made.

If you have any questions, please call the Institutional Review Board office at 731.661.5580. The forms referred to above can be found on the Institutional Review Board website at http://www.uu.edu/programs/irb/.

Randall W. Phillips

Randall Phillips, Ph.D.
Chair, Institutional Review Board
Union University

8/23/2012
Approval Date

FREED-HARDEMAN UNIVERSITY
Office of Academics • 158 E. Main Street • Henderson, Tennessee 38340-2399 • 731.989.6004 • 731.989.6945 • www.fhu.edu

August 31, 2012

Karolyn Parchman
220 John Martin Road
Bradford, TN 38316

Dear Karolyn:

The purpose of this letter is to inform you that your IRB proposal titled *Integrating Technology: Influences on Attitudes and Self-Efficacy Beliefs in Pre-service Education Technology Courses* has been approved by the IRB and the Office of Academics and Enrollment Management. Your IRB proposal number for this project is 13-004.

Please note that any changes made to your proposal shall be approved by the IRB prior to those changes being implemented. Such change requests should be forwarded to Ryan Fraser, IRB chair.

At the conclusion of the study, you must complete a final report to the IRB. The final report must be completed within one calendar year. If the study is not completed in one calendar year, you must provide the IRB with an update of the study and request that the study be allowed to continue.

I wish you the best as you move forward with this research, and please do not hesitate to contact my office if I may be of any assistance.

Respectfully,

Charles Vires, Jr., Ph.D.
Vice President for Academics and
Enrollment Management

APPENDIX D

Professor's Script for Pre-course Survey

"Research is an integral part of teaching and learning, providing data that often leads to improvements in education. You have the opportunity to participate in a research study related to technology in teaching and learning, but your participation is totally voluntary and your participation will not affect your grade positively or negatively. You are not to provide your name, but you will be asked to provide your (name of college/university) ID number so that the researcher can match your responses provided at the beginning of the class to those provided in a questionnaire you will complete at the end of the semester. No one besides the researcher will have access to individual responses. If you are younger than 18 years of age, you may not participate.

To start the questionnaire, go to www.technologybeliefs.weebly.com. The homepage will explain the eligibility criteria and give you the option to participate or not. Please complete the questionnaire outside of class during the first two weeks of the semester.

Thank you."

Professor's Script for Post-course Survey

"During the first two weeks of this course you were asked to participate in a research study that related to technology in teaching and learning. Part of that research study is a post-course survey that will allow the researcher to match your responses early in the class to those at the end of the class. As before, your participation is totally voluntary and your participation will not affect your grade positively or negatively. You are not to provide your name, but you will be asked to provide your (name of college/university) ID number so that the researcher can match your responses on the two surveys. No one besides the researcher will have access to individual responses. If you are younger than 18 years of age, you may not participate.

To start the questionnaire, go to www.technologybeliefs.weebly.com. The homepage will explain the eligibility criteria and give you the option to participate or not. Please complete the questionnaire outside of class during the last week of the semester.

Thank you."

APPENDIX E

Influences on Attitudes and Self-Efficacy Beliefs Survey
Adapted from Attitudes Toward Computer Technology (ACT) survey and Computer Technology Integration Survey (CTIS)

Q1 Student ID Number:

Q2 Age:
- ❍ 18-20 years
- ❍ 21-25 years
- ❍ 26-30 years
- ❍ 30+ years

Q3 Gender:
- ❍ Male
- ❍ Female

Q4 Please choose the highest educational level you have received:
- ❍ High School diploma
- ❍ Associate's degree

Q5 If you are enrolled in an undergraduate degree program at this time, please choose your current level:
- ❍ 1st year
- ❍ 2nd year
- ❍ 3rd year
- ❍ 4th year
- ❍ 5th year

Q6 Which teaching endorsement(s) are you seeking?

- ❍ Early Childhood PreK-3
- ❍ Elementary K-6
- ❍ Middle Grades 4-8
- ❍ Special Education
- ❍ Any secondary endorsement 7-12 or 9-12

Q8 How do you use your cell phone most often?

- ❍ Phone calls only
- ❍ Phone calls and text messaging
- ❍ Phone calls, text messaging and Internet access
- ❍ I don't have a cell phone

Q9 What type of Internet access do you have at home?

- ❍ I don't have Internet access at home
- ❍ Dial-up
- ❍ Cable
- ❍ DSL
- ❍ Cellular (mobile phone or hotspot)
- ❍ I am not sure

Q10 How often do you use the following: (choose one number for each category)

	Never (1)	At least once/year (2)	At least once/month (3)	At least once/week (4)	Daily (5)
Word Processing Software (Word, Google Docs, iWork, etc.) (1)	❍	❍	❍	❍	❍
Electronic Mail/Communication (e-mail, Blackboard, Moodle, etc.) (2)	❍	❍	❍	❍	❍
Audio Visual - Creating and/or receiving (Photoshop, Flickr, Snapfish, Edmoto, etc.) (3)	❍	❍	❍	❍	❍
Social Network (Facebook, Blog, Wiki, etc.) (4)	❍	❍	❍	❍	❍
Other (please specify) (5)	❍	❍	❍	❍	❍

Q11 Have you taken any course in which you've learned to use these computer technologies? (choose yes or no for each)

	Yes (1)	No (2)
Word Processing (1)	❍	❍
Electronic Mail/Communication (2)	❍	❍
Audio Visual (3)	❍	❍
Social Network (4)	❍	❍

Q12 Please list any other computer technologies you may have learned how to use in a course you've taken.

Q13 This section has 19 statements about computer technologies. Please indicate the extent to which you agree or disagree to all statements. There are no correct or incorrect responses.

	Strongly Disagree (1)	Slightly Disagree (2)	Slightly Agree (3)	Strongly Agree (4)
I don't have any use for computer technologies on a day-to-day basis. (1)	❍	❍	❍	❍
Communicating with others over a computer network can help me to be a more effective teacher. (2)	❍	❍	❍	❍
I am confident about my ability to do well in a course that requires me to use computer technologies. (3)	❍	❍	❍	❍
Using computer technologies in my job will only mean more work for me. (4)	❍	❍	❍	❍
I do not think that computer technologies will be useful to me as a teacher. (5)	❍	❍	❍	❍
I feel at ease learning about computer technologies. (6)	❍	❍	❍	❍
With the use of computer technologies, I can create instructional materials to enhance my teaching. (7)	❍	❍	❍	❍
I am not the type to do well with computer technologies. (8)	❍	❍	❍	❍

If I can use word processing software, I will be a more productive teacher. (9)	❍	❍	❍	❍
Anything that computer technologies can be used for, I can do just as well some other way. (10)	❍	❍	❍	❍
The thought of using computer technologies frightens me. (11)	❍	❍	❍	❍
Computer technologies are confusing to me. (12)	❍	❍	❍	❍
I could use computer technologies to access many types of information sources for my work. (13)	❍	❍	❍	❍
I do not feel threatened by the impact of computer technologies. (14)	❍	❍	❍	❍
I am anxious about computers because I feel like I might break them. (15)	❍	❍	❍	❍
Computer technologies can be used to assist me with classroom management techniques. (16)	❍	❍	❍	❍
I don't see how computer technologies can help me learn new skills. (17)	❍	❍	❍	❍
I feel comfortable	❍	❍	❍	❍

about my ability to work with computer technologies. (18) Knowing how to use computer technologies will not be helpful in my future teaching. (19)	❍	❍	❍	❍

Q14 This section has 27 statements about your confidence with computer technologies. There are two sections. Please indicate the extent to which you agree or disagree to all statements. There are no correct or incorrect responses. **I feel confident...**

	Strongly Disagree (1)	Slightly Disagree (2)	Slightly Agree (3)	Strongly Agree (4)
Using a word processing program to write a letter or an essay (1)	❍	❍	❍	❍
Accessing previous files with a word processing program (2)	❍	❍	❍	❍
Making corrections while word processing (3)	❍	❍	❍	❍
Formatting text (e.g., bold, underlining) while word processing (4)	❍	❍	❍	❍
Moving blocks of text while word processing (5)	❍	❍	❍	❍
Using the spelling checker while word processing (6)	❍	❍	❍	❍
Using the searching feature in a word processing program (7)	❍	❍	❍	❍
Printing out files I've written while word processing (8)	❍	❍	❍	❍
Saving documents I've written with a word processing program (9)	❍	❍	❍	❍
Renaming a word processing file to make a back-up	❍	❍	❍	❍

copy. (10)				

Q15 I feel confident...

	Strongly Disagree (1)	Slightly Disagree (2)	Slightly Agree (3)	Strongly Agree (4)
Logging on to e-mail (1)	❍	❍	❍	❍
Reading mail messages on e-mail (2)	❍	❍	❍	❍
Responding to mail messages on e-mail (3)	❍	❍	❍	❍
Deleting messages on e-mail (4)	❍	❍	❍	❍
Sending mail messages on e-mail (5)	❍	❍	❍	❍
Sending the same mail message to more than one person on e-mail (6)	❍	❍	❍	❍
Responding privately to messages sent to more than one person on e-mail (7)	❍	❍	❍	❍
Forwarding messages received on e-mail (8)	❍	❍	❍	❍
Attaching documents to an e-mail message (9)	❍	❍	❍	❍
Reformatting an attachment that exceeds the file attachment size limit (10)	❍	❍	❍	❍

Q16 This section has 21 statements about how you feel about integrating technology into classroom teaching. Please indicate the extent to which you agree or disagree to all statements. There are no correct or incorrect responses.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I feel confident that I understand computer capabilities well enough to maximize them in my classroom. (1)	❍	❍	❍	❍	❍
I feel confident that I can successfully teach relevant subject content with appropriate use of technology. (2)	❍	❍	❍	❍	❍
I feel confident that I have the skills necessary to use the computer for instruction. (3)	❍	❍	❍	❍	❍
I feel confident in my ability to evaluate software for teaching and learning. (4)	❍	❍	❍	❍	❍
I feel confident that I can use correct computer terminology when directing students' computer use. (5)	❍	❍	❍	❍	❍
I feel confident that I can help	❍	❍	❍	❍	❍

students when they have difficulty with the computer.(6)					
I feel confident I can effectively monitor students' computer use for project development in my classroom. (7)	❍	❍	❍	❍	❍
I feel confident that I can motivate my students to participate in technology-based projects. (8)	❍	❍	❍	❍	❍
I feel confident I can mentor students in appropriate uses of technology. (9)	❍	❍	❍	❍	❍
I feel confident I can consistently use educational technology in effective ways.(10)	❍	❍	❍	❍	❍
I feel confident I can provide individual feedback to students during technology use. (11)	❍	❍	❍	❍	❍
I feel confident I can regularly incorporate technology into my lessons, when	❍	❍	❍	❍	❍

appropriate to student learning. (12)					
I feel confident about selecting appropriate technology for instruction based on curriculum standards. (13)	❍	❍	❍	❍	❍
I feel confident about assigning and grading technology-based projects. (14)	❍	❍	❍	❍	❍
I feel confident about keeping curricular goals and technology uses in mind when selecting an ideal way to assess student learning. (15)	❍	❍	❍	❍	❍
I feel confident about using technology resources (such as spreadsheets, electronic portfolios, etc.) to collect and analyze data from student tests and products to improve instructional practices. (16)	❍	❍	❍	❍	❍
I feel confident that I will be comfortable using technology in	❍	❍	❍	❍	❍

my teaching. (17)					
I feel confident I can be responsive to students' needs during computer use. (18)	❍	❍	❍	❍	❍
I feel confident that, as time goes by, my ability to address my students' technology needs will continue to improve. (19)	❍	❍	❍	❍	❍
I feel confident that I can develop creative ways to cope with system constraints (such as budget cuts on technology facilities) and continue to teach effectively with technology. (20)	❍	❍	❍	❍	❍
I feel confident that I can carry out technology-based projects even when I am opposed by skeptical colleagues. (21)	❍	❍	❍	❍	❍