A STUDY OF THE ATTITUDES OF UNIVERSITY OF NORTH CAROLINA EDUCATION FACULTY TOWARD THE USE OF COMPUTER-BASED SIMULATION IN PRE-SERVICE TEACHER EDUCATION METHODS COURSES

by

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ABSTRACT

MARY F. ENGLEBERT: A study of the attitudes of University of North Carolina education faculty toward the use of computer-based simulation in pre-service teacher education methods courses. (Under the direction of DR. JOHN GRETES)

The use of computer-based classroom teaching simulations has proved to be a very effective methodology for training pre-service teachers. Despite wide adoption of this instructional methodology in Australia, South Korea, and other countries; however, education faculty in the United States have been slow to adopt it. To date no research has been discovered that establishes a cause for this reluctance. Since attitudes impact behavior, this study sought to discover whether the age, tenure status, or Carnegie Classification of university was associated with the attitude toward computer-based classroom teaching simulations of education faculty who teach instructional methods courses in the University of North Carolina constituent universities. The study used descriptive and inferential statistics to determine that no association appears to exist between these characteristics, common to all of the faculty in the study, and the attitudes held by the faculty toward adopting computer-based classroom teaching simulation as an instructional methodology.

DEDICATION

The four year journey to earn this doctorate began in what (in retrospect) can only be described as a moment of madness; however, its completion is one of the happiest days of my life. This happiness is possible only through the support, generosity, and ready assistance of numerous people in my personal, professional, and academic lives.

I would like to acknowledge my husband, Curt, who believed in me, encouraged me at every turn, and simply would not accept that I could not or would not finish. I would also like to thank the members of my Daniels and Englebert families who repeatedly expressed their support and pride in what I was attempting to do even though my granddaughter Tabitha frowned at being told she would have to call me "Dr. Oma" if I finished. My grandson Ian's regular inquiries about whether I had done my homework and admonishments that I could not play until it was, were reminders of what was at stake. My friends Judy, Jane, and Lynette assumed that there was no other outcome than completion, and all along treated the whole thing as if it were a done deal. They listened patiently and kept a ready store of tissues especially in the waning weeks. The desire to avoid embarrassing or letting any of them down was a powerful incentive. My only regret is that my mom, Ruth Daniels, did not live to see my degree awarded. She would have loved it.

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and were helpful in any way they could be. I am grateful for their understanding and thoughtfulness. Pete Wachs is due a special thank you for helping me see that Dr. Chuang Wang was right--statistics really isn't "death by a thousand numbers."

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CHAPTER 1: INTRODUCTION

Practical experience during which students move from dependent learning to self-direction is a basic principle of adult learning (Knowles, Holton & Swanson, 2005), and the goal of teacher education programs is to move students from learning about curriculum, instruction, and behavior management to functioning in their own classrooms as independent teachers (NCATE, 2008). While the field-based or practice teaching experience is the most common format for achieving this goal, evidence exists that the experience could be enhanced by the introduction, prior to the field experience, of practice via computer-based classroom simulations (Berliner, 1985; Cruickshank, 1968; Ferry & Kervin, 2006; Girod, 2009; Girod & Girod, 2008; Kiili, 2007; Murphy, Kauffman & Strang, 1987; Strang, 1997).

Simulations are considered to be an effective hands-on, active way of learning and perhaps more importantly, for retaining what has been learned (Aldrich, 2004; Cruickshank, 1968; Merrill, 2001; Strang, 1997). A hallmark of effective digital or computer-based educational simulations is active participation by students in immersive environment-based, role-playing situations that help develop their decision-making skills, lead to a deeper understanding of the issues involved in the problems presented for resolution, and the development of self-assurance and confidence in their ability to apply in real life what they have learned through the simulation (Girod, 2009; Hertel & Millis, 2002; Zibit & Gibson, 2005). Educational simulations are fundamentally games through which players are able to explore "what if" scenarios (Aldrich, 2004; Pannese& Carlesi, 2007). The combination of the personal computer and education simulations led to the development of digitized learning scenarios, commonly referred to as digital-game-based-learning (DGBL), that do not require a classroom or other students to engage in the role-play that is the hallmark of simulation (Aldrich, 2004; Killi, 2005).

Digital-game-based-learning is considered to be among the most effective types of simulation because it keeps the learner engaged and motivated throughout the gaming experience (Becker, 2007; Killi, 2005). Teachers are encouraged by the National Council for Accreditation of Teacher Education (NCATE) to incorporate digital games into their own instructional methodologies to engage K-12 students in the learning process (NCATE Professional Standards for the Accreditation of Teacher Preparation Institutions, 2008). In addition Garau, Slater, Pertaub & Razzaque (2005), found that humans ascribed human feelings and traits to virtual agents in an immersive environment thus making computer-based simulations an effective way of testing, in a safe environment, the very kinds of human interaction and reaction common to classroom teaching. Furthermore, recent developments in software and gaming technology (such as improvements in graphics and interactivity) have improved their effectiveness. This development coupled with lower costs and wider availability, make computer-based siulations a much more attractive training tool. Statistically significant evidence suggests that digital game based learning experiences feel real. Improvements in their capability, functionality, and effectiveness have implications for the field of education beyond their supplemental use in K-12 classrooms, but they have not been embraced by teacher education programs in the U.S. even though their use has been encouraged by an important educational accrediting organization.

While the use of digital game based learning has been found to be very effective in K-12 classrooms (Cardelle-Elawar, 1999; Kara, 2008; Steinberg, 2000) and is strongly encouraged by NCATE for use in Gifted Education and Science, Technology, and Math instruction (NCATE Professional Standards for the Accreditation of Teacher Preparation Institutions, 2008), colleges and schools of education in the United States have been slow to introduce these simulation activities into pre-service teacher education courses (Aldrich, 2004). Education majors could benefit enormously from digital game based learning in the form of computer-based classroom teaching simulations as a way of preparing for and enhancing their student teaching field experiences as well as increasing their confidence and effectiveness in their first years of teaching (Becker, 2007; Berliner, 1985; Cruickshank & Broadbent, 1968; Pannese & Carlesi, 2007; Strang, 1997, 1996; Strang et al., 1987). These potential benefits to individual teachers in their first years in the classroom could also mitigate criticisms of teacher preparation programs in general.

Teacher education programs, in the U.S., have been routinely condemned in recent years as various groups and individuals seek to identify the root causes of academic failure. U.S. Public Law 107 - 110 - An Act to Close the Achievement Gap With Accountability, Flexibility, and Choice so That No Child is Left Behind (NCLB), enacted by the U.S. Congress in 2002, was intended to bring about sweeping change that would result in significant gains; however, the focus of the legislation continued to be on improvement at the K-12 level—not in the education programs that prepare future teachers for their own classrooms. Recent evidence suggests that calls for change are once again being refocused to include the preparation and training that teachers get before they ever begin to teach in classrooms of their own. As recently as October 2009, in a speech delivered at Columbia University's Teacher College, the U.S. Secretary of Education, Arne Duncan, called for "revolutionary change" in the college programs that prepare teachers. While Secretary Duncan's description of the nation's teacher education programs as "cash cows" detracted from the more important complaints, he shared, of new teachers about their preparation that should be noted by university leadership and faculty. The first of the complaints made by young teachers and cited by Duncan was, "…they did not get the hands-on teacher training about managing the classroom that they needed, especially for high-needs students." (2009).

Recommendations, over the past 40 years, on how to bring about the needed improvements in teacher education programs have repeatedly included the incorporation of simulation practice into the training regimen (Cruickshank, 1966, 1968; Reid, 1980). More recently (since the 1980s) calls for inclusion have specified that they be interactive-digital simulations (Murphy, Kauffman & Strang, 1987; Strang, 1996, 1997; Strang, Badt, & Kauffman, 1987; Strang, Badt, Loper & Richards, 1985; Strang, Kauffman, Badt, Murphy & Loper, 1987; Strang & Loper, 1983).

Simulations may well be one of the single most effective and efficient ways of improving teaching skills without involving actual K-12 students in the teacher-learning process (Aldrich, 2004; Berliner, 1985; Cruickshank, 1968; Simons, Ditrichs & Grier, 1995; Strang 1997; Strang & Loper, 1983; Turbill, Cambourne & Ferry, 2005; Zibit & Gibson, 2005). Indeed, digital game-based classroom teaching simulations have proven effective at increasing the confidence of pre-service teachers, helping them link theory with practice, and improving their instructional, behavior management, and cognitive thinking skills (Cruickshank, 1968; Ferry, Kervin, Turbill, Cambourne, Hedberg, Jonassen et al., 2004; Simon, Ditrichs & Grier, 1995; Strang, 1997, 1996; Strang, Badt & Kauffman, Murphy & Loper, 1987). Practice teaching in virtual classrooms has positive ethical, academic, and financial benefits as well (Strang, Kaufman, Badt, Murphy & Loper, 1987). Furthermore, pre-service teachers enthusiastically embrace it when given the opportunity to use it (Ferry & Kervin, 2006; Ferry, Kervin, Cambourne, Turbill, Puglisi, Jonassen et al., 2004; Simon, Ditrichs & Grier, 1995; Strang, Badt, Loper & Richards, 1985). Despite the evidence produced by research studies that digital simulations work (Ferry & Kervin, 2006; Ferry, Kervin, Cambourne, Turbill, Puglisi, Jonassen et al., 2004; Girod & Girod, 2008; Kiili, 2007) and marked improvement in the simulations themselves, adoption by U.S. teacher education programs continues to be slow (Berliner, 1985; Cruickshank & Broadbent, 1968; Doak & Keith, 1986; Evertson et al., 1985; Ferry et al., 2005, Strang, 1997, 1996, 1987; Tucker, Plax & Kearney, 1985).

Need for Research

In the face of repeated statistically significant evidence that the use of computer-based classroom teaching simulations improve teaching and classroom management skills, along with confidence and cognitive thinking skills, the question arises as to why it is not more widely incorporated into teacher preparation programs. The National Council for Accreditation of Teacher Education cites improved preparation as one of the most important factors in increasing first year teacher retention rates, which has academic as well as financial implications (NCATE, 2001). Indeed, the 2000-01 NCATE report on the impact of five factors related to first year teacher retention rates shows that survey respondents who received feedback on teaching and practice teaching as part of their pre-service training were more than twice as likely to remain in the profession after their first year than teachers who did not (NCATE, 2001). While Korean, Australian, and Canadian teacher training programs have introduced the methodology and are studying its effects on their graduates, faculty members teaching in such programs in the United States have been slow to recognize and adopt its use (Ferry, Kervin et al., 2004). The reasons for the failure to introduce computer-based classroom teaching simulations into teacher education instruction are unknown but must be discovered and addressed (Dede, 1988) so that this powerful learning tool can and will be adopted. Since attitude and perception play a significant role in the adoption of any new instructional method and technology by college and university faculty into their own teaching methodologies (Adams, 2002; Dede, 1988; Dusick, 1998; Elsam, 2006; Groves & Zemel, 2000; Johnson, 1984), understanding the attitudes they hold toward computer-based classroom teaching simulation as an instructional tool is a first step in determining why U.S. education faculty have been slow to adopt it (Cook & Selltiz, 1964; Elsam, 2006; Knezek, Christensen & Miyashita, 1998; Mangano, 1973; Nicolle & Lou, 2008). University faculty have been determined to be very resistant to change of any kind in their adopted teaching methodologies (Mangano, 1973; Mitra, Steffensmeier, Lenzmeier & Massoni, 1999; Panda & Mishra, 2007; Roberts, Kelley & Medlin, 2007; Wetzel & Williams, 2005), yet the mere act of measuring attitude and intent has been found to significantly impact their behavior (Antonak & Livneh, 1991; Cook & Selltiz, 1964; Sexton, King & Goodstadt-Killarn, 1999). Furthermore, faculty behavior can be altered by awareness, reinforcement over time, and institutional commitment to a desired change (Mangano, 1973). Thus, any assessment of faculty attitudes toward computer-based classroom teaching simulations may result in change (Bell, 2001; Berliner, 1985; Evertson et al., 1985; Mangano, 1973; Wetzel, Floden & Ferrini-Mundy, 2002). As a first step, this exploratory research study with a survey method focuses on discovering attitudes that lie at the heart of the slow pace with which computer-based classroom teaching simulations have been adopted by the faculty of colleges and schools of education in the University of North Carolina system. It sought to reveal connections between demographic and professional characteristics selected due to their commonality among the participants and the factors that might impact the incorporation of computer-based classroom teaching simulations into the teaching regime.

Purpose of the Study

The purpose of this research study was to identify specific demographic and professional characteristics of faculty who teach methods courses to pre-service teachers. It further sought to determine whether any or all of the selected characteristics were associated with factors that were used to define faculty attitudes that influence them to adopt computer-based classroom teaching simulations. Understanding whether associations exist between selected demographic and professional characteristics and study factors may lead to additional research that helps establish the importance of introducting computer-based classroom simulations into instructional methods courses.

Statement of the Research Problem

Teacher education programs are often criticized for graduating teachers who are not prepared for the realities of their own classrooms. Computer-based classroom simulations have proved to bridge the gap between the college experience and K-12 education workplace and could potentially diminish this particular criticism (Cruickshank, 1966, 1968; Ferry et al., 2004, 2006; Strang, 1996, 1997). Despite this possibility and mounting evidence that simulations have been adopted and work well in other fields such as medicine, aviation, criminal justice, and the military, they are not widely used in pre-service teacher education programs. Since faculty attitudes determine, to a large extent, what instructional methods are used, this study addressed whether any specific demographic and professional characteristics influence the attitudes of teacher education methods course faculty toward computer-based classroom teaching simulations. Demographic characteristics included in the survey were age, gender, and education. Age was the single demographic characteristic included in the study based the variables common use in studies of faculty technology use (Sahin & Thompson, 2007; Panda & Mishra, 2007; Johnsrud & Harada, 2005). Professional characteristics included in the data collection were years of teaching, tenure, employment status (full-time or part-time), curriculum level, and the Carnegie classification of the employer institution (Carnegie Foundation for the Advancement of Teaching). Tenure status and Carnegie classification of employer institution were selected for inclusion in the data analysis based on their inclusion in studies of faculty technology use (Gueldenzoph et al., 2000; Johnsrud & Harada, 2005). Faculty attitude was based on three factors as determined by a factor analysis. The 3 factors were labeled:

- perceived impact of adoption of the methodology;
- inclination toward adoption;
- perceived burden of adoption (described by some faculty as the "hassle

factor”).

Significance of the Study

This inferential study may lead participants to re-examine their current instructional methodologies and whether those methodologies could be enhanced by the integration of teaching and classroom management through computer-based classroom teaching simulations. The findings of this study could benefit colleges and schools of education by introducing to their faculty an instructional tool that has not been widely adopted in the U.S., but that has great potential for improving the quality of their graduates. The findings of this study could help determine whether the significant investment of time and dollars into the development of high-quality classroom teaching simulations is warranted. Finally, factors identified as contributing to the adoption of the teaching and learning methodology can be fostered in methods course faculty preparation and course development. If faculty attitudes are overwhelmingly negative toward the integration of such a simulation into their own methodologies, and if they have no confidence that computer-based classroom teaching simulations would be beneficial to their students, then the time and financial costs of development would need to be carefully considered and an educational plan developed to improve understanding of the benefits and to encourage their integration.

Research Questions

This exploratory study consisted of a survey of K-12 methods course faculty, in the colleges and schools of education in the constituent universities of the University of

North Carolina. This survey gathered certain demographic and professional data as a basis for determining whether the characteristics (data) are linked in any way to their attitudes toward interactive computer-based classroom simulation as a means of preparing future teachers for their student teaching experience and future classroom. Links to the web-based survey (see Appendix A) were distributed via an emailed invitation along with instructions (see Appendix B) for completing the survey. Survey questions sought to determine the perceptions of faculty toward the impact that computer-based classroom teaching simulation might have on them, their students, and instruction; their inclination toward adopting it as an instructional method; and, their perception of the burden adoption represents. Certain demographic and professional characteristics (age, tenure status, and Carnegie Classification of employer institution) were selected, based on earlier studies of faculty and technology use (Gueldenzoph et al., 2000, Johnsrud & Harada, 2005; Panda & Mishra, 2007; Sahin & Thompson, 2007), to form the basis for the following research questions:

1. Is the age, tenure status, or Carnegie classification of the institutional employer of the faculty member related to his or her perception of the impact that adoption of computer-based classroom teaching simulation might have?
2. Is the age, tenure status, or Carnegie classification of the institutional employer of the faculty member related to his or her inclination toward adopting computer-based classroom teaching simulation as an instructional methodology?
3. Is the age, tenure status, or Carnegie classification of the institutional employer of the faculty member related to his or her perception of the burden

that adopting computer-based classroom teaching simulation might have on him or her?

Hypotheses

The following hypotheses and null hypotheses were developed for the three research questions.

- Hypothesis 1. The age of the faculty member will be associated with his or her attitude toward computer-based classroom teaching simulations.
- Null Hypothesis 1: Age of the participant will not be associated with his or her attitude toward computer-based classroom teaching simulations.
- Hypothesis 2. The tenure status of the faculty member will be associated with his or her attitude toward computer-based classroom teaching simulations.
- Null Hypothesis 2: The tenure status of the participant will not be associated with his or her attitude toward computer-based classroom teaching simulations.
- Hypothesis 3. The Carnegie classification of the faculty member's institutional employer will be associated with his or her attitude toward computer-based classroom teaching simulations.
- Null Hypothesis 3: The Carnegie classification of the faculty member's institutional employer will not be associated with his or her attitude toward computer-based classroom teaching simulations.

Delimitations and Limitations

The study concerned the attitudes of teacher education faculty in the United States toward computer-based classroom teaching simulations. Due to the number of teacher education faculty in the colleges and schools of education in the U.S., delimitations included:

- Study participation was open only to faculty who teach instructional methodology courses to pre-service teachers in the colleges and schools of education of the constituent universities of the University of North Carolina.
- Participants were not randomly selected.
- No teaching strategies, technologies, or methodologies beyond computer-based classroom teaching simulations were addressed in the survey.
- Due to time and cost constraints, the study was distributed using a web-based survey tool. Data were obtained using quantifiable survey questions, and participation was open for a two week period that began in mid-April and ended on May 10.

The following additional limitations were acknowledged:

- While attitudes can be studied, they reflect the participant's attitude only at the moment he or she responds to the study and may fluctuate according to circumstance (Antonak & Livneh, 1991).
- Participant selection. Participants were not randomly selected; all faculty in the target population were surveyed. The survey included all faculty members who teach methods courses at the fifteen colleges and schools of education in the University of North Carolina system. The modified survey created for this study,

based on the FAIT Survey (Knezek, Christensen, & Miyashita, 1998), was tested for reliability and validity via a pilot study; however, the faculty members in the pilot study were not members of the target group. Their input led to changes that increased the internal reliability of the instrument.

- The possibility existed that only those faculty whose attitudes fell to one extreme or the other would respond to the survey, and thus the results might represent the attitudes of faculty either predisposed toward the integration of simulated teaching opportunities or those who strongly objected to it.

Assumptions

The researcher assumed that:

1. Faculty members had at least some understanding of simulation and of the existence of computer-based, interactive simulation.
2. Faculty members were able to identify and articulate their concerns and questions about using simulated classrooms and virtual students to teach classroom management techniques to pre-service teachers. The pilot study of the survey instrument insured that it elicited this information.

Definitions of Key Terms

The terms listed below were relevant to the study of various types of simulations. While they may have different meanings in other contexts (for example, “presence”), the definitions provided here are particular to this study.

Agent: Virtual beings driven by artificial intelligence (scripted by algorithms) (Biocca, 1997).

Attitude: “Tthe relatively enduring organization of interrelated beliefs that describe, evaluate, and advocate action with respect to an object or situation, with each belief having cognitive, affective, and behavioral components" (Rokeach, 1996, p. 132). According to Thurstone (1928), attitudes can be measured “by expressions of acceptance or rejection of opinions” (p. 533).

Carnegie Classification: Universities and colleges are classified, by the Carnegie Foundation for the Advancement of Teaching, into several different levels depending upon their stated educational mission and focus. In research studies, the classifications serve the purpose of controlling for institutional differences and ensuring adequate sample representations of institutions, students, or faculty (Carnegie).

Computer (digital) simulation: “Defined as a program that models a system or a process, which can be natural or artificial” (Baek, 2009, p. 29).

Cross Sectional Design: “Collection of data from selected individuals in a single time period. It is a single, stand-alone study” (Gay & Airasian, 2000).

Digital-Game-Based-Learning (DGBL): Computer-based interfaces that simulate real places and situations. Players participate in a series of activities that:

- develop context-specific, problem-solving skills

- provide personally tailored and highly motivational instruction
- promote student-directed learning, free inquiry, and exploration
- support constructivist environments conducive to various forms of social learning (Becker, 2005).

Head-Mounted Display (HMD): head-mounted devices that immerse participants into a virtual 360 degree experience (Psotka, 1995).

Immersive environment: simulated environment through which the human participant can interact, via computer software, with virtual beings that have been programmed to respond to the human's behavior. Immersive environments range from virtual worlds such as *SecondLife,* where participants decide upon and carry out actions through their surrogates known as avatars, to worlds and environments where players are limited to the scenarios generated by the computer software (Slater, Usoh & Steed, 1994).

Information and Communication Technologies (ICTs): Include computer hardware and software, the Internet, and networks, as well as devices that digitize text, video, and audio content.

Massive Multiuser Online Games (MMOG): Online games that are played in virtual environments. They are dynamic and persistent, given that the game continues whether or not a particular participant is engaged or not. (Bonk & Dennen, 2005; Schrader & McCreery, 2008).

Methods faculty: Faculty in institutions of higher education who deliver specific discipline or grade-level content instruction to pre-service, K-12 teachers which prepares their students to develop effective teaching strategies, instructional plans, and classroom materials for teaching (McCall, Janssen & Riederer, 2008).

Presence: No common definition exists, but researchers generally agree that it is determined by two general, variable categories: media characteristics and user characteristics. Media characteristics include form (properties of display medium, degree of control within, and ability to modify the environment) and content (representations of objects, actors, events). User characteristics range from age, gender, personality, cognitive awareness, and prior experience with virtual environments to the ability to suspend disbelief (Baños et al., 2004). Social presence occurs when humans feel they have access to the intelligence of the 'other' (in this case the virtual "agent") and can 'do' or behave in the virtual environment in the same ways that they can in the real world (Garau, Slater, Pertaub & Razzaque, 2005). Co-presence is the extent to which humans in a virtual environment have the sense they are with other people even though the "people" are digital creations (Biocca, 1997). Co-presence is related to agent awareness which is the extent to which humans feel the virtual beings in the virtual environment are aware of them (Garau, Slater, Pertaub & Razzaque, 2005).

Summary

Computer-based simulated classroom teaching experiences first began to appear in teacher training programs in 1963 (Cruickshank, 1968; Cruickshank & Broadbent, 1968; Egbert, 1965; Silberman, 1963). While teaching simulations have become more sophisticated over the past forty years, and while research has repeatedly demonstrated their effectiveness in training pre-service teachers for the realities of the classroom, no evidence exists of widespread adoption by faculty in colleges of education.

To summarize the attitudes of faculty in the United States toward the use of simulation to prepare pre-service teacher students for their classrooms, this dissertation is organized and reported in five chapters. Chapter One introduces the focus of the research that investigated these attitudes and feelings as evidenced by the frequencies, averages, and percentages reported in Chapter Four. This chapter also includes support for the need for the study, a statement of the problem, a description of the study, the significance of the study, and research questions as well as delimitations, limitations, assumptions, and definitions of terms. It provides a foundation for Chapter Two, which presents a comprehensive review of the literature related to the use of simulation used for training and teaching purposes. Major topics explored as part of the literature review include human response to virtual beings in computer-generated environments, the development and quality of non-education teaching and training simulations, and the historical and current use of simulations in pre-service teacher education. Included within these major topics is the successful use of computer-based simulation for teaching purposes in a variety of professions, the cautions, concerns, advantages, and disadvantages related to its use, and the possibilities it offers for deeper learning and retention of what has been learned. The chapter does not include a review of literature related to faculty attitudes as no such studies were discovered, and it is believed that none have been published. The literature reviewed in Chapter Two provides a firm foundation for the study. Chapter Three reports the methodologies used to gather and analyze the study data. Chapter Four reports the findings that resulted from the analysis of the data. Chapter Five discusses the conclusions reached.

CHAPTER 2: LITERATURE REVIEW

Calls for the overhaul of teacher education programs in the United States come as often as criticisms of the public school systems that employ their graduates. The quality and effectiveness of teacher education programs have a direct impact on the quality and effectiveness of the teachers they train (Evertson et al., 2005; Wilson, Floden & Ferrini-Mundy, 2002). Thus, when new teachers report that they do not feel adequately prepared for their first years in their own classrooms, the methodologies and practices of their teacher preparation programs legitimately come under increased scrutiny. Despite critical reviews of colleges and schools of education, their faculty are often reluctant to adopt new strategies and technologies that could potentially improve the learning process for their students (Adams, 2002; Bell, 2001; Mitra et al., 1999; Nicolle & Lou, 2008; Roberts et al., 2007; Sahin & Thompson, 2007; Spodart, 2003).

Overview of Simulation as an Educational Tool

Simulation has long been a credible, effective teaching tool. Cruickshank and Broadbent, in their seminal work, *The Simulation and Analysis of Problems of Beginning Teachers*, cited simulations as the difference between theory and practice and nearly half a century ago foresaw widespread use of them in the preparation of teachers (1968). Cruickshank (1968) reported on the use of the computer-based teacher education simulation, *Longacre School,* and called for further studies on the use and impact of computer-based simulation as a teaching tool through its integration into teacher education. Harold Strang (1996) built on Cruickshank's studies of interactive classroom simulations that coupled lesson planning and execution by participants with feedback on the success or weakness of their work. This helped them understand, prior to their student teaching experience, the connection between their planning and the success of their future students. In *Simulations and the Future of Learning: An Innovative (and Perhaps Revolutionary) Approach to E-Learning*, Clark Aldrich (2004) continued to make the case for using simulation games to promote deep learning and behavioral change in various educational settings, noting that it provides a blueprint for conceptualizing, designing, building, and teaching through computer-based simulations. According to Aldrich, simulations are best used in four ways--understanding big ideas and concepts, learning how to deal with time and scale, decision-making practice, and providing opportunities to try new things in a safe environment.

Studies show that in addition to being an effective way to help students learn how to carry out tasks, teaching simulations are equally effective at helping teacher education students gain appreciation for the difficulties they will face in real-world situations (Rollag & Parise, 2005). The ability to work through problems to a successful conclusion in simulated environments gives the participants confidence in their ability to face problems, identify solutions, and carry out the steps required to achieve their goals (Poulon, 2007). Teacher education simulations can provide pre-service teachers with these much needed skills if used as part of their training regimen (Schrader & McCreery, 2008).

Despite the promise of interactive computer-based simulation as a tool for teacher preparation and the phenomenal advances since Cruickshank's early work in technology that increased its effectiveness, it has failed to attract the attention of teacher education faculty in the United States (1968). To understand why this is so, this chapter explores the interaction of humans with computer-generated beings in virtual environments, the state of development and quality of interactive simulation technology in general, the use of simulations to train students and practitioners in non-teacher-education professions and workplaces, and, finally, the current state of classroom simulations aimed at preparing teacher candidates for their future profession.

Human Response in Virtual Environments

The effectiveness of a simulated classroom environment to enhance teacher training is dependent upon the acceptance by the human participants (pre-service teachers) of the digital-based student "beings" who inhabit the virtual classroom as being real (Cruickshank & Broadbent, 1968). The interaction of humans and virtual beings in virtual worlds has been studied over the past two decades to determine whether the human participants feel a sense of presence when interacting with the virtual beings (Slater, Pertaub, Barker & Clark, 2006; Slater, 2004; Young & Tseng, 2008). Reeves and Nass found that computer-generated voices were perceived in the same ways that human voices are perceived and draw the same responses (1996). They further reported that since voice is an indication of presence, their research supported other research findings that humans attribute a "presence" to computers (1996). Slater, Usoh, and Steed reported, as a result of their 1994 study on the depth of presence, that in general a participant's ability to interact productively with virtual beings is dependent upon the participant's sense of presence. Baños et al. (2008) determined that 3-D imaging (stereoscopy) had little effect on the sense of presence that human participants experience in a virtual world, lending support for the idea that a simulation need not be highly sophisticated to be effective.

Reeves and Nass (1996) reported the results of a series of experiments that demonstrated that computer-human interactions mirrored very closely that of human-human interactions. Their experiments showed that violations of interpersonal space were just as uncomfortable or comforting, praise or criticism had the same psychological effects, dominant or submissive personality types caused the same reactions, the intensity of experience resulted in the same outcome, computer team members were treated as human team members would be, and reactions to computers with assigned genders was the same as those to male or female humans (for example, evaluations from “male” computers were considered friendlier than evaluations from “female” computers even though the evaluations were identical) (Reeves & Nass, 1996).

As a result of three studies on human reaction to information delivered via the computer, Lang et al. (2002), found that alarming or deviant text appearing on a computer did not generate a response any different than that elicited by calmer, non-deviant text, but that animated banner headlines resulted in significant increases in heart rate and other indicators of response (2002). Wise and Reeves (2007) found that heart rates increased when pace and type of information presented was controlled by the computer, as compared to control exercised by the participants in their study. Finally, recall of information was better when the computer controlled the pace of presentation (Lang, 2002). While these studies were conducted as marketing research, the findings have implications for designers of interactive learning simulations. When interactions are not driven by mouse clicks, responses are likely to be intuitive and what is learned is more likely to be retained.

The results of these studies suggest that computer-generated virtual students would be perceived as real, would be responded and reacted to in the same ways that teachers respond to real students, and that active, animated beings would elicit psychological and emotional reactions even though they are not real. The foregoing outcomes provide an important foundation and rationale for increased use of computer-based classroom teaching simulations in teacher training programs.

Development and Quality of Simulations

Simulations for education purposes have been used in various ways over the past half century, beginning with the simplest, face-to-face, role-playing exercises that are still in use today. The development sequence and quality of simulations are presented here.

Types of Simulations

Simulations have been incorporated into instruction as face-to-face or virtual role-playing activities for some time, but interactive, immersion-type simulations differ from these activities in that the interactive, immersive simulations have infinite reactions and outcomes depending upon the actions of the participants (Baek, 2009). According to Becker & Parker (2009) there are two basic types of digital computer simulations: discrete and continuous. Discrete simulations generally involve sequential activities that occur one at a time. Continuous simulations generally involve a physical process that has many activities occurring simultaneously, such as a chemical reaction,. Swaak et al.

(1998) place the continuous and discrete types, labeled by Becker and Parker (2009), into the conceptual model. Conceptual models, according to (Swaak et al., 1998) are generally found in discovery-learning context, while operational models are associated with experiential learning. A computer or digital simulation is defined by Baek (2009) as “a program that models a system or a process, which can be natural or artificial” (p. 29) and an interactive simulation offers options for selection by the user that then create a different sequence of events based on any and every choice. Digital simulations are generally categorized as experiential or symbolic (Psotka, 1995). Experiential simulations put participants in the center of situations where they can react to events based on actual ones. Symbolic simulations keep the participant on the outside of the simulation as he or she manipulates variables in a laboratory-research or a system set up (for example, an electrical grid test) (Baek, 2009). According to Baek (2009), educational simulations are usually divided into those that teach about something and those that teach how to do something, which includes situational simulations. Situational simulations deal with human and organizational behavior and are found least often because they are difficult and expensive to develop due to the “great complexity of human and organizational behavior” (p.32).

Advantages and Disadvantages of Simulations

Simulations have distinct advantages over real-world practice. They are the next best thing to actual real-world, real-time experience because they allow participants to ask the question “what if” and then to experience the consequences of their actions without posing a risk to lives or property (Becker & Parker, 2009; Rieber, 1996). Practical experience in immersive environments enhances the participant’s ability to apply abstract knowledge in a virtual situation reflecting the real one in which they will work (Dede, 1995). Bonk and Dennen (2005) cite improvements to decision making capabilities and problem-solving skills that increased the confidence and reflective thinking of participants in digital simulation training. In addition, computer simulations increase motivation because they actively engage students and feedback or response is immediate (Baek, 2009; Dondi & Moretti, 2007). They can be replayed endlessly for reinforcement or to find better, different solutions to a given problem (Aldrich, 2004).

While the list of positive outcomes of learning through the use of simulations, in general, could be expanded, simulations used in teacher education training have been found to have some very specific important outcomes. Cruickshank (1966) reported that pre-service teachers who were engaged by their instructors in face-to-face, role-play simulations were able to assume full responsibility for their student teaching classrooms three weeks earlier than their peers who had not engaged in the simulation training, their confidence in their teaching abilities was higher, and their work behaviors were better. Ferry and Kervin (2006) tested computer-based classroom teaching simulations and reported the same outcome combined with participant reports of increased understanding of complex classroom situations, realizing the connection between educational theory and classroom practice, and identifying for themselves the areas in which they needed more professional development or knowledge. In addition to these potential results, computer-based teaching simulations make it possible for pre-service teachers to practice teaching when time permits, to engage with students who are never tired, to make mistakes and reflect on them, to practice the same teaching or discipline technique more than once, to have their teaching, pacing, and behavior reviewed by a professor who can give feedback specific to an individual teacher candidate's actions or behaviors before he or she sets foot in a student-teaching classroom (Strang, 1997). These same advantages are cited repeatedly in the literature, but attention must also be given to the potential problems presented by digital simulation-based learning.

Learning via simulated environments does have potential disadvantages. Among those noted by Bonk and Dennen (2005), in their report on the outcome of military training simulations, is the potential for participants to become desensitized to the consequences of their actions. They further cautioned that training via simulation, offered as an individualized, isolated learning activity, can have disastrous consequences if care is not taken to provide appropriate guidance. For example, computer-based simulations have been associated with social, psychological, and emotional problems such as depression, deviant behavior, job burnout, and addiction to the immediate feedback that results from working with and learning via digital interactive media (Bonk & Dennen, 2005). Furthermore, one study has shown that some learners cannot manage the copious amount of information or action that occurs in a simulation, and that they may miss clues that would lead them to better choices or conclusions (Chinn & Brewer, 1993). Concerns have also been raised about the addictive qualities of digital games, which are the foundation for digital simulations (Bonk & Dennen, 2005). Finally, the cost of producing high-quality simulations, whether the quality is related to graphics, design, or, in the case of situational simulations, recreating the complexities of human and organizational behavior, is a disadvantage that cannot be ignored by most institutions of higher education (Bonk & Dennen, 2005).

Use of Simulations in Non-Teaching Professions

Computer-based simulations are routinely used as training and preparedness exercises in other professions where practice on human subjects has high risks. While K-12 classroom instruction does not usually involve life or death decisions, the stakes are high and a single academic year with an ill-prepared teacher can have a profound and enduring impact on the students who have the bad luck to be in his or her classroom (Darling-Hammond, 2000; Leigh, 2009; Sanders & Rivers, 1996; Stronge et al., 2007). Proponents of the adoption of computer-based simulations in teacher training programs routinely cite its successful use in the fields of criminal justice, medicine, the military, and aviation. Significant research supports those positive reviews.

The field of criminology and criminal justice has instituted the use of simulation training and situation-modeling for individual law enforcement officers, detectives, departments, and for cross-agency training exercises. Experimental studies show that detectives trained via computer-based-simulation using the P300 GKT head-mounted display (HMD) are significantly more likely than the control group participants to identify which suspects and witnesses were telling the truth (Eck, 2008; Hahm et al., 2009). Dray et al. (2008) reported the results of their 2008 study of simulation-based modeling of the impact of various law enforcement responses to an illegal activity, in this case the drug trade. Using the software, "*SimDrugDrought*" and "*SimDrugPolicing*" that simulates street-level drug-related crimes and law enforcement responses, agents were able to test their theories on which responses resulted in the best long-term strategy (Dray). The Dray et al. study clearly indicated that the most effective means of combating illegal-drug activities of all types was street-level, problem-oriented police intervention as opposed to the more highly visible “drug bust.” Other uses of simulation-based-training in the field included a description by McGrath and McCarthy (2008) of the work done by the National Incident Management and Incident Command Systems (established after September 11, 2001) with local police, fire, and other agencies to practice disaster drills with the Interactive Synthetic Environment for Exercise (ISEE) developed by Dartmouth College. The ISEEs are based on actual personnel and resources available to the units and departments that participate; local road conditions and weather are coded into the software for a real-time, real-life feel (McGrath & McCarthy, 2008). Garrett (2002) describes a virtual environment training simulation, used to prepare officers for the task of transporting prisoners on airplanes; this event involves a loaded weapon in a closed, small space populated with many civilians, which is not common to their regular routine. Participants reported increased awareness of the hazards of responding to incidents within a confined space with many potential victims, a better understanding of the difference in the threats inherent to the environment on a plane as opposed to the more open environments in which their standard training takes place, and increased confidence in their ability to respond appropriately under the stress of such an event. They believed that the improvements carry over to other more routine duties, such as traffic stops. Since the goal of these simulated environments and situations is to prepare police officers, detectives, and other law enforcement personnel for events that require split second, decision-making capabilities. their supervisors were especially pleased with the ability to have participants replay episodes where procedure was not followed or more practice was needed (Forsythe, 2004).

While studies show that simulated-situation-training is very effective at preparing law enforcement personnel for the most stressful and dangerous events they will face, the focus in the field of medicine is on the emotions and well-being of patients cared for by healthcare workers who today routinely train using computer-based simulations. The use of computer-based-simulation practice is considered routine in medicine today (Wayne et al., 2006). Physicians, nurses, anesthesiologists, and other healthcare providers make wide use of human simulation figures, simulated-training exercises and computer-based simulations of various medical procedures. Gallagher and Cates (2004) found that medical residents who were trained via virtual reality simulations made six times fewer errors during a gall-bladder dissection procedure which they performed 30% faster than a control group. Furthermore, the residents in the experimental group performed on par with experienced physicians. The results of a simulated carotid artery procedure showed the same impressive results, and led Gallagher and Cates to conclude that the traditional method of training on patients is unacceptable given such clear evidence that simulation training is operationally superior.

In a test of two-year residents' mastery of cardiac life support skills, Wayne et al. (2006) found that skills were significantly improved following computer-based simulation practice, and all participants exceeded the mastery competency standards (based on the U.S. Medical Licensing Examination and American Heart Association guidelines), and they rated the training, evaluation, and feedback in a simulated clinical environment very highly. In a 1995 study of nurses' and anesthesiologists' simulation training in respiratory crisis management, Holzman, Cooper, Gaba et al. (1995) reported that 90% of the 72 nurse and anesthesiologist participants felt the training was so beneficial that it should be repeated at least once every two years, and more than 50% believed it should be repeated every six months.

Simulation-based-training has also been found to enhance behavior, decision-making, and critical thinking skills in emergency care situations. A 2007 study of emergency room nurses and crisis situations using the "*Sim Man*" human patient simulator showed an average gain of 20 points between pre- and post-test scores for those attributes. Participants also reported feeling more confident about their abilities in these areas (Wolf, 2008). Only one study (of a group of 38 third year medical students) reported finding no difference between lecture and simulator-trained students. It went on to state that the results of this single study should not be considered conclusive due to the very small number of participants who were limited to a one-time, brief simulation-based training experience, and that even with these limitations the lecture did not prove superior to simulation (Gordon et al., 2006). The value of computer-based simulation training in the medical field has been recognized to the extent that Barzansky and Etzel (2007) reported that 75% of U.S. medical schools were making use of multiple types of computer-based-simulation-training for both clinical evaluations and procedures. Finally, the ethical implications of using this proven training methodology were cited repeatedly as the single most important reason for its rapid and widespread adoption in all medical practitioner training (Gallagher & Cates, 2004; Hmelo, Gotterer & Bransford, 1997; Holzman et al., 1995; Ziv, Wolpe, Small & Glick, 2003).

The moral and ethical implications of confining surgical training and diagnostic practice to human patients are considerable when research has clearly demonstrated that the use of simulations and simulated patients improves these skills. Ziv et al. (2003)

assert that continuing to use real human patients in medical learning situations when simulations are available reduces those individuals to commodities (2003). The use of medical simulations helps diminish possible preventable injuries resulting from medical practitioners learning new techniques or trying therapies. Furthermore, the cost of training and malpractice liability may be reduced when health professionals have been able to practice their skills as often as they feel the need, and the dollars saved could be applied to research, better facilities, or more staff (Holzman et al., 1995).

Educational environments seldom put teachers into the kind of life or death situations common to the medical profession. Putting pre-service teachers into classrooms with children whose future academic success can hinge on a single year with an ill-prepared or bad teacher when the methodology exists for practice on simulated students is a risk that should be avoided. It may very well be the moral and ethical equivalent of sending a surgeon into the operating room with two years of lecture preparation and an observer, charged with providing post-operation analysis, while he or she performs an operation that could cripple the patient, (Darling-Hammond, 2000).

Early supporters of simulation training for medical personnel pointed to its use in military training and the field of aviation as proof that the potential benefits far outweighed the reluctance of skeptics (Issenberg et al., 1999). Indeed, the U.S. Armed Forces led in the development of virtual environment and MMOG training exercises. Both officers and enlisted personnel use computer-based-training to prepare for command and leadership roles, as well as for tactical field experience and behaviors. In 2005, Bonk and Dennen reported to the Office of the Under Secretary of Defense for Personnel and Readiness the results of fifteen research studies on the use of simulated environments and virtual beings to teach or to practice. Research Study X, “Decision-Making, Leadership, and Interpersonal Conflict,” and Research Study XI, “Learning from Mistakes and Learning Histories” reported marked improvement in decision-making skills, self-reflection, and cognitive awareness (Bonk & Dennen, 2005). The results of Research Study XIV, “Problem Solving Processes and Types of Knowledge Facilitated by MMOGs,” showed significant improvements in problem solving skills, one of the most frequently cited outcomes of interactive computer-based gaming. In addition, a recently reported study of combat mission simulation training found that self-confidence was among the more important traits linked to identifying appropriate targets and avoiding misfires; secondary findings were improvements in multitasking performance and recognizing the need for responses that are aligned with the environment in which the soldier is operating (Chen & Terrence, 2009). Prensky (2001) reduces the complexities of simulation training in the military to the goal of training the soldiers’ mind so that when they get into a tank on the battlefield, they will know what to do without having to think about it. While all of these skills and abilities are important to the field of aviation, they are equally important to the teaching profession (Darling-Hammond, 2000; Leigh, 2009; Stronge, Ward, Tucker & Hindman, 2007).

Flight simulators are one of the most-often cited forms of computer-based-simulation-training, and research into its effectiveness supports its continued use. Recent studies have been conducted on simulations as routine training methodologies (Ruigrok & Hoekstra, 2007), pilot and air-traffic controller decision-making when presented with unexpected challenges (Ruigrok & Hoekstra, 2007; Wiegmann, Goh & O'Hare, 2002), and training programs for new aircraft (Capello, Guglieri & Quagliotti, 2009; Ruigrok &

Hoekstra, 2007; Sato, 2008). The outcomes were significant in each case; computer-based-simulation training was found to be critical to the training of aviation personnel whether they fly planes or manage flight patterns. Whether the training regimen is conducted in the field of criminology, medicine, the military, or aviation, the outcomes are similar with respect to improved decision-making skills and the trainee's confidence in his or her ability to function well should the situation arise. These same skills and functional capabilities are important to the teaching profession as well, and simulations have been found to foster them in pre-service teachers in the same ways that guided practice in a virtual world does for other professionals (Cruickshank, 1968; Ferry et al., 2004; Strang, 1987; Kervin et al., 2005).

Effects of Simulations

One of the most difficult steps in the evolutionary process of new technology adoption for instructional purposes is, according to Dede (1988), identifying its possible impact on the learner and the learning process. Since Dede's pronouncement in 1988, numerous research studies on the effects of training and practice via computer-based simulation in the fields of criminal justice, medicine, the military, and aviation have identified many benefits. Among the effects associated with learner outcomes, the most commonly cited are improved problem-solving skills, higher quality decision-making and cognitive thinking, and the opportunity to practice for real situations in a safe environment (Batha & Carroll, 2007; Bonk & Dennen, 2005; Forsythe, 2004; Gallagher & Cates, 2004; Prensky, 2001; Scalese, Obeso, & Issenberg, 2008; Schrader & McCreery, 2008), but others exist and are just as noteworthy. Computer-based simulations of workplaces and situations are available for use at any time and make reflection, review, and failure possible (Bonk & Dennen, 2005; Gallagher & Cates, 2004; Scalese, 2008; Schrader & McCreery, 2008; Swaak, 1998). The ethical considerations of developing and practicing many types of law enforcement, medical, military, or flight operations in real time, with humans serving as the test models, make computer-based simulations a much better training choice (Bonk & Dennen, 2005; Gallagher & Cates; Galloway, 2009). Students and participants in digital game based learning report a greater degree of satisfaction with the student-centered, problem-solving experience that is inherent to computer-based simulation (Pannese & Carlesi, 2007; Schrader & McCreery, 2008). Finally, while financial savings are not the most compelling reason for introducing computer-based-simulation-training, they are often mentioned as an additional positive byproduct (Capello et al., 2009; Kuijper, 1997; Prensky, 2001; Reiber, 1996).

Faculty Attitudes toward Simulations

Faculty and trainers, sometimes fearful of displacement as a result of the adoption of DGBL, have discovered that the ability to see the learner in action in real time, to increase or decrease the intensity of the simulated situation, to give immediate feedback, and to debrief after training sessions actually enhances the learning process, increases the relevance of the training to their students' work environments, and increases their own importance in the process (Capello et al., 2009; Eck, 2008; Garrett, 2002; Hahm et al., 2009; McGrath & McCarthy, 2008; Pannese & Carlesi, 2007). According to Rollag and Parise (2005) electronic simulations force students "to confront the complexity, ambiguity, and interpersonal tension inherent in real-life management situations" (p. 770) in ways that lectures and other instructional methods cannot.

Repeated searches for studies related to faculty use and attitudes toward computer-based classroom teaching simulations strongly suggested that none exist; however, a great deal of research has been conducted on faculty attitudes toward technology (Adams, 2002; Elam, 2006; Groves, 2000; Gueldenzoph et al., 2000; Johnsrud & Harada, 2005; Mitra et al., 1999; Nicolle & Lou, 2008; Roberts et al., 2008; Sahin & Thompson, 2007; Twale, 1991). Although studies of faculty attitudes toward technology focus largely on its use to support the delivery of instruction rather than the integration of it as part of the instruction (Adams, 2002; Elam, 2006; Groves, 2000; Gueldenzoph et al., 2000; Johnsrud & Harada, 2005; Mitra et al., 1999; Nicolle & Lou, 2008; Roberts et al., 2008; Sahin & Thompson, 2007; Twale, 1991), as would be the case with the guided practice inherent to computer-based classroom simulations, they provide a foundation for the current study. Gueldenzoph et al. (2000) found no significant relationship between the use of technology in the classroom and the demographic and professional characteristics of faculty. Johnsrud and Harada (2005) found that non-tenured faculty members were significantly less likely to introduce technology into their instruction, but they did not attribute this to tenure status per se but to other pressures that were obstacles to what could be called experimental instruction. Studies of faculty attitudes toward and use of technology in their instruction shed light on the factors that have been used to determine attitude and thus provide a basis for the study of faculty attitudes toward computer-based classroom teaching simulations for pre-service teacher education.

Use of Simulations in Preparing Teachers

The use of simulations in pre-service teacher education offers a unique tool for assessing competence prior to the field-based experience, and in a way that was not previously available to faculty charged with this task. Simulations have long been used in educational settings as an effective way to help students gain intuitive, implicit, and functional knowledge (Becker & Parker, 2009; Cruickshank, 1966; Swaak et al., 1998) and, according to Rollag and Parise (2005), to present students with the complexity, ambiguity, and interpersonal tensions inherent to real life situations. From text-based, written simulations and face-to-face, role-play in a physical classroom, to the immersive environments of today's digitized versions of classroom settings and situations, simulations have been repeatedly cited as the link between theory and practice for pre-service teachers (Berliner, 1985; Brown, 2000; Cruickshank, 1966; Cruickshank & Broadbent, 1968; Doak & Keith, 1986). In addition to providing a setting in which theory may be applied to practice, Cruickshank (1968) listed 12 possible advantages of simulation practice for pre-service teachers; these included the opportunity to see and think about incidents that may not occur during the student-teaching experience, the possible reduction of teacher failure and turnover, the opportunity for guided practice prior to the student-teaching experience, and the ability of teacher educators to make better selection decisions. Cruickshank was one of many leaders in the field of teacher education who recognized, in the early days of the digital revolution, the potential that computers held for radical change in the field of teacher training (Berliner, 1985; Strang, 1996; Strang et al., 1987). The possibilities seemed endless to early proponents who envisioned and created many types of simulations, including "*Longacre School*," "*Cook School District*," and others described in the following section.

Types of Classroom Simulations

Interactive computer-based classroom simulations are only one of the types of teaching simulations that exist. "*Longacre School"* and "*Cook School District"* are typical of classroom-based, role-play simulations where education students play the roles of students, teachers, and administrators (Cruickshank, 1966). These face-to-face, role-playing simulations may not have all of the benefits inherent to immersive computer-based-simulations, but they were seen as an improvement to the practice of lecture, reading, and discussion that preceded their use (Berliner, 1985; Cruickshank, 1966; Cruickshank & Broadbent, 1968; Strang, 1996). Brand's 1977 study of music education majors showed the effectiveness of review, by teacher education students, of recorded situations showing teachers and students interacting in classrooms. The videotapes focused on vignettes of teaching methodologies, behavior management problems and interventions, and recorded interviews with the teachers featured in the videos. Although a written post-test showed no significant difference between the experimental and control groups, students in the experimental group fared much better in their classrooms when confronted with actual situations in which their behavior management skills had been tested (Brand, 1977).

Chambers and Stacey (2005) described the use of video-based case studies in a science and mathematics pre-service teacher education program. Student teachers view children solving mathematics problems and then watched the child, via a video clip, explain his or her rationale for the answers he or she gave to the problems. Advantages to case studies of this type include: student teachers were able to identify the misconceptions in understanding the children had rather than simply identifying that they had not followed the proper steps to solve particular problems, they realized the very limited time they have in an actual classroom to assess student "thinking" as the students are working, they saw the impact of various classroom management techniques used by teachers, and they were able to review and replay the episodes for further learning and clarification (Chambers & Stacey, 2005).

Case studies, whether presented via written textual documents or video, are a step in the progression of experiential learning for pre-service teachers. Chambers and Stacey (2005) described a study of one computer-based, non-interactive classroom teacher simulation, "*Virtual Classroom*," that functioned much like a videotape simulation. Participants in the study of a Department of Science and Mathematics Education program, viewed three video clips of classroom teaching and teacher interviews. The student teacher participants watched classroom teaching, behavior, and pacing behaviors from different vantage points via the use of remote controls; participants could click on spots in the clips to activate additional resources related to the particular activity.

"Cook School District," "*Virtual School," "ClassSim," "SimClass,"* and "*SimSchool"* are computer-based training simulations that immerse student teachers in the realities of classroom teaching, decision-making, and behavior management (Baek, 2009; Girod, 2009). "*Cook School District"* was developed in 2002-2004 on grant funding from Preparing Tomorrow's Teachers to Use Technology (Girod, 2009). "*Virtual School*," developed in the United Kingdom, allows users to take on many of the responsibilities of the classroom, teaching, and student behavior management at the

middle-level (Baek, 2009). "*ClassSim"* (an Australian simulation), "*SimClass"* (in use in South Korea) and "*SimSchool"* provide near-realistic experiences for pre-service and novice teachers to learn new skills and techniques, and to practice for the purpose of improving existing ones (Baek, 2009; Chen & Terrence, 2009; Zibit & Gibson, 2005). Participants arrange their classrooms, carry out lesson plans, and manage learning and discipline processes knowing that mistakes, misjudgments, and errors are opportunities to learn better ways of doing these tasks under the guidance of their professors (Baek, 2009, Ferry et al., 2004 & 2006). These classroom simulations, and others like them, are the leading edge of what could be a technological revolution in the profession of teacher education. They hold the promise of creating better teachers who are much more prepared on their first day in the classroom (Baek, 2009; Girod, 2009; Zibit & Gibson, 2005)

Advantages of Classroom Simulations

Although they are difficult and costly to develop, the advantages of situational simulations indicate that they likely hold the most promise of any recent development for improving teacher education instruction (Aldrich, 2004; Hertel & Millis, 2002). Girod (2009) noted the desire and dedication of teacher education professionals to develop teacher candidates into good teachers, and stated that these professionals are challenged by the complexity of the task. He cited "teacher work sampling" as an important component of the teacher education process and described how the recognition of that importance led to the creation of the "*Cook School District"* simulation. "*Cook School District," "SimSchool," SimClass*," and other teacher education simulations introduce pre-service teachers to the effective use of technology as a teaching tool through direct use (Becker, 2007; Girod, 2009). Research shows statistically significant results in their capacity to enhance participants' ability to apply abstract knowledge in a virtual situation that reflects the real one in which they will work (Dede, 1995; Evertson et al., 1985; Girod & Girod, 2008). Simulated classroom teaching practice increases motivation (Cruickshank & Broadbent, 1968; Dondie & Moretti, 2007) and reinforced the pre-service teacher's professional identity as a future teacher (Ferry & Kervin, 2006; Poulou, 2007). They help education students develop an awareness of and ability to identify potential classroom problems, to learn better decision-making processes, and they give them the opportunity to reflect on the consequences of the decisions they make (Ferry & Kervin, 2006; Ferry et al., 2004; Yeh, 2006). Simulations make all of these advantages possible within an environment that involves less risk than trial and error in the real classroom and with their future students (Cruickshank & Broadbent, 1968; Ferry & Kervin, 2006; Girod & Girod, 2008; Kervin et al., 2005). In 1968, Cruickshank predicted that the use of teaching simulations in pre-service teacher education would lead to lower turn-over rates due to the ability of teacher education professionals to provide more guided instruction and to spot weak, inadequate teacher candidates before they made it to a classroom of their own. Teacher turn-over rates remain a significant issue today (NCATE, 2005). Cruickshank's prediction has not been realized; perhaps the time for simulation has arrived (Doak & Keith, 1986; Zibit & Gibson, 2005).

Disadvantages of Classroom Simulations

While computer-based classroom simulations have many advantages and appear to present significant possibilities for improving teacher education training, potential disadvantages or pitfalls should not be ignored or glossed over in an enthusiastic embrace of the technology. Steinberg (2000) points out that individuals who make use of digital simulations might not feel as connected or personally responsible for the decisions or mistakes they make. Research into military action simulations appears to indicate that this argument has some validity and is certainly a potential problem that the professor guiding the simulated learning experience should be aware of (Harmon, 2003). Steinberg (2000) further cautions that students learning via simulation might simply accept computer-generated answers or choices without question; they might also begin to rely on the computer to formulate the answers. While these particular concerns should not be dismissed, they seem less likely to occur in a simulated teaching environment where the teacher, as player, would be forced to choose a specific action. The key to avoiding the most serious of the disadvantages is most likely the attention and oversight of the professor (Chapman & Sorge, 1999). Elder (1973) states, in reference to face-to-face simulations, that they are “purposeful activities but without explication,” they are meaningless.

The costs associated with developing, maintaining, and updating simulations can be prohibitive as well. Harlow and Sportsman (2007) developed an equation to analyze the financial viability of simulation use in nursing education courses. The equation incorporated investment costs (one-time development expenses), the annual cost of a classroom, equipment, lab, technical personnel, and faculty costs in an effort to determine whether the costs were offset by the savings or other benefits. The results of the study showed that while initial investment costs were high relative to savings, other important factors had to be taken into account to measure the true cost and value, including increased competency and reduction in threats to patient safety that would ultimately result in additional savings (Harlow & Sportsman, 2007).

Effects of Classroom Simulations

The most definitive evidence that computer-based classroom simulations are effective tools for training pre-service teachers comes from studies conducted on the pre-service teachers themselves. The methodology appears to have originated in the U.S. and even though it has been slow to catch on in U.S. colleges and schools of education, a great deal of research has been conducted in the U.S. as well as in Australia, Korea, and Europe. Murphy, Kauffman, and Strang reported in 1987 that pre-service teachers who used "*The Curry Simulation"* (one of the earliest computer-based teaching simulations) significantly reduced misbehavior in their classrooms and that the effects were maintained over time. Harold Strang's (1997) longitudinal study of 2000 participants over 16 years who used '*The Curry Simulation"* during their pre-service teacher education programs reported that participants were much more able to identify their own strengths and weaknesses (they were significantly less likely to overestimate their proficiencies), and that the feedback enhanced their learning. By comparison with the control group, participants had more highly-developed instructional and behavior management skills (including the critical skill of pacing). Seventy-five percent of the participants believed the simulation was an effective teaching tool and 92% believed it was useful for beginning teachers.

The findings of more recent studies bear out the claims and the hopes of early advocates in the U.S. such as Strang and Cruickshank. Girod and Girod (2008) replicated the results of a 1969 Cruickshank study by conducting research on Master of Arts in Teaching candidates using their own "*Cook School District"* teaching simulation. Participants developed a clearer understanding of the alignment of instruction, outcomes, and assessments. They developed their range of strategies, were more aware of the connection between teaching and learning, and gained a deeper understanding of the importance of professional development. Taken together, the body of evidence is significant in demonstrating that simulation practice improves instruction, behavior management, planning, decision-making, and cognitive thinking.

Summary

Teaching simulations have been studied and demonstrated to be effective over their 50 year history of use. The development of digital classroom teaching simulations in the past 25 years and the advantages of using them to prepare pre-service teachers for the classroom also have been shown. They help aspiring teachers understand big ideas and concepts, learn how to deal with time and scale, provide decision-making practice, and provide opportunities to try new things in a safe environment. They are especially effective at preparing teachers to manage student behavior and learning as well as how to manage their own behaviors under the types of situations they will confront in their classrooms. Computer-based classroom teaching simulations are liked by pre-service teachers who feel more confident after using them. Students in teacher education preparation programs are not the only advocates for more widespread use of digital teaching simulations; however, few, if any, of the proponents of computer-based classroom teaching simulations advocate replacing lecture, reading, or student teaching terms, faculty who have introduced the methodology into their teaching regimen strongly encourage the incorporation of it. They recommend it as a way of insuring that pre-service teachers are better prepared for student teaching and can make the most of that short experience and thus come better prepared for the realities of their own future classrooms (Ferry & Kervin, 2006; Ferry et al., 2004; Strang, Badt & Kauffman, 1987; Zibit & Gibson, 2005).

The number of colleges and schools of education in the U. S. who have incorporated computer-based teaching simulations remains low despite the evidence that it is effective. The low rate of adoption is likely due to faculty attitudes (Adams, 2002; Bashir, 1998; Evertson et al., 1985; Panda & Mishra, 2007; Sahin & Thompson, 2007; Twale, 1991), which impact behavior (Moreno, 2007; Thurstone, 1928). Determining what attitudes faculty hold toward digital classroom teaching simulations is one of the first steps to encouraging the integration of computer-based classroom simulations into their instruction because attitude and perception play a significant role in the adoption of new instructional methods and technology by college and university faculty (Cook & Selltiz, 1964; Elsam, 2006; Mangano, 1973; Panda & Mishra, 2007).

The attitudes of teacher education faculty may be one of the deciding factors in more widespread incorporation of computer-based teaching simulations into teacher education programs, and thus a study of those attitudes is likely a first step in that process (Cook & Selltiz, 1964; Elsam, 2006; Mangano, 1973). For this reason, this study focused on identifying those faculty attitudes. Chapter Three describes the participants who will be surveyed to gather information about their attitudes and feelings toward the use of computer-based simulation in pre-service teacher education, the survey to be distributed to those participants, and the methodology to be used to analyze the data gathered. Chapters One, Two, and Three are designed to create a cohesive foundation for the reported results of the study outcome.

CHAPTER 3: METHODOLOGY

This chapter describes the methodology and procedures used to conduct the research study. To that end, it is divided into six sections. Section 1 provides the research questions; section 2 describes the research design; section 3 describes the participants; section 4 describes the instrumentation; section 5 describes the data collection procedures; and section 6 describes the data analysis procedures.

The purpose of this exploratory research study with a survey method was to discover the attitudes of faculty who teach educational methods courses to pre-service teachers and to find whether possible relationships exist between their attitudes and any demographic or professional characteristics. As a means to reveal what factors may influence faculty the study sought to:

- discover attitudes of instructional methods faculty toward computer-based classroom teaching simulations;
- identify demographic and professional characteristics of instructional methods faculty;
- determine whether any relationships exist between attitudes and any or all of the demographic or professional characteristics.

Discovery of connections between faculty attitudes and demographic or professional characteristics were sought to reveal what steps might be taken to influence faculty to integrate classroom-based teaching simulation into their instructional methodologies and which faculty are more likely to do so.

Exploratory studies frequently are used when no previous study or research is discovered to provide a foundation for the current study (Wikipedia, 2008). While many studies exist regarding student and instructor attitudes toward technology or computer-based classroom teaching, none were found that specifically addressed faculty attitudes toward the use of teaching simulations as an instructional methodology. Thus, the use of an exploratory survey design was deemed appropriate for this study which analyzed frequencies and percentages to determine the attitudes of study participants toward computer-based classroom teaching simulations and any potential associations of their attitudes with three participant demographic and professional and characteristics.

Computer-based classroom teaching simulations seem to be an effective instructional methodology for pre-service teacher education (Becker & Parker, 2009; Cruickshank, 1966; Swaak et al., 1998). Their use appears to lead to improvements in instructional, behavior management, planning, and cognitive thinking skills (Baek, 2009; Brown, 2000; Doak & Keith, 1986, Rollag & Parise, 2005; Zibit & Gibson, 2005). Since attitude and perception play a significant role in the adoption of new instructional methods and technology by college and university faculty into their own teaching regimen (Cook & Selltiz, 1964; Elsam, 2006; Mangano, 1973), gaining information about their attitudes may lead to an understanding of how to change them (Mitra et al., 1999; Panda & Mishra, 2007). While quite a few studies have been conducted on the impact of simulated teaching experience or practice on pre-service teacher education students, little to no information has been gathered about faculty attitudes toward the methodology.

Chapter One described the foundation and need for the study. Chapter Two presented a comprehensive review of literature and research related to computer-based simulations in non-educational settings and as they are currently used in teacher education programs. This chapter describes the methods and procedures used to conduct this explorator research study.

Research Questions

Three of the eight different demographic and professional characteristics included in the survey were selected for inclusion in the data analysis. The variables age, tenure status, and Carnegie Classification of employer institution were selected for inclusion based on their inclusion in studies of faculty technology (Gueldenzoph et al.,2000; Johnsrud & Harada, 2005; Panda & Mishra, 2007; Sahin & Thompson, 2007) and formed the basis for the research questions to be answered. The questions were:

1. Is the age, tenure status, or Carnegie classification of the institutional employer of the faculty member related to his or her perception of the impact that adoption of computer-based classroom teaching simulation might have?
2. Is the age, tenure status, or Carnegie classification of the institutional employer of the faculty member related to his or her inclination toward adopting computer-based classroom teaching simulation as an instructional methodology?
3. Is the age, tenure status, or Carnegie classification of the institutional employer of the faculty member related to his or her perception of the burden that adopting computer-based classroom teaching simulation might have on

him or her?

Design of the Study

This exploratory study of teacher education faculty who teach methods courses in the Colleges and Schools of Education in the fifteen institutions of The University of North Carolina (UNC System) employed an exploratory study with a survey design via a single, password-protected web-based survey (distributed to participants by email). Participants were asked to answer 48 survey questions (see Appendix A). Answers to 40 of the questions resulted in data on faculty attitudes toward computer-based classroom teaching simulations; answers to the other 8 questions resulted in demographic and professional data some of which were then correlated with the data on faculty attitude. Data were analyzed using the Statistical Package for the Social Sciences, Version 18 (SPSS).

The study was conducted in accordance with the guidelines and approval of the Institutional Review Board (IRB) of The University of North Carolina at Charlotte which granted a waiver or exemption from the signed consent to participate requirement (see Appendix C, IRB Approval and Waiver of Consent). The IRB approval document was attached to the emailed invitation to participate, and recipients of the email were told that clicking on the link to the web-based survey would indicate their consent to participate. Recipients of the emailed invitation were free to disregard it, and respondents were free to disengage (or quit) from the survey at any point before pressing the “submit” button at the end of the survey. The survey was active for a 2 week period that ended May 10, 2010. Responses were completely anonymous, and participants were informed that their participation was confidential and entirely voluntary. A total of 272 invitations, with a link to the survey, were sent via email. Eighty-four participants responded to the survey for a return rate of 31%.

Description of Variables Included in the Study

While exploratory studies are not experimental in nature, they can have independent and dependent variables. Independent variables in this study were age, gender, education, employment status (full or part-time), tenure status, years of teaching at the university level, teaching (or curriculum) area, and institutional (university) employer. The survey instrument collected data for eight different independent variables; however, just 3 of the independent variables were deemed to have the potential for meaningful relationships between them and the study factors. The three independent variables selected for inclusion in the study were age, tenure status, and Carnegie Classification of Institutional Employer.

Faculty attitude was the single dependent variable for the study. However, attitude is difficult to define and is often characterized as a combination of "opinion" and overt action (Thurstone, 1928). It cannot be measured without first determining the means, scale, history, and actions by which it will be determined (Thurstone, 1928; Antonak & Livneh, 1991). This study used faculty perception of and receptivity to adopting computer-based classroom teaching simulations as the means by which "attitude" would be established.

Rationale for Inclusion of Independent Variables

Faculty age was included in the study because of the possibility that participant attitudes might differ due to exposure to technology (Adams, 2002; Russell, O'Dwyer, Bebell, & Wei 2007: Sahin & Thompson, 2007). The advent of the personal computer as an educational tool began in the formative years of faculty members under the age of 40. Thus, Faculty members under the age of 40 were considered to have had significantly more exposure to technology throughout their lives both in their homes and educational environments, and were, presumably, more familiar and comfortable with electronic media for entertainment and academic purposes (Dusick, 1998; Baldwin, 1998; Gueldenzoph, Guidera, Whipple et al., 2000). Furthermore, faculty members 40 years of age and older were presumed to have come late to the adoption of computers and to the integration of technology into their teaching methodologies (Adams, 2002; Gueldenzoph, et a.l, 2000). For these reasons, a relationship may well exist between the age variable and any one or all of the three factors.

Tenure status of faculty was included in the study for the purpose of determining whether it has any association with the attitude of faculty toward computer-based classroom teaching simulations (Gueldenzoph et al., 2000; Meyer & Yonghong, 2007; Russell et al., 2007). Faculty with tenure status might be less inclined to adopt new methodologies if they did not want to be bothered with trying something new and different (Gueldenzoph et al., 2000; Mangano, 1973; Roberts et al., 2007). On the other hand, faculty with tenure might be more inclined to try something new and different since the success or failure of the attempt would have no impact on a major career issue (Gueldenzoph et al., 2000; Johnsrud & Harada, 2005). Conversely, faculty without tenure might be more open to experimentation for research purposes (Johnsrud & Harada, 2005).

Carnegie Classification of institutional employer was included in the study for the purpose of discovering whether any difference existed in the attitudes of faculty who teach at institutions classified at non-research as opposed to attitudes of those who teach at institutions classified at the research level (Bolger & Sprow, 2002; Meyer & Yonghong, 2007; Roberts et al., 2007; Russell et al., 2007: Sahin & Thompson, 2007). Institutions classified below the research level are commonly referred to as "teaching" institutions, and as such, faculty in their colleges or schools of education may be more likely to adopt an instructional methodology that could enhance the learning experience (Meyer & Yonghong, 2007). Conversely, they may be more heavily invested in maintaining a face-to-face lecture as instructional methodology (Bolger & Sprow, 2002; Groves, 2000). Faculty at institutions classified at the research level are under significantly increased pressure to focus on the advancement of new discoveries and might presumably be more reluctant to devote the time and effort required to incorporate a new instructional methodology or to trust their teaching assistants with doing so. On the other hand, they may be more likely than faculty at "teaching" institutions to view the introduction of a new instructional methodology as an opportunity for research and experimentation.

Participants

The population for this study was made up of faculty members that teach Kindergarten-12th Grade (K-12) methods courses in the fifteen constituent universities in

The University of North Carolina (UNC system) (N=272) that have colleges or schools of education. The target population was not randomly chosen, but was instead selected for convenience, for financial reasons, and for the diversity they represent in terms of faculty demographics, teaching experience, and teaching environments. The population for the study numbered 272, and thus the decision was made to include the entire population in the study as all of the members were accessible.

The UNC system is comprised of the public institutions of higher education in North Carolina, a southeastern U.S. state. The sixteen institutions that make up the system range in size from approximately 3,000 students at Elizabeth City State University on the northeast coast of the state to more than 33,000 students at North Carolina State University in Raleigh, the state's capitol. Finally, the system includes schools that are historical black and Native American institutions thus increasing the likelihood of diversity among the participants. Table 1 presents the following institutional information: location, Carnegie Classification, Fall 2008 Headcount, 2009-10 Projected Teacher Education Graduates, and the number of methods faculty.

Table 1

Constituent Universities of the UNC System with Colleges or Schools of Education

Institution, Location*	Carnegie Classification**	Fall 2008 Headcount***	Projected 2009-10 Teacher Education Graduates****	# of Methods Faculty*****
Appalachian State University, Boone	Masters	16,610	659	23
East Carolina University, Greenville	Research	27,677	430	46
Elizabeth City State University, Elizabeth City	Baccalaureate	3,104	68	14
Fayetteville State University, Fayetteville	Masters	6,217	146	12
North Carolina Agriculture & Technical University, Greensboro	Research	10,388	140	17
North Carolina Central University, Durham	Masters	8,035	155	15
North Carolina State University, Raleigh	Research	32,872	225	30

Table 1 (Continued)

UNC Asheville, Asheville	Baccalaureate	3,629	41	3
UNC Chapel Hill, Carrboro	Research	28,567	260	18
UNC Charlotte, Charlotte	Research	23,300	335	24
UNC Greensboro, Greensboro	Research	19,976	388	21
UNC Pembroke, Pembroke	Masters	6,030	165	4
UNC Wilmington, Wilmington	Masters	12,643	413	17
Western North Carolina, Cullowhee	Masters	9,050	235	12
Winston Salem State University, Winston Salem	Baccalaureate	6,442	50	16

*All institutions are located within the state of North Carolina.

**From Carnegie Classifications. *Institution Lookup*. Retrieved June 20, 2010 from The Carnegie Foundation for the Advancement of Teaching Web site: http://classifications.carnegiefoundation.org/lookup_listings/institution.php.

***From The University of North Carolina General Administration, Chapel Hill. (2009). *Facts and figures.* Retrieved November 5, 2009 from the UNC General Administration Web site: http://www.northcarolina.edu/about/facts.htm.

**** From The University of North Carolina General Administration, Chapel Hill (2004). *A Plan to Address the Shortage of Teachers in North Carolina.* Retrieved November 5, 2009 from the UNC General Administration Web site:

http://www.northcarolina.edu/reports/index.php?page=download&id=112&inline =1

*****Note*. Includes both regular and special education methods faculty

The UNC institutions are located in a wide range of settings from densely populated cities to small rural towns from the Atlantic Coast to the Appalachian Mountains. The faculty and student populations are diverse with regard to race, age, socio-economic status and academic preparation (Facts and Figures, 2009). The UNC colleges and schools of education produce more than 50% of the state's total teacher education graduates each year ("Teacher Preparation and Development," 2009). In addition, classification of the institutions by The Carnegie Foundation for the Advancement of Teaching range from "*Baccalaureate – Arts and Sciences"* to *Doctorate – Granting –Very High Research*" (Carnegie). The Carnegie Commission on Higher Education classifies colleges and universities "as a way to represent and control for institutional differences and also in the design of research studies to ensure adequate representation of sampled institutions, students, and faculty (Carnegie).The UNC Colleges and Schools of Education were selected due to the very diverse environments and populations they represent and their accessibility to the researcher. Together they were projected to award teaching degrees to more than 3,700 graduates in the 2009-10 academic year.

The target population consisted of education faculty who are routinely assigned responsibility for teaching methods courses in the UNC System colleges and schools of education. While the target population (N=272) invited to participate was small, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) indicated that the sample was adequate and large enough to insure external validity (Field, 2009). The target population included faculty who teach methods courses in both mainstream and special education programs and also included faculty employed either full-time or part-time. It reflected the diversity of the faculty teaching in the UNC System as a whole with regard to age, gender, ethnicity, and experience. See Table 1 above for the Colleges and Schools of Education represented along with the number of methods faculty and the projected number of graduates in the Academic Year 2009-10. To increase the rate of participation, a drawing for $100 was conducted on the date provided in the invitation to participate (approximately 3 weeks from the survey distribution date).

Instrumentation

The data were collected via a 48-item survey (see Appendix A) based on Knezek, Christensen, & Miyashita's Faculty Attitudes Toward Information Technology (FAIT) survey (1998). The FAIT Survey is one of nine different surveys developed by Knezek et al., (1998) for the purpose of measuring faculty, teachers', and students' attitudes toward technology use in teaching and learning (1998). Knezek et al., (2010) have validated the various instruments (including the FAIT) over the past ten years through the Institute for Integration of Technology into Teaching and Learning (ITTL).

Factor analysis is commonly used to establish validity because it establishes relationships between variables (Field, 2009). Content and construct validity, established for the FAIT through factor analysis conducted by Christensen and Knezek, resulted in seven factors that were then introduced as part of a pilot study (1998). A total of nine doctoral candidates have used the FAIT as the basis for their dissertation studies, eight books include chapters that either cite research conducted using the survey or describe its use, and the authors are currently engaged in nineteen projects that are making use of the FAIT survey in some form. The projects include *SimSchool for Special Populations* and *Intel Pre-service Teach to the Future* (Knezek et al., 2010).

Internal reliability estimates for the 7-factors (Subscales) addressed in the FAIT are presented in table 2 below.

Table 2

*Internal Consistency for 7-Factor Structure of the FAIT**

Subscales	Alpha	No. of Variables
F1 (Enthusiasm)	.96	15
F2 (Anxiety)	.98	15
F3 (Avoidance)	.74	6
F4 (Email)	.95	11
F5 (Negative Impact on Society)	.84	10
F6 (Classroom Learning Productivity)	.90	14
F7 (Kay Semantic)	.94	10

*From Faculty attitudes toward information technology (FAIT) Survey. *Instruments for assessing attitudes toward information technology*. Retrieved November 11, 2009 from the North Texas University, Center for Educational Technology website: http://www.tcet.unt.edu/research/

Educators are given permission to use the instrument free of charge as long as the North Texas University Center for Educational Technology is notified, proper credit is given to the source(s), and any publications that result are shared with Knezek, Christensen, and Miyashita (2010). Notification of the intended use of the FAIT was sent to Knezek et al., on July 22, 2010 (see Appendix D).

The research survey (see Appendix A), based on the FAIT, was created to collect information about participants' attitudes toward computer-based classroom teaching simulations. It also collected demographic and professional data of the participants to statistically compare, contrast, and find possible relationships between the data and participant attitudes. The 48 items on the survey used for this study were based on questions asked in the FAIT Survey (Knezek et al., 1998). The final version of the survey consisted of forty items that dealt with the subject of the study and 8 items that sought information on demographic and professional status. The questions included in the study were modified substantially due to differences in the subject matter (technology versus computer-based classroom teaching simulation) and according to the results of a pilot study conducted to establish reliability. The survey was organized into two major sections: Sections A and B. Section A consisted of 40 questions related to faculty attitudes toward computer-based classroom teaching simulation. Part B1 (5 questions) asked participants to indicate their professional status, and Part B2 (3 questions) gathered demographic data.

Pilot Study

A pilot study was conducted to test the reliability and content validity of the proposed survey. The pilot study also served to identify defective items and to insure that the results would be generalizable to the population of interest. Ten faculty members in three different education departments at Appalachian State University, a mid-size university with a large education college, were asked to participate in the pilot study.

They agreed to complete a paper-based, proposed study survey which consisted of 75 questions and to provide feedback. While all of the pilot study faculty participants were not education methods course instructors, they were all familiar with learning via technology and routinely have their classes meet in the Appalachian State University Reich College of Education's virtual environment, AET Zone. Pilot study participants were asked to:

1. rank the 75 questions related to computer-based classroom teaching simulation in order from "most relevant" to "least relevant;"
2. indicate whether each question addressed a single issue;
3. provide comments on the quality of each of the questions.

Pilot study participants ranked the same 55 questions (of the original 75) at the top of their lists. The level of agreement on which questions should be eliminated from the study was high and the number of potential questions was subsequently reduced from 75 to 55 based on raw pilot study results. Following that reduction, questions that respondents indicated were duplicative, ambiguous, or liable to cause confusion were either eliminated or reworded which resulted in the elimination of an additional 10 questions.

The remaining 45 questions were further reduced to 40 based on follow up interviews with two of the pilot study participants who suggested rewording some of the questions for clarity and removing some of the questions that were very closely related to others. Following the interviews, all of the revisions suggested by the pilot study participants were incorporated into the final version of the survey of 40 questions to be distributed to actual study participants.

Validity and Reliability

An exploratory factor analysis was used to organize the large number of questions into scales. The factor analysis utilized Principal components analysis (PCA) with Varimax rotation to differentiate the factors as much as possible and to group them into a smaller set of linear combinations. The PCA identified 3 factors as determinants of attitude toward the use of computer-based classroom simulations in pre-service teacher education: perception of the impact of adoption, inclination toward adoption, and perception of burden of adoption.

The results were then analyzed for reliability using Cronbach’s Alpha in the Statistical Package for the Social Sciences (SPSS). The analysis showed a high degree of confidence in the reliability of the survey and questions. The reliability statistic of .921 was reported on the Cronbach’s alpha for the 10 pilot study recipient answers to the 40 survey questions. While the FAIT Survey formed the basis for the initial pilot survey questionnaire, the final version of the questions on the research survey that was distributed to study participants was quite different, and its relationship to the FAIT was almost unrecognizable. Table 3 presents the factors aligned with the research questions and survey items.

Table 3

Factors Related to Research Questions and to Survey Items

Factor	Research Question	Survey Item (see Appendix A)
Perception of the impact of adoption	1,4,7	1,2,6,7,12,26,27,28,29,30,35,36, 37,38,40
Inclination toward adoption	2,5,8	4,9,10,11,13,14,20,21,22,23, 24,25,32,33,34
Perception of burden of adoption	3,6,9	3,5,8,15,16,17,18,19,31,39

Limitations

The survey used in this study was comprised of 40 Likert Scale items with the scale ranging from “Strongly Disagree” to “Strongly Agree” and included a “Neutral” option. The five point scale was selected for use to insure that participants could indicate a nore nuanced response than fewer options wold allow, a lack of opinion or knowledge toward a particular issue. The data collected were used to report the frequencies and percentages of demographic and professional data to answer the research questions provided in the Research Questions section of this chapter. Self-report surveys distributed via the Internet have several disadvantages that could constitute threats to validity. Simply asking an individual to provide information about his or her attitudes can alter those attitudes for as long as 6 weeks (Droba, 1932). Attitudes are subject to change and reflect only what the respondent is thinking or feeling at the particular time he or she completes the survey (Antonak & Livneh, 1991); respondents may intentionally distort their answers (Thurstone, 1928). The act of asking a participant to answer questions about his or her attitudes may create what Antonak & Livneh (1991) describe as the phenomenon of either creating an attitude where none existed prior to the question or creating one that is transient and applicable to only that moment. Other threats existed in addition to concerns related to the act of measuring via surveys. The five option (including “neutral”) Likert scale was intended to mitigate, to the degree possible, the restrictions inherent to this forced choice survey methodology (Antonak & Livneh, 1991).

Given the distribution method for the survey (via the web) no guarantee existed that the respondent who received the survey actually completed it or that he or she did not confer with colleagues before answering. Some respondents may not have completely understood one or more questions; others may have had concerns about confidentiality. In addition, web-distributed surveys tend to have low return rates. Forced answer questions such as those asked in a Likert Scale format may not allow for the nuanced or unexpected information that could result from interviews or open-ended, short answer questions (Thurstone, 1928). However, they have the advantage of being able to code for data analysis purposes; they are inexpensive to administer and may lead to faster and higher survey returns since respondents can complete them quickly. One particular concern was the size of the population surveyed. The total number of surveys distributed was 272 with all recipients being eligible to participate in the study. The response rate was 30.8% or 84 which was adequate and large enough to insure external validity (Field, 2009).

Questions were designed to determine each respondent’s depth of knowledge and his or her use of teacher-education computer-based simulations, his/her beliefs about it in general and its use for teacher preparation in particular, and how he or she would behave toward it if confronted with the possibility of utilizing it. However, self-reports of attitudes and feelings are particularly subject to manipulation, thus care was taken to word the questions in ways so that the respondent did not believe a right or preferred answer existed (Cook & Selltiz, 1964). In addition, the survey was sufficiently long enough that participants were discouraged from attempting to insure their answers were consistent. Negative response questions (11, 12, 15, 19, 20, 24, 30, 33-38, and 40, see Appendix A), were reversed for the purpose of scoring

Survey Procedures

The researcher used an exploratory study with a survey design for the study and collected demographic, professional, and attitudinal data via a quantitative survey that was available to participants for a 2 week period. All methods faculty in the UNC System Schools (N= 272) were invited via email to participate in the study. Seventy-two responses were received by the end of the first two weeks. A follow up reminder entitled, *2nd Request for your participation in a 20 minute doctoral dissertation survey* (see Appendix E), was sent to participants at the mid-point of the 2 week period and resulted in an additional 12 responses.

The survey was distributed using a web-based survey tool, Survey Share, and results were downloaded to Excel for import into SPSS for analysis. All survey data was stored in a password protected file on a password protected laptop computer. No one other than the researcher had access to any of the data during the collection or analysis phases of the study. While a drawing for a $100 prize was part of the survey invitation, it was not tied to any factor other than survey completion. The methodology by which respondents' names were collected for the drawing insured that the participant was completely divorced from his or her survey response. Participants were instructed at the end of the survey to send their names, preferred method of contact for notification, and preferred time and days to the researcher's university email account. This procedure insured that only those who participants who finished the survey were included in the drawing and that the award recipient's survey response would remain anonymous while he or she could be contacted by the researcher if his or her name were drawn. All emails were retained. The random award was intended to (and likely did) have an influence on the survey response rate.

Data Analysis

Data analysis was performed using descriptive and inferential statistics. The 40 questions were designed to be answered using a Likert Scale. Multivariate Analysis of Variance (MANOVA) was used to answer the nine research questions by assessing whether any possible differences existed among selected demographic and professional characteristics on any of the three factors identified by the factor analysis conducted via principal component analysis (PCA). Descriptive statistics were rendered to show the characteristics of the sample across the dependent and independent variables.

Summary

The integration of computer-based classroom teaching simulations into methodology course instruction may be one of the keys to improving the quality of college of education graduates. However, that integration depends upon the awareness, acceptance, and adoption of the methodology by education methods course faculty in colleges and schools of education. The knowledge gained as a result of this survey into faculty attitudes toward may help researchers know the depth of awareness and the prospects for adoption within the foreseeable future. The study was conducted using a 48 item survey based on the FAIT that was delivered, via email, to 272 faculty members who teach instructional methods courses to pre-service teacher education students. The validity and reliability of the survey instrument were established, and a principal component analysis reduced the factors associated with "attitude" to three (perception of the impact of adoption, inclination toward adoption, and perception of burden of adoption). A link to the Likert Scale based survey set up in *SurveyShare* was sent via email to 272 intended participants. Eighty-four of those surveyed responded to the survey. Chapter Three provided the details associated with the design of the study, the development of the survey instrument, the participants, the data collection procedures, and the procedures to be used in the analysis of the data collected. Results were analyzed and are reported in Chapter Four of this dissertation.

CHAPTER 4: RESULTS

The purpose of this exploratory research study was to determine whether any or all of 3 independent variables (age, tenure, or Carnegie Classification of employer institution) are associated with the attitudes of faculty toward computer-based classroom teaching simulations. The participants in the study were 84 educational methods faculty in the 15 constituent universities with schools and colleges of education in the University of North Carolina System. Research data were gathered using a Likert scale questionnaire. Principal component analysis was used to organize the 40 survey items into more easily interpretable factors. Subgroups of the participants were compared on the following factors using Multivariate Analysis of Variance (MANOVA): perceived impact of adoption; inclination toward adoption; and, perceived burden of adoption. The following sections are included within this results chapter: (a) Description of Participants; (b) Factor Analysis Results; (c) Descriptions of Independent Variables and Rationale for Inclusion; (d) Results of the Data Analysis (includes restatement of research questions and results of inferential statistical analysis); and (e) Summary.

Description of Participants

Descriptive statistics were used to gather demographic data for the 3 independent variables (age, education level, and gender) and are presented in Table 4 below.

Table 4

Demographic Characteristics of Participants (N=84)

Characteristic	N	% of total
Age Range		
Between 25-29	1	1.2
Between 30-34	11	13.1
Between 35-39	13	15.5
Between 40-44	12	14.3
Between 45-49	11	13.1
Between 50-54	9	10.7
Age 55+	27	32.1
Educational Level		
Master's Degree	10	11.9
Doctorate	74	88.1
Gender		
Female	58	69.0
Male	26	31.0

Table 5 summarizes the professional characteristics of the sample by individual characteristics.

Table 5

Professional Characteristics of Participants (N=84)

Characteristic	N	% of total
Employment Status		
Full-time	74	88.1
Part-time	10	11.9
Tenure Status		
Tenured	30	35.7
Non-Tenured	54	64.3
Educational Level		
Master's Degree	10	11.9
Doctorate	74	88.1
Number of Years Teaching at University Level		
1-4 years	32	38.1
5-10 years	19	22.6
11-15 years	13	15.5
16+ years	20	23.8
Curriculum Area		
Birth-Kindergarten	1	1.2

Table 5 (Continued)

Primary Grades (1-5)	33	39.3
High School (9-12)	14	16.7
Special Education	11	13.1
Other	9	10.7
University Employer		
Appalachian State University	10	11.9
East Carolina University	14	16.7
Elizabeth City State University	2	2.4
Fayetteville State University	2	2.4
North Carolina Agriculture & Technology University	0	0
North Carolina Central University	2	2.4
North Carolina State University	16	19.0
UNC Asheville	2	2.4
UNC Chapel Hill	0	0
UNC Charlotte	9	10.7
UNC Greensboro	8	9.5
UNC Pembroke	3	3.6
UNC Wilmington	9	10.7
Western Carolina University	5	6.0
Winston Salem State University	2	2.4

Factor Analysis

Principal component analysis (PCA) was used to simplify the interpretation of the data. The PCA was exploratory since there was no initial assumption as to the number of possible factors. An initial scree plot (See Figure 1) suggested the possibility of 3 factors.

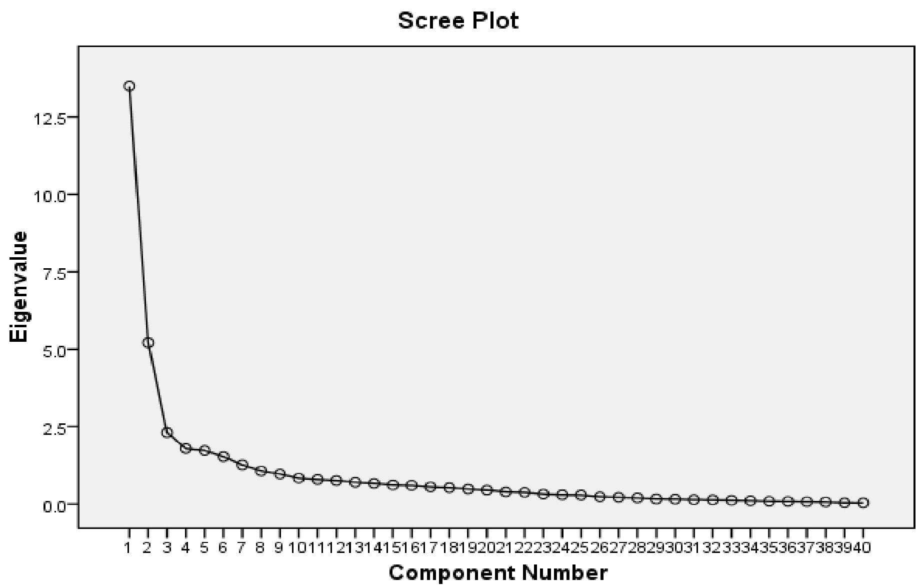

Figure 1. *Scree Plot*

A subsequent analysis requesting only 3 factors was performed using an orthogonal (Varimax) rotation to minimize the correlation between the final factors and clarify the interpretation. A reliability estimate was established for each scale using Cronbach's alpha. The results are presented by Scale in Table 6 below.

Table 6

Cronbach's Alpha Coefficients

Scale	Coefficient
1	.952
2	.899
3	.736

The 40 survey items were organized into 3 main groups that were subsequently identified as factors and were labeled: Perceived Impact of Adoption, or simply "Impact" (Factor 1); Inclination Toward Adoption, or simply "Inclination" (Factor 2); and Perceived Burden of Adoption, or simply "Burden" (Factor 3).

Two tests indicated the acceptability of using factor analysis on these data. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was .809. Field (2009) suggests accepting values of 0.5 and anything between 0.8 and 0.9 are great. The KMO score indicated that the sample was adequate. Bartlett's Test of Sphericity indicated that the relationships between the variables were adequate for factor analysis as well (Field, 2009). Table 7 below presents the results of both tests.

Table 7

Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Barlett's Test of Sphercity

Test		Result
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.809
Bartlett's Test of Sphericity	Approx. Chi Square	2511.142
	df	780
	Sig.	.000

Initial eigenvalues illustrated the amount of variance explained by each factor and combined with the KMO assisted with the determination in which factors to retain. The percentage of variance is presented in Table 8 by Factor.

Table 8

Initial Eigenvalues for 3 Components (Factors)

	Total	% of Variance	Cumulative %
Factor			
1	13.490	33.726	33.726
2	5.212	13.030	45.756
3	2.304	4.490	52.515

Table 9 presents the matrix of the factor loadings for each variable onto Factors (components 1-3).

Table 9

Rotated Component Matrix

Survey Item (see Appendix A)	Components		
	1	2	3
28	.890		
26	.864		
14	.824		
29	.819		
27	.799		
22	.777		
9	.774		

Table 9 (Continued)

21	.763	
10	.748	
3	.737	
25	.732	
30	.705	
39	.669	
13	.654	
31	.638	
12	.620	
40	.611	
16	.594	
23	.593	
18	.479	
11	.467	
1		.803
32		.776
5		.748
2		.717
6		.677
8		.657
17		.647
15		.627

Table 9 (Continued)

7		.618	
19		.520	
4		.477	
37			.661
33			.628
34			.617
38			.601
24			.490
35			.474
36			.456
20			.446

** Factor 1: Impact

***Factor 2: Inclination

****Factor 3: Burden

Verification that the conditions were met for 3 factors was provided by Principal Component Analysis and the Scree Plot. This indicated multivariate analysis of variance (MANOVA) as the preferred inferential statistics test to avoid a Type I error that was more likely to result from repeated T-tests or individual Analysis of Variance (ANOVA) tests (Field, 2009).

For the purposes of determining whether age has any association with the attitude of faculty, the five age ranges presented as selections on the survey were divided into two categories (ages 25-39 and ages 40-55+). Tenure was divided into the subcategories, tenured and non-tenured. Employer institutions were divided into research intensive and non-research intensive categories according to their classification by the Carnegie Commission on Higher Education (Carnegie). The means and standard deviation for each of the independent variables is presented below by the 3 scales that represent attitude.

Table 10

Descriptive Statistics for Independent Variables for 3 Scales (Faculty Attitude)

University Classification	Tenure Status	Age Category	N	Mean	SD
Scale 1*					
Non Research	Tenured	21-39	1	63.000	-
		40 or older	20	54.800	18.774
	Non-Tenured	21-39	13	55.692	9.186
		40 or older	23	48.478	14.767
Research	Tenured	21-39	1	25.000	-
		40 or older	8	59.500	19.486
	Non-Tenured	21-39	10	53.100	8.006
		40 or older	8	45.250	16.993
Scale 2*					
Non Research	Tenured	21-39	1	47.000	-
		40 or older	20	35.550	9.773
	Non-Tenured	21-39	13	34.615	11.485
		40 or older	23	31.087	11.220
Research	Tenured	21-39	1	15.000	-

Table 10 (Continued)

		40 or older	8	31.125	10.561
	Non-Tenured	21-39	10	33.500	8.195
		40 or older	8	34.125	9.187
Scale 3***					
Non Research	Tenured	21-39	1	20.000	-
		40 or older	20	23.400	6.839
	Non-Tenured	21-39	13	24.000	4.600
		40 or older	23	22.695	5.111
Research	Tenured	21-39	1	16.000	-
		40 or older	8	25.875	5.617
	Non-Tenured	21-39	10	23.800	6.860
		40 or older	8	23.875	6.577

*Scale 1: impact

**Scale 2: inclination

***Scale 3: burden

Answering the Research Questions

The descriptive data were employed to answer the research questions as a means to discovering the attitudes of instructional methods faculty toward computer-based classroom teaching simulations and whether certain of their demographic or professional characteristics were related to one or more of the three factors used to measure attitude. The research questions were:

1. Is the age, tenure status, or Carnegie classification of the institutional employer of the faculty member related to his or her perception of the impact that adoption of computer-based classroom teaching simulation might have?
2. Is the age, tenure status, or Carnegie classification of the institutional employer of the faculty member related to his or her inclination toward adopting computer-based classroom teaching simulation as an instructional methodology?
3. Is the age, tenure status, or Carnegie classification of the institutional employer of the faculty member related to his or her perception of the burden that adopting computer-based classroom teaching simulation might have on him or her?

All of the research questions were answered using a Multivariate Analysis of Variance (MANOVA) to test for main effects and interactions of the independent variables (age, tenure status, and Carnegie Classification of institutional employer) on the dependent variables of impact, inclination, and burden. Preliminary assumption testing revealed no serious violations of the applicable assumptions for MANOVA. Box's Test of Equality of Covariance Matrices revealed a p value of .100 which indicated that the assumption of homogeneity of variance-covariance was not violated. Levene's Test of Equality of Error Variances revealed a p value no values less than .05 which indicated that the assumption of equality of variance was met for each of the 3 scales. Table 11 presents the results.

Table 11

Levene's Test of Equality of Error Variances

Scale	F	df1	df2	Sig.
1	1.595	7	76	.150
2	.872	7	76	.533
3	.920	7	76	.496

Results of Inferential Statistical Analysis

A MANOVA was conducted to examine any difference among the three independent variables on any one of the three factors as well as to test for any interaction among the independent variables on the factors. Field (2009) recommends Pillai's Trace as a conservative multivariate test statistic. Pillai's Trace indicated no statistically significant difference existed among age, tenure status, or Carnegie Classification of institutional employer on the three factors or the interactions of all of them. Therefore, none of the null hypotheses was rejected. Table 12 below presents the findings.

Table 12

Multivariate Analysis of Variance for Independent Variables Correlated with Attitude

Variable	Value	F	Hypothesis df
Effect			
(Pillai's Trace)			
Age	.026	.671	3.00
Tenure Status	.986	.343	3.00

Table 12 (Continued)

University Classification	.082	2.200	3.00
University Classification*Tenure	.081	2.160	3.00
University Classification*Age	.061	1.604	3.00
Tenure*Age	.057	1.482	3.00
Age*Tenure*University Classification	.050	1.288	3.00

Summary

This study, using Multivariate Analysis of Variance, found no relationship exists between the attitudes of education faculty who teach methods courses in the UNC System institutions to pre-service teachers, toward computer-based classroom teaching simulations and any one or combination of the three independent variables of age, tenure status, and Carnegie Classification of institutional employer. Therefore, none of the null hypotheses could be rejected. Attitude was comprised of 3 factors: perceived impact of adoption; inclination toward adoption; and, perceived burden of adoption. Thus, the research questions were answered in the negative.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

Although the adoption of computer-based simulated classroom teaching experience as an instructional methodology for pre-service teacher education has been encouraged by some educational experts since the mid 1970s, educational faculty in the United States have been slow to integrate it into their teaching regimen (Cruickshank, 1968; Cruickshank & Broadbent, 1968; Egbert, 1965; Silberman, 1963). Simulation is considered to be an effective hands-on, active way of learning, and perhaps more importantly, for retaining what has been learned (Aldrich, 2004; Cruickshank, 1968; Merrill, 2001; Strang, 1997). Furthermore, NCATE encourages their adoption as an instructional methodology (NCATE, 2008). Integrating simulated teaching experience into instruction appears to prepare pre-service teachers more effectively for their student teaching, field experiences as well as increasing their confidence and effectiveness in their first years of teaching (Becker, 2007; Berliner, 1985; Cruickshank & Broadbent, 1968; Pannese & Carlesi, 2007; Strang, 1997, 1996; Strang et al., 1987).

The literature reviewed in Chapter Two presented information on the acceptance of computer-based simulation in medical, aviation, criminal justice and incident management, military and other types of training experiences. The chapter also included significant information on studies, conducted in nations other than the U.S., on the impact of simulation training on the skills and development of pre-service teachers who practiced instruction and behavior management using computer-based classroom teaching simulations. After reviewing the literature, the researcher came to the conclusion that extensive research exists on faculty attitudes toward technology and its use but found no studies that focused on faculty attitudes toward computer-based classroom teaching simulations in particular as an instructional methodology. Furthermore, the research that addressed the use of computer-based classroom simulations appears to have been exclusively focused on the impact the methodology has on students—not on the reasons that faculty do or do not integrate it into their instruction. While studies of trainers and teachers in fields other than education indicated positive reactions to the quality of the simulation training experience and the student outcomes and retention, interest in adopting it into teacher training and preparation in the United States has not occurred.

The current study was designed to study faculty attitudes toward computer-based classroom teaching simulations as a first step in the process of discovering what lies behind the lag in its adoption (Adams, 2002; Bashir, 1998; Evertson et al., 1985; Sahin & Thompson, 2007; Twale, 1991Cook & Selltiz, 1964; Elsam, 2006; Mangano, 1973; Panda & Mishra, 2007; Moreno, 2007; Thurstone, 1928). Faculty attitudes were defined through factor analysis as perceived impact of adoption of the methodology, inclination toward adoption, and perceived burden of adoption. Because this study was believed to be the first study of education faculty attitudes toward computer-based classroom teaching simulation, a descriptive study might have been appropriate; however, hypotheses were formed, and thus the study was exploratory with a survey method.

Faculty who teach instructional methods courses in the colleges and schools of education in the constituent institutions of The University of North Carolina were surveyed to collect data that were then used to address the research questions. A total of 272 email invitations were sent, and 84 recipients participated in the study. The data relevant to the study were collected and were presented, along with the results of the statistical analysis in Tables 4 through 12 in Chapter Four. A major limitation inherent to the study was the confinement of participation to The University of North Carolina education methods faculty; however, the sample was diverse and adequate.

Conclusions

MANOVA results showed no statistically significant evidence that any one or a combination of the independent variables of age, tenure status, and Carnegie Classification of institutional employer was related in any way to one of the factors or to any combination of the 3 factors. Thus, the answer to each of the research questions was negative. The findings of this study are in line with those found by Gueldenzoph et al., (2000) who also found no significant relationship between the use of technology in the classroom and demographic and professional characteristics. However, Johnsrud and Harada (2005) found that non-tenured faculty members were significantly less likely to introduce technology into their instruction, but they did not attribute this to tenure status per se but to other pressures that were obstacles to what could be called experimental instruction. While the findings were disappointing, they are not without value; they can provide the foundation for future research that includes larger sample size and other independent variables that could confirm the findings of this study or result in additional information.

Recommendations for Future Research

The incorporation of digitally or electronically mediated instruction into college level classroom instruction continues to grow. As part of this digital integration, computer-based classroom simulations show promise as a preparatory tool, and research should be expanded to include faculty use of and experience with it as a pre-service teacher training tool. The ability to provide guided practice in instructional methodology and behavior management, via realistic classroom and student simulation, prior to the practice teaching experience could be an invaluable assessment tool for education faculty. While the methodology appears, from previous studies to result in positive development of the skills and characteristics important to the teaching profession (Baek, Y. 2009; Chapman, K. et al., 1999; Ferry et al., 2004), that evidence has come almost exclusively from studies done in educational institutions outside the United States. U.S. colleges and schools of education could do more to encourage experimental research on the effects of computer-based classroom teaching simulations in their own teacher training programs.

Additional research on this topic would be improved through the distribution of the survey instrument beyond a single university system and the inclusion of qualitative research methods. While the current survey results are useful and instructive, future research should be directed toward validating the findings in other populations and expanding the list of variables included. Research on the effect of actual participation, by faculty, in a computer-based classroom teaching simulation could provide invaluable to establishing whether lack of awareness and understanding of what simulations are and can do play a larger role than attitude in the adoption of the methodology. Furthermore, many of the limitations inherent to likert-scale based studies, such as this one, that focus on attitude could be mitigated through the inclusion of qualitative research. Interviews and focus groups could have provided context and nuance to the findings. Finally, the inclusion of current teachers and other educational professionals in studies that compare the potential value of computer-based classroom teaching simulations with the types of preparation and training methods used in pre-service teacher education programs that do not include this instructional method could be very useful. The possibilities for future research seem limitless.

As the comfort level, of faculty and students, with computers and electronically mediated instruction continues to increase, computer-based classroom teaching simulations may well play a larger role in teacher education courses. Previous research suggested that faculty attitudes and behavior could, indeed, be altered by awareness of new and different information. One possible outcome of the current study is that it may lead faculty who participated in it to become interested in exploring computer-based classroom teaching simulations and to perhaps experiment with incorporating it into their own instructional regimens. A further hope is that this study will provide the foundation for further research on what motivates faculty to incorporate digital teaching simulations into their pre-service teacher education instruction. In doing so, the study may lead to improvements in classroom instruction and behavior management training that pre-service teachers receive before they enter a classroom full of children.

The future of the nearly 30% of K-12 students in the United States who either drop out or fail to graduate on time hinges on the quality of the nations teacher education programs (Duncan, 2009). According to U.S. Secretary of Eduation Arne Duncan improving the chances of success for the students that make up this number requires revolutionary change in teacher education programs as opposed to evolutionary tinkering (2009). Computer-based classroom teaching simulations as a teacher preparation tool may not be the only solution, but they could well be part of the answer. Research into this promising tool should and must continue.

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APPENDIX A: SURVEY INSTRUMENT

Survey to Determine Faculty Attitudes Toward Computer-based Simulation

Although computer-based simulations for pre-service teacher education have been available for more than thirty years and have proved to be very effective, they have not been widely adopted as a teaching strategy by methods course faculty in colleges and schools of education. The purpose of this study is to gather information concerning the knowledge of and attitudes held by methods course faculty in colleges and schools of education. The information you provide as part of this study will be confidential. Outcomes and data will be reported only in the aggregate.

Part A: Information about attitudes toward the use of computer-based classroom teaching simulation for pre-service teacher education

Instructions: Please answer all questions by selecting from the Likert Scale selections: Strongly Agree (SA), Agree Somewhat (AS), Neutral (N), Somewhat Disagree (SD), or Disagree Strongly (DS). Selections are radio buttons that will permit only one answer per question.

1. I am aware of the existence of computer-based classroom teaching simulations for pre-service teachers training.
2. I am aware of studies done to determine the effectiveness of computer-based classroom teaching simulation use in pre-service teacher education.
3. I would use computer-based simulation if the software were available at my institution.
4. I have been encouraged by my department chair to use computer-based classroom

teaching simulation as an instructional methodology.

5. I have incorporated computer-based classroom teaching simulation into my instruction.

6. I am aware that computer-based simulations such as *SecondLife*, etc., exist.

7. I participate in computer-based simulations such as *SecondLife*, etc.

8. I am currently trying to learn about computer-based classroom teaching simulations.

9. If I get the opportunity, I would like to use computer-based classroom simulation for instruction.

10. Overall, I think the use of computer-based simulation would be helpful in my methods course instruction.

11. Use of computer-based simulation requires unnecessary curriculum reforms.

12. The integration of computer-based classroom teaching simulations into the curriculum would probably result in only minor improvements in our teacher training programs.

13. Computer-based classroom teaching simulations would make self-paced, flexible instruction possible.

14. Computer-based classroom teaching simulations would allow me to coach and facilitate students learning more.

15. I am unsure how to integrate computer-based simulation into instruction.

16. It is important that my university's teacher education programs include the use of computer-based classroom simulations.

17. I am working hard on using computer-based simulation to maximize the effects of my teaching.

18. I enjoy preparing class activities that integrate computer-based instructional activities.

19. I have avoided the use of computer-based simulation because I am not familiar with how they are used to enhance instruction.

20. The use of computer-based technology in instruction would reduce my personal interaction with students.

21. The use of computer based classroom simulations might enable me to tailor feedback to a student's individual needs.

22. Computer-based simulations provide an instructional methodology that appeal to a variety of student learning styles.

23. When using technology for instruction (including computer-based classroom simulations), I see my role as a facilitator of individual student's learning.

24. The use of computer-based technology almost always reduces the personal attention that students receive.

25. The introduction of computer based classroom simulations into my teaching tool kit might increase my interaction with individual students.

26. I believe that integrating computer based classroom simulations into methods course teaching and learning would help students acquire critical teaching skills.

27. I believe that integrating computer based classroom simulations into methods course teaching and learning would help students acquire critical classroom management skills.

28. I feel the use of computer based classroom simulations for instruction would positively affect my students' learning.
29. I feel the use of computer based classroom simulations for instruction would positively affect the students' future teaching methods.
30. I do not believe that computer-based classroom teaching simulations would enhance preservice teacher preparation.
31. I need more compelling reasons why I should incorporate computer based classroom simulation.
32. I have access to computer-based simulation on campus.
33. I already feel overburdened without adding computer based classroom simulation into my instruction.
34. I have insufficient time to develop instructional strategies that incorporate computer-based simulation.
35. My limited computer skills prevent me from using computer-based simulation.
36. I would need convenient access to more computers for my students to integrate computer based classroom simulations into my instruction.
37. I would need more technical support to integrate computer based classroom simulation into classroom instruction.
38. I need more resources that illustrate how to integrate computer based classroom simulation into the curriculum.
39. I would attend a workshop on the use of computer-based classroom simulation.
40. I believe that computer based classroom simulation would diminish students' ability to analyze behavior.

Part B1: Professional Information

Selections are radio buttons that will permit only one answer per question.

1. Are you employed to teach?

   ○ Full-time ○ Part-time

2. Are you tenured?

   Yes ○ No ○

3. How long have you been teaching at the University level?

   ○ 1-4 years ○ 5-10 years ○ 11-15 years ○16+ years

4. Please select your methods curriculum level

   ○ Kindergarten
   ○ Primary Grades (1-5)
   ○ Middle Grades (6-8) or Jr. High (6-9)
   ○ High School (9^{th}-12^{th} Grade)
   ○ Special Education

5. Please select your university employer (the data collected via this question will not be used in a way that will identify any respondent).

   ○ Appalachian State University
   ○ East Carolina University
   ○ Elizabeth City State University
   ○ Fayetteville State University
   ○ North Carolina A & T University
   ○ North Carolina Central University
   ○ North Carolina State University
   ○ UNC Asheville
   ○ UNC Chapel Hill
   ○ UNC Charlotte
   ○ UNC Greensboro
   ○ UNC Pembroke
   ○ UNC Wilmington
   ○ Western Carolina University
   ○ Winston Salem State University

Part B2: Demographic Information

1. Age: ○ 21-24 ○ 25-29 ○ 30-34 ○ 35-39

   ○ 40-44 ○ 45-49 ○ 50-54 ○ 55+

2. Education: ○Master's degree ○ Doctorate

3. Gender: ○ Male ○ Female

APPENDIX B: EMAIL INVITATION TO PARTICIPATE AND CONSENT FORM

Subject: Request for your participation in a 20 minute Doctoral Dissertation Study

Dear Professor X:

I am a doctoral student at The University of North Carolina at Charlotte currently completing the requirements for my dissertation. My research study is focused on the attitudes of education methods faculty toward the use of computer-based classroom teaching simulations in pre-service teacher education. While many studies have verified the positive impact that teaching simulations have on pre-service teachers, very little research has been conducted on faculty who make the decisions about what instructional methodologies they will use in their own classes. My hope is that the survey will reflect attitudes of faculty who have embraced this technology, have rejected it, or are ambivalent toward it. Your opinions on the subject are very important, and I would like to include your input in this study.

The survey consists of 48 total items (40 related to opinion/attitude and 8 related to demographic/professional status) and should require no more than 20 minutes of your time.

All participant information will be kept confidential and will be used only in the aggregate for the purpose of this dissertation study and future projects. There are no known risks associated with this study. Responses will be anonymous, and your name will not be associated with your responses in any way. The IRB Approval of the study and Waiver of Documentation of Consent are attached to this email. If you agree to participate, you will be one of approximately 275 participants. Questions about IRB compliance may be directed to the UNC Charlotte Office of Research Compliance Research & Federal Relations, 9201 University City Blvd., Charlotte, NC 28223. Phone: 704-687-3309. Fax: 704-687-2292

I hope that you will participate and thank you in advance for giving your time and attention to this request. If you agree to participate in the study, please click on the link below with the understanding that clicking on the link implies your consent to participate. Approximately 275 invitations to participate are being distributed and all participants who complete the survey by May 10, 2010 will be entered into a drawing for a single participation award of $100 cash. Instructions will be provided at the end of the survey on how to enter the drawing while maintaining anonymity for the survey responses. The selection for the award will be made using the random selection tool in the Statistical Package for the Social Sciences.

CLICK ON THIS LINK TO TAKE THE SURVEY: http://www.surveyshare.com/survey/take/?sid=104854

You are a volunteer. The decision to participate in this study is completely up to you. If you decide to participate in the study, you may stop at any time.

Should you have any questions regarding this study, please do not hesitate to contact me or the chair of my committee, Dr. John Gretes.

Mary F. Englebert, Doctoral candidate
828-262-6519
mfengleb@uncc.edu

Dr. John Gretes, Committee Chair
jagretes@uncc.edu

Attachment: Approval of Exemption

APPENDIX C: IRB APPROVAL AND WAIVER OF CONSENT FORM

UNC CHARLOTTE

Compliance Office / Office of Research Services

9201 University City Boulevard, Charlotte, NC 28223-0001
t/ 704.687.3311 f/ 704.687.2292 www.research.uncc.edu/comp/complian.cfm

Institutional Review Board (IRB) for Research with Human Subjects

Approval of Exemption

Protocol #	**10-03-47**			
Title:	**A Study of Faculty Attitudes Toward the Use of Computer-based Simulation in Pre-Service Teacher Education**			
Date:	**4/8/2010**			
Responsible Faculty	**Dr.**	**John**	**Gretes**	**Educational Leadership**
Investigator	**Ms.**	**Mary**	**Englebert**	**Educational Leadership**

The Institutional Review Board (IRB) certifies that the protocol listed above is exempt under category 2 .

Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:

a) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and

b) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

This approval will expire one year from the date of this letter. In order to continue conducting research under this protocol after one year, the "Annual Protocol Renewal Form" must be submitted to the IRB. Please note that it is the investigator's responsibility to promptly inform the committee of any changes in the proposed research, as well as any unanticipated problems that may arise involving risks to subjects. Amendment and Event Reporting forms are available on our web site: http://www.research.uncc.edu/comp/human.cfm

Dr. M. Lyn Exum, IRB Chair — 4/12/10

Date

APPENDIX D: NOTIFICATION TO TEXAS CENTER FOR EDUCATION TECHNOLOGY OF INTENDED USE OF FAIT

From: Englebert, Mary Sent: Thu 7/22/10 9:08 PM
To: TCET@unt.edu
Cc:
Subject: notification of intended use of FAIT as basis for dissertation survey

Attachments

My name is Mary F Englebert (mfengleb@uncc.edu), and I am a doctoral student at The University of North Carolina at Charlotte. Per the instructions on the TCET website I am writing to let you know that I am using the FAIT survey as the basis for a survey on faculty attitudes toward the use of computer based classroom teaching simulations in pre-service teacher education. My anticipated completion date for the survey and results is mid-August, and I hope to defend my dissertation in late September or early October. The survey recipients/participants are 272 education methods faculty in the 15 colleges and schools of education in the constituent universities of the University of North Carolina University System. My dissertation committee chair (and the named lead investigator on the IRB application) is Dr. John A. Gretes (jagretes@uncc.edu)

At this time I have no plans to publish the results as I am totally focused on my full-time employment and completing my dissertation; however, if the opportunity arises (after I've recovered from this experience), I will provide a copy of the publication to you along with written permission to use any parts as allowed by the publisher.

Mary F Englebert

APPENDIX E: REMINDER EMAIL TO SURVEY PARTICIPANTS

Subject: 2nd Request for your participation in a 20 minute doctoral dissertation survey

Dear Professor XXX: I sent an earlier request for participation in my faculty survey and later discovered that the link did not work in some of the emails. The text of the original email appears below. If you have not done so, will you please click on this active link and complete my survey? http://www.surveyshare.com/survey/take/?sid=104854. If you have taken the survey, I thank you and apologize for bothering you again.

Mary F. Englebert, Doctoral candidate
828-262-
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I am a doctoral student at The University of North Carolina at Charlotte currently completing the requirements for my dissertation. My research study is focused on the attitudes of education methods faculty toward the use of computer-based classroom teaching simulations in pre-service teacher education. While many studies have verified the positive impact that teaching simulations have on pre-service teachers, very little research has been conducted on faculty who make the decisions about what instructional methodologies they will use in their own classes. My hope is that the survey will reflect attitudes of faculty who have embraced this technology, have rejected it, or are ambivalent toward it. Your opinions on the subject are very important, and I would like to include your input in this study.

The survey consists of 48 total items (40 related to opinion/attitude and 8 related to demographic/professional status) and should require no more than 20 minutes of your time.

All participant information will be kept confidential and will be used only in the aggregate for the purpose of this dissertation study and future projects. There are no known risks associated with this study. Responses will be anonymous, and your name will not be associated with your responses in any way. The IRB Approval of the study and Waiver of Documentation of Consent are attached to this email. If you agree to participate, you will be one of approximately 275 participants. Questions about IRB compliance may be directed to the UNC Charlotte Office of Research Compliance Research & Federal Relations, 9201 University City Blvd., Charlotte, NC 28223. Phone: 704-687-3309. Fax: 704-687-2292

I hope that you will participate and thank you in advance for giving your time and attention to this request. If you agree to participate in the study, please click on the link below with the understanding that clicking on the link implies your consent to participate. Approximately 275 invitations to participate are being distributed and all participants who complete the survey by May 10, 2010 will be entered into a drawing for a single participation award of $100 cash. Instructions will be provided at the end of the survey on how to enter the drawing while maintaining anonymity for the survey responses. The selection for the award will be made using the random selection tool in the Statistical Package for the Social Sciences.

CLICK ON THIS LINK TO TAKE THE
SURVEY: http://www.surveyshare.com/survey/take/?sid=104854
You are a volunteer. The decision to participate in this study is completely up to you. If you decide to participate in the study, you may stop at any time.

Should you have any questions regarding this study, please do not hesitate to contact me or the chair of my committee, Dr. John Gretes.

Mary F. Englebert, Doctoral candidate
828-262-6519
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Dr. John Gretes, Committee Chair
jagretes@uncc.edu

Attachment: Approval of Exemption

VITA

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Education

Doctorate in Educational Administration
University of North Carolina at Charlotte, Charlotte, NC

Master of Arts in History

University of North Carolina at Charlotte, Charlotte, NC

Bachelor of Arts, History Major, Political Science Minor

University of North Carolina at Charlotte, Charlotte, NC

Associate of Arts Degree
Mitchell Community College, Statesville, NC

Positions Held

Director, Extension and Distance Education — October 2009-Present
Division of Educational Outreach and Summer Programs
Appalachian State University

Associate Director, Distance Education — March 2002-Sept. 2008
Senior Program Manager — June 1997-February 29, 2002
Department of Continuing and Distance Education, and Summer Programs
The University of North Carolina at Charlotte, Charlotte NC

Teaching Assistant, History Department — January 1992-May 1995
The University of North Carolina at Charlotte, Charlotte, NC

English Teacher
Wang fu Jing Senior School, Beijing, — August-December 1994
The People's Republic of China

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Presentations

Wholistic Approach to Navigating the Online Course Waters June 10, 2008
UNC Charlotte Faculty Development Workshop
UNC Charlotte, Charlotte, NC

Online and Face-to-Face Hybrid Teaching April 24, 2008
North American Association of Summer Sessions
Sheraton Norfolk Waterside Hotel, Norfolk, Virginia

Education + Technology: Careers that Make a Difference! August 6-10, 2007
Microsoft Digigirlz Conference
Microsoft Headquarters, Charlotte, NC

Creating Communities in Cyberspace May 23-26, 2007
Distance Education Learning Administration Conference
Jekyll Island Resort, Jekyll Island, Georgia

Distance Education Student and Administrative Services December 9-10, 1999
5th UNC Forum on Distance Learning and Education
The University of North Carolina at Charlotte, Charlotte, NC

Beyond High School: Considerations for an International Career February 16, 1995
International Baccalaureate Degree Student Forum
The University of North Carolina at Charlotte, Charlotte, NC

Obstacles to the Liberation of Chinese Women March 25-26, 1994
6th Annual Graduate History Forum
The University of North Carolina at Charlotte, Charlotte, NC

Making a Place: Chinese Women, Death and the Ancestors March 26-27, 1993
5th Annual Graduate History Forum
The University of North Carolina at Charlotte

Publications

Creating Communities in Cyberspace
Published, Proceedings of the 2007 Distance Education Learning Administration Conference, Jekyll Island, Georgia, May 23-26, 2007

Development of an Electrical Engineering Technology Distance Education Curriculum
Published, Proceedings of the 2003 American Society for Engineering Education Annual Conference & Exposition, Nashville, TN, June 2003