

The University of Southern Mississippi
The Aquila Digital Community

Dissertations

Spring 5-2012

Educational Technology Integration and High-Stakes Testing

Tracy Demetrie Daniel
University of Southern Mississippi

Follow this and additional works at: <https://aquila.usm.edu/dissertations>



Part of the [Curriculum and Instruction Commons](#), [Educational Methods Commons](#), and the [Elementary and Middle and Secondary Education Administration Commons](#)

Recommended Citation

Daniel, Tracy Demetrie, "Educational Technology Integration and High-Stakes Testing" (2012).
Dissertations. 750.
<https://aquila.usm.edu/dissertations/750>

This Dissertation is brought to you for free and open access by The Aquila Digital Community. It has been accepted for inclusion in Dissertations by an authorized administrator of The Aquila Digital Community. For more information, please contact Joshua.Cromwell@usm.edu.

The University of Southern Mississippi

EDUCATIONAL TECHNOLOGY INTEGRATION
AND HIGH-STAKES TESTING

by

Tracy Demetrie Daniel

Abstract of a Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

May 2012

ABSTRACT

EDUCATIONAL TECHNOLOGY INTEGRATION

AND HIGH-STAKES TESTING

by Tracy Demetrie Daniel

May 2012

Determining if the investment in educational technology will improve student achievement is complicated and multifarious. The purpose of this study was to evaluate the influence of teacher technology integration on student achievement as measured by the Mississippi Subject Area Testing Program (SATP) and to explore the relationship between technology integration and other factors (a teacher's age, gender, computer self-efficacy, and technology training).

This non-experimental, quantitative study included 106 secondary school teachers from six school districts in Mississippi. The respondents completed a questionnaire based on their SATP course (Algebra I, Biology, English II, and U. S. History) teaching experiences. This study employed a multiple linear regression statistical test. The findings of this study indicated that there was a statistically significant relationship between technology integration and a teacher's age, gender, computer self-efficacy, technology training, and student test scores (collectively). The study also showed that when controlling for all other variables, computer self-efficacy and technology integration was statistically significant while age, gender, and student test scores were not statistically significant.

COPYRIGHT BY
TRACY DEMETRIE DANIEL
2012

The University of Southern Mississippi

EDUCATIONAL TECHNOLOGY INTEGRATION
AND HIGH-STAKES TESTING

by

Tracy Demetrie Daniel

A Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

Approved:

Director

Dean of the Graduate School

May 2012

ACKNOWLEDGMENTS

To my dissertation chair, Dr. Rose McNeese, thank you so much for your guidance, support, advice, and diligence. To my statistician, Dr. J. T. Johnson, thank you for everything you have done and taught me over the past few years. To Dr. Thelma Roberson, thank you for your guidance and encouragement throughout this journey. And to my wonderful and supportive family and circle of friends, I thank you for always being there!

TABLE OF CONTENTS

ABSTRACT.....	ii
ACKNOWLEDGEMENTS.....	iii
LIST OF TABLES.....	vi
CHAPTER	
I. INTRODUCTION	1
Background	
Purpose of Study	
Justification	
Research Question	
Hypothesis	
Assumptions	
Delimitations	
Definition of Terms	
Summary	
II. REVIEW OF LITERATURE	11
Historical Perspective	
Theoretical Framework	
The 21 st Century Students	
The Call for Change in Education	
High Stakes Testing	
21 st Century Skills	
Technology Integration	
Professional Development	
Computer Self-Efficacy	
Summary	
III. METHODOLOGY	47
Introduction	
Mississippi Subject Area Testing Program	
Levels of Technology Integration	
Research Design	
Instrumentation	
Participants	

	Research Question	
	Hypothesis	
	Summary	
IV.	RESULTS	54
	Introduction	
	Description of Respondents	
	Results	
	Data Analysis	
	Data Findings	
	Hypothesis Results	
	Summary	
V.	CONCLUSION.....	71
	Introduction	
	Summary of Procedures	
	Major Findings	
	Discussion	
	Limitations	
	Recommendations for Policy and Practice	
	Recommendations for Future Research	
	Summary	
	APPENDIXES	80
	REFERENCES	92

LIST OF TABLES

Table

1. Frequencies of Gender55

2. Frequencies of Race56

3. Frequencies of Age56

4. Frequencies of Teachings Experience57

5. Frequencies of Courses Taught.....57

6. Frequencies of SATP Scores58

7. Frequencies of Degree Earned58

8. Means and Standard Deviations of Computer Self-Efficacy60

9. Means and Standard Deviations of Technology Integration.....61

10. Frequencies of Computer Access.....63

11. Frequencies of Interactive White Board Training64

12. Frequencies of Software Training.....65

13. Frequencies of Integrating Technology in Classroom Training66

14. Frequencies of Overall Technology Professional Development/Training.....66

15. Frequencies District/School Technology Use Requirement67

16. Means and Standard Deviations of Sub Scores68

17. Regression Coefficients69

CHAPTER I

INTRODUCTION

The deauthorization of the Enhancing Education Through Technology program (Title IID of the reauthorized Elementary and Secondary Education Act – No Child Left Behind Act of 2001) (Nagel, 2011; eSchool News, 2011) and the decrease in funding for Career and Technical Education program, Special Education programs, Improving Teacher Quality program, and Title I Grant program (Federal Funds Watch, 2011; Nagel, 2011) has caused educational leaders throughout the United States to face the challenge of doing more with much less. The 29.1 million dollar cut to education programs (Federal Funds Watch, 2011) has educational leaders looking closely at their own budgets to prioritize initiatives. Many school leaders are looking to educational technologies such as cloud computing (to reduce software and production costs), electronic book readers (to reduce textbook spending), and “Bring Your Own Device” (Devaney, 2011a, p. 12) initiatives (to reduce the cost of equipment replacement) to help fill in the gaps between funding and meeting new and growing accountability standards while continuing to prepare students who are equipped with 21st century skills for college, the workforce, and the military (Devaney, 2011a; 2011b; Zwang, 2010).

The challenge of doing more with less suggests to educational leaders that they should be more frugal in and more informed about spending. This study provides educational leaders with data, tools, and knowledge that will guide decision making and planning for educational technology purchases, usage, and professional development to increase student achievement.

Background

The inception of formal technology integration in the classroom can be traced back to the early 1900s with the introduction of film and radio to the classroom (Cuban, 1986). Thomas Edison was so enthused about the new technology and the possibilities the technology held for the classroom that he, in 1913, predicted that film would replace the classroom textbook due to an increase in the use of motion picture in the classroom (Cuban, 1986). Contrary to Edison's prediction, film did not replace textbooks due to the infrequent use of the new technology by teachers. In addition, the same disappointment occurred with the introduction of radio and television as classroom tools. Reasons noted by Cuban for the lack of use of these early forms of educational technology include the lack of equipment, the lack of training on the equipment, cost, and uncertainty about the influence on teaching and learning. Some of the same reasons for lack of technology integration are still true today.

Although the influence of educational technology on teaching and learning is still uncertain, just as it was in the early 1900s, schools across our nation have invested and are continuing to spend millions of dollars on educational technology, technology integration, and technology training. These investments are being made while hoping to improve student achievement and increase the average yearly progress to meet the requirements of the No Child Left Behind Act (NCLB) of 2001 (U. S. Department of Education, 2002). Many schools have moved from simply ensuring that each classroom has Internet-access, to making sure that each classroom has three to four multimedia computers and an interactive whiteboard to enhance instruction. Part D, Enhancing

Education Through Technology (E2T2) of NCLB encourages technology purchases by setting technology goals for schools. The desired outcomes of E2T2 include having every school fully integrate technology into the curriculum and improve student academic achievement through the use of educational technology. E2T2 also encourages schools to foster effective technology integration through teacher training and curriculum development (U. S. Department of Education, 2002).

While some research such as 1985 Apple Classrooms of Tomorrow Study (Apple Classrooms of Tomorrow-Today, 2008; Apple Classrooms of Tomorrow, 1985), the 1994 Kulik Study (Schacter, 1999); the 1990-1997 Sivin-Kachala Study (Schacter, 1999; Sivin-Kachala, Bialo, & Rosso, 2000); and the Wenglinsky Study (Wenglinsky, 2005) regarding the relationship between educational technology and student academic achievement has been conducted, the research findings indicated contradictory results. The results seem to differ primarily due to the definition of student achievement applied in each study. Student achievement is generally measured by standardized test scores; however, some define student achievement by increase in grades, motivation, 21st Century skills, etc. (Apple Classrooms of Tomorrow-Today, 2008; Apple Classrooms of Tomorrow, 1985; Schacter, 1999; Sivin-Kachala, et al., 2000; Wenglinsky, 2005). Although the results of the research conflict, the researchers agree that technology-rich environments seem to increase student attitudes toward class and learning.

Many school leaders believe that simply putting computers in the classroom will automatically increase learning (Kleiman, 2004) while other educational leaders value teacher training on new technologies. This debate, as well as current studies examining

the relationship between educational technology and student achievement, has encouraged this researcher to explore the factors that influence technology integration in the classroom and examine the effects, if any, on student achievement.

Purpose of Study

The purpose of this study was to evaluate the influence of teacher technology integration on student achievement as measured by high-stakes testing programs (Mississippi Subject Area Testing Program-SATP) and to add to the body of research on the effectiveness of educational technology to help guide educational leadership in the planning, purchasing, and usage of educational technologies. Data was gathered from six school districts in Mississippi. The data included general demographic data about the school district, school, and teachers as well as data regarding teacher technology integration (levels of teacher technology integration, frequency of technology integration, technology training, personal/home use of technology, etc.)

To determine whether or not using technology leads to higher levels of student learning has become more urgent because of the emphasis on “standards-based accountability” and costs of purchasing and implementing technology (Protheroe, 2005, p. 46). Answering whether or not technology improves student learning is difficult and should include defining assessment, complexities of people, technology and educational organizations (Spurlin, 2006). This study also explored the 21st century student and compared him to students of the past. This exploration of the digital native provides implications for educators and their use of educational technology to make the teaching

and learning process relevant while attempting to meet the increasing number of state and national accountability standards.

Justification

The question of whether or not to include technology in the classroom is no longer a relevant question. The No Child Left Behind Act mandates the full integration technology in the classroom. The mandate shifts the question and exploration to how best to integrate technology to improve student achievements.

This study explored the relationship between a teacher's integration of technology in the classroom and student achievement. As previously noted, some researchers agree that environments enriched by educational technology increase student motivation for learning (Apple Classrooms of Tomorrow-Today, 2008; Apple Classrooms of Tomorrow, 1985; Schacter, 1999; Sivin-Kachala, et al., 2000; Wenglinsky, 2005). If this, indeed, is the case as documented by the results of this study, schools could increase student interest and learning by increasing the investment in educational technologies for classroom use. The additional investment in educational technologies could possibly reduce the budget for areas such as textbooks, paper, and other supplemental materials. In addition to increased student motivation for learning, students could possibly leave high school better prepared to enter college, the military and the work force due to increased exposure to 21st Century technologies and skills. The need to know what impact, if any, teacher technology integration in the classroom has on student achievement is more urgent in the 21st century than before due to the emphasis on

accountability and the substantial cost of purchasing and implementing technology in the classroom (Protheroe, 2005).

Research Question

This study examined the following question: Does a relationship exist between teacher technology integration in the classroom and the teacher's age, gender, computer self-efficacy, technology training, and state subject-area test scores of students?

Hypothesis

H₁: There is a statistically significant relationship between teacher technology integration in the classroom and the teacher's age, gender, computer self-efficacy, technology training received, and student test scores.

Assumptions

The researcher assumed that the survey participants were sincere and honest in their survey responses. It was also assumed that the SATP scores provided by the participants were all-inclusive and accurate. It was further assumed that survey participants had access to some educational technology and technology training.

Delimitations

This study was delimited to secondary public education teachers in Mississippi.

This study was also delimited to Mississippi Subject Area Testing Program teachers.

Definition of Terms

21st Century Skills. The set of skills needed in order to be able to compete on a global level and be able to successfully work in the 21st century. The skills include

critical thinking and problem solving; communication; collaboration; creativity and innovation; information, media, and technology skills; life and career skills; initiative and self-directions; social and cross-cultural skills; productivity and accountability; and leadership and responsibility (Partnership for 21st Century Skills, 2009; Apple Classrooms of Tomorrow-Today, 2008).

Assessment. A method or methods used to determine what a student knows or can do (Learning Technologies at Virginia Tech, 2009).

AYP (average yearly progress). The key measure to determine if a school or school district has made the required annual progress according to the requirements set forth by the No Child Left Behind Act of 2001.

Computer self-efficacy. An individual's belief of his/her ability to use a computer or computer applications (Smith, 2001).

Digital immigrant. A person born prior to the digital age that may or not speak the digital technology fluently; anyone who is uncomfortable using digital technology (Prensky, 2001).

Digital media. Any digitized content (i.e. computer, iPod) that can be transmitted over a network or storage device that holds digital data (Jukes & McCain, 2008).

Digital native. A person born during the digital age that is very comfortable with digital technology (Prensky, 2001).

Educational technology. Technology applications designed and used for instructional purposes (Bailey & Mageau, 2004; Frazier & Bailey, 2004).

Gatekeeper. A person, specifically an educator, who chooses which technology is allowed to be used (Prensky, 2001).

High-stakes testing. The practice of attaching consequences to standardized scores.

Hypertext/hyperlink mind. Multitasking at a superficial level; being able to leap around in one's thinking (Miller, 2008).

National Assessment of Educational Progress (NAEP). Largest nationally representative and continuing assessment of what American students know and can do in various subject areas; the results of the NAEP assessments are reported in the Nation's Report Card.

No Child Left Behind (NCLB) Act of 2001. The reauthorization of the Elementary and Secondary Education Act with the purpose of closing the achievement gap with accountability, flexibility, and choice so no child is left behind (U. S. Department of Education, 2002).

Neuroplasticity. The brain's ability to reorganize itself by forming new neural connections throughout a person's lifetime (Doidge, 2007).

Social networking. The practice of expanding one's personal or business network of contacts through contact with other individuals (Computer Language Company, 2011).

Student achievement. A measure of a defined level of success for a student; for the purpose of this study, student achievement will be measured by the improvement of outcomes on a standardized test (Apple Classrooms of Tomorrow-Today, 2008; Apple

Classrooms of Tomorrow, 1985; Schacter, 1999; Sivin-Kachala, et al., 2000; Wenglinsky, 2005).

Technology integration. Incorporating technology into classroom instruction and lessons.

Summary

The integration of technology in the classroom today (21st century) is very similar to the integration of film, radio, and television in the early 1900s. Not only was the inception of film and radio met with both optimism and disappointment, the failure to fully integrate the new technology in the classroom was disappointing to Thomas Edison who was very hopeful that the new devices could possibly transform education as they knew it (Cuban, 1986). Some of the same reasons noted by Cuban (1986) for the failure to better integrate film, television, and radio are also indicated by 21st century teachers for their lack of technology integration. Those reasons include lack of time, lack of equipment, lack of adequate funding, and lack of technology training.

Educational leaders of the 21st century, like Thomas Edison in the 1900s, are so hopeful that educational technology can cure the educational ills that they are continuing to budget and spend millions of dollars on educational technology. Some educators believe that simply placing a computer in the classroom is all that is needed to improve student achievement (Kleiman, 2004). Other educators are interested in finding out if the educational technology itself is the answer or if good teaching along with good educational technology resources and practices are the answer.

This research explored educational technology, technology integration in the classroom as well as educational technology's impact, if any, on student achievement as measured by high-stakes testing. Mississippi Subject Area Testing Program teachers in public school districts will be surveyed. Questions regarding their gender, age, ethnicity, experience, computer self-efficacy, level of technology integration, technology training received, and test scores were included in the survey.

CHAPTER II

REVIEW OF LITERATURE

Historical Perspective

During the early 1990s, the computer to student ratio was 1 to 20 (Wenglinsky, 2005). Also during this decade, very few classrooms were equipped with computers, and very few computers were integrated into the curriculum (Wenglinsky, 2005). By the late 1990s, according to Wenglinsky, the computer to student ratio was reduced to 1 to 5 with more computers in the classroom for student use for practicing/reinforcing skills and completing assignments. Wenglinsky further notes that by the end of this decade, teachers were more comfortable integrating computers in the curriculum because more of them had received adequate technology training. Although by the late 1990s, the computer to teacher ratio was decreasing, the number of computers in classrooms was increasing, the frequency of teacher technology integration in the classroom was on the rise and student computer usage in the classroom was increasing, so were the critics. Criticisms regarding computers in education and the effects computers had on the social, emotional, and physical development of children began to develop (Wenglinsky, 2005; Cuban, 2001). These criticisms sparked the debate of whether to integrate technology in the classrooms or not. This debate led to Wenglinsky's bottom line – "Does using technology in schools raise student achievement?" (p. 1). That same question is being asked in the education arena today.

Theoretical Framework

Although conflicting results have been found regarding the influence of technology, based on John Schacter's (1999) review and analyzation of seven educational technology studies, many researchers agree that technology-rich environments increase student motivation for learning (Apple Classrooms of Tomorrow-Today, 2008; Apple Classrooms of Tomorrow, 1985; O'Dwyer, Russell, Bebell, & Tucker-Seeley, 2005; Schacter, 1999). This finding lends itself to the behaviorist theory although behaviorism is largely attributed to "observable" behavior rather than thinking behavior (Conway, 1997). Behaviorists believe that learning is a change in behavior, and that change in behavior is a result of a specific stimulus. The specific stimulus can be a positive or negative stimulus (McLeod, 2007).

The stimulus concept was expanded by B. F. Skinner, father of operant conditioning and grandfather of behaviorism. B.F. Skinner extended Thorndike's law of effect (McLeod, 2007) by coining the term "reinforcement" and adding to the early behaviorist theory. Skinner's additions to the behaviorist theory included the belief that any non-reinforced behavior would be weakened or die out (McLeod, 2007). Furthermore, any desired behavior could be ignited through positive stimuli or reinforcement.

The constructivist theory also provides a theoretical framework for this problem. The basis for constructivism is the belief that knowledge is gained through experiences. According to Matusevich (1995), constructivism is child-centered and requires learning environments to be experience-based and should take into consideration a variety of

perspectives. Matusevich further suggests that the constructivists theorize that each child's education should focus on authentic tasks with real-world application and relevance which often leads to higher-order thinking.

The constructivist approach appears to be the basis for Marc Prensky's work and Dr. Phillip Schlecty's Working on the Work framework. Schlecty hypothesizes that in order for students to complete school work and retain what they have learned, they must be authentically engaged. The work must, not only be relevant to the student, the work must also be interesting. The Schlecty framework requires teachers to reform by changing the quality of learning experiences in the classroom if the desire is to improve student achievement. In order for this change to occur, the core and culture of schools must change from the top down (Schlecty, 2002).

Almost every facet of society in the 21st Century has been inundated with computers or some form of technology. Therefore, it would be negligent of educators to educate children (digital natives) without including technology in the curriculum. The dawn of the 21st Century society not only ushered in a technologically-rich environment, it has given birth to "digital natives" and classified those born before technology and the digital age as "digital immigrants" (Prensky, 2001). Marc Prensky, in 2001, coined these descriptions of citizens to help educators understand the task before them. Digital natives, according to Prensky, were not just born into a digital and information age. They speak the digital language fluently and their whole lives revolve around technology and the immediate access to information (Prensky, 2001). Natives cannot imagine their lives without technology because they have not experienced life without technology according

to Prensky. Prensky implies that because of this familiarity with and need for technology, these students should not be educated without the “tools of their trade” whether or not it can be agreed upon that these tools positively influence student achievement or not. Although the influence cannot be agreed upon, Prensky believes that the integration of technology makes the education of the digital native more relevant to them.

Educators and educational leaders may not often see the relevance of technology integration. This is one reason Prensky (2001) classifies them as digital immigrants – those not born in the digital age. According to Prensky, the digital immigrants may speak the language of the digital natives, but often are not fluent in the language or as comfortable with technology as are the digital natives. This lack of comfort, according to Prensky, can cause the digital immigrant to become the “gatekeeper” of technology. Thus, allowing in only technology for which they are comfortable and providing less relevant lessons for students, but more comfortable lessons for themselves.

In order to fully integrate technology in the curriculum as required by NCLB, digital immigrants will be required to change their way of thinking, their behavior, their understanding of the natives, and planning. However, the behavioral approach, which is deeply rooted in change, and the constructivist approach provides the theoretical framework for this problem.

John Schacter (1999) analyzed five of the largest scale studies of educational technology that had been conducted at that time along with two smaller studies. Schacter analyzed Kulik’s Meta-Analysis Study of 1994, Sivin-Kachala’s Review of the Research

(1990-1997), The Apple Classrooms of Tomorrow (1985), West Virginia's Basic Skills/Computer Education Statewide Initiative, Harold Wenglinsky's National Study of Technology's Impact of Mathematics Achievement, Scardamalia and Bereiter's Computer Supported Intentional Learning Environment Studies, and The Learning and Epistemology Group at MIT. Schacter's analysis of these studies guides the theoretical foundation for this research.

The Kulik Study conducted in 1994 by James Kulik used a meta-analysis to aggregate the findings obtained from 500 research studies on computer-based instruction (Schacter, 1999). According to Schacter, Kulik drew four basic conclusions from his study. The conclusions were:

1. On average, students who used computer-based instruction scored higher than students in controlled conditions without computers.
2. Students learn more in less time when they receive computer-based instruction.
3. Students like their classes more and develop more positive attitudes when their classes include computer-based instruction.
4. Computers did not have positive effects in every area in which they were studied.

Like the Kulik Study, the Sivin-Kachala research found that educational technology, for the most part, had a positive influence on student achievement. The Sivin-Kachala research reviewed 219 research studies from 1990-1997 in order to assess the effect of technology on learning and achievement across all learning domains and

ages (Schacter, 1999). Schacter reports that the Sivin-Kachala research found that students in technology-rich environments experienced positive effects on achievement in all major subjects, showed increased achievement in pre-school through higher education for both regular and special needs children, and showed improved attitudes toward learning and their own self-concept. The Sivin-Kachala study, according to Schacter, also found that the level of effectiveness of educational technology was influenced by the specific student population, the software design, the role of the instructor, and the level of student access to technology.

The Apple Classrooms of Tomorrow (ACOT) project was initiated in 1985 as a research and development collaboration among public schools, universities, research agencies, and Apple Computer, Inc. (Baker, Gearhart, & Herman, 1990; Schacter, 1999). This project studied seven classrooms that were representative of America's elementary and secondary schools. The goal of this project, according to Schacter, was to study how teaching and learning might be affected by teachers' routine technology integration in the classroom. Schacter reports that the ACOT project had a positive impact on student attitudes and teacher practices, but showed no significant improvement in vocabulary, reading comprehension, mathematical concepts, and work-study on standardized tests in those with computer-assisted instruction when compared to those with no computer access.

Policymakers and educational researchers have debated the role of computers in the classroom for the past 45 years (Wenglinsky, 2005). As was the case with the introduction of film and radio in the classroom in the mid-1900s (Cuban, 1986), the

introduction of computers and other new classroom technologies came with both “supporters” and “detractors” (Wenglinsky, 2005). Although these detractors existed, some policymaker supporters began seeking sources to increase the number of computers in the classroom and to increase student accessibility to computers. This led to increased support and funding from the federal, state, and local governments as well as the private sector mainly because they believed that students needed to be technology proficient in order to compete in the job market (Wenglinsky, 2005). Other proponents of increased technology in the classrooms sought to “enhance school productivity through reducing the role of and perhaps eliminating teachers in the classroom” (Wenglinsky, p. 2) while opponents feared that the technology would replace brick and mortar schools and could possibly reduce opportunities for students to “socialize and exchange ideas” (Wenglinsky, p. 3). Other proponents believed that encouraging schools to increase the use of computers in the classroom would help the businesses selling the computers more than it would help the student using the computers.

According to Wenglinsky (2005), the debate of whether to include computers in the classroom or not shifted to how to use the technology wisely since the inclusion of the technology seemed inevitable. Wenglinsky expressed that the effectiveness of the educational technology was based on how the technology was included into the practice of teaching. In Wenglinsky’s opinion, the constructivist teacher’s use of technology was more beneficial to students than the didactic approach because constructivists use the computer as one of many tools that students use to learn concepts through problem

solving. The didactic teacher, on the other hand, uses the computer as a replacement for materials and other classroom tools (Wenglinsky, 2005).

The statistics about teacher usage of computers is somewhat surprising. Les Foltos (2002) gives the following statistics from Larry Cuban: fewer than 20% of teachers use technology several times a week and nearly half of teachers didn't use the technology at all although those resources were abundant. Cuban further states, according to Foltos, that of the 50% of teachers that used technology (regardless of how often), only a small amount of those teachers actually used the technology in a constructivist manner to improve the teaching and learning process. This classic use of technology may be disappearing as new evidence of educational technology's positive influence on academic achievement emerges. According to Wenglinsky's (2005) evaluation of the National Assessment of Educational Progress' 1996 and 2000 results, educational technology had a positive effect when used in constructivist ways (simulations and application) whereas "drill and practice" (p. 46) had a negative effect on math for the eighth graders surveyed. Fourth graders saw improvement in their math scores when educational technology was used to solve simulations (Wenglinsky, 2005).

There has been no "aspect of schooling" that has been untouched by reformers in the past 200 years (Cuban, 2001, p. 1). Each reform has come with new policies and procedures to cure the ills of the educational system. After the release of the *Nation at Risk* report in 1983, many proponents of reform believed that reforming schools through the implementation and use of new technology would help eliminate many societal issues and strengthen the nation's global presence. These societal issues, according to the

Nation at Risk report (National Commission on Excellence in Education, 1983), were brought about by “a rising tide of mediocrity,” (p. 7) that threatened our very future. Reformers from the corporate world and political arena placed the blame for our societal decline on high schools (Cuban, 2001). These reformers, according to Cuban, felt that high schools were not adequately preparing students for the “fast-changing automated workplace” (p. 4) and producing low to mediocre performing high school graduates. This belief was supported by the three main findings of the report: Secondary school curricula no longer have a central purpose; the secondary school curriculum offers too many courses that allows students too many choices; and 25% of credits earned by the general high school student comes from the following: health and physical education, work study/cooperative extension-type courses, remedial English and math, and adulthood and marriage-type training courses (National Commission on Excellence in Education). This report also found that, in comparison to other nations, American students spend much less time on school work, classroom and homework time is often ineffective, and American schools fail to help the students develop good study skills (National Commission on Excellence in Education). Because of the disturbing findings of the 1983 *Nation at Risk* report, the recommendations concentrated on improving five areas: content, standards and expectations, time, teaching, and leadership and fiscal support (National Commission on Excellence in Education). The content area recommendation included teaching computer science in high school to equip the students with the skills necessary to become technologically proficient in addition to the creation

of new basic skills in English, mathematics, science, and social studies (National Commission on Excellence in Education).

The mid-1990's brought with it an "economic revival" (p. 32) that included a surplus of funds for education systems and more reform (Cuban, 2001). This reform, led by Governors Pete Wilson and Gray Davis, included smaller classes, standards-based curriculum, state-mandated tests, consequences for low-performing schools, and new educational technology for schools.

The 21st Century Student

Schools across our nation are still investing millions of dollars on educational technology, technology integration, and technology training to improve student achievement in order to meet accountability standards set by the No Child Left Behind Act of 2001. Many of these schools have moved from making sure that every classroom has Internet-access during the late 1990s to the deployment of one-to-one computing in the early 2000s (Wambach, 2006).

While teachers and administrators, alike, are struggling with the notion of doing more with less, administrators are trying to get more for their investment and have begun re-evaluating educational technology usage and purchases (Daniel, 2007). While educational leaders are re-evaluating technology's importance, educational technology leaders such as Marc Prensky, Ian Jukes, and Alan November are diligently trying to help educators understand the 21st Century students and inform educators that 21st Century students should not be taught without technology (Jukes & McCain, 2008; November, 2009; Prensky, 2001).

The 21st century student, also referred to as a digital native or a digital kid, has very little or no knowledge of a world without technology (Jukes & McCain, 2008). Twenty-first century students, who are often called “different,” process, interact, and use information in a way that is different from previous generations mainly because of their constant exposure to technology and digital media. According to Jukes & McCain, there is emerging clinical research about 21st century students. The research supports the belief that digital natives are neurologically wired differently in order to adapt to new technologies and a variety of digital experiences that are common in the 21st century.

The 21st century student, unlike the student of the past, is comfortable with and enjoys “visual digital bombardment of simultaneous images, texts, and sounds” (Jukes & McCain, 2008, p. 10). This visual bombardment is not only enjoyable for 21st century students, it is preferred because the experience conveys more information in a short period of time than reading a book can offer (Jukes & McCain, 2008).

The digital generation, 21st century students, have very little, if any, input in how they are educated (Prensky, 2006). According to Prensky, these 21st century children are bored in the United States and abroad. They, according to Linda Stone (2009), are in need of being “a live node on the network” (p. 1) meaning they are constantly using some piece of networked technology such as cell phones to send and receive text messages, check phone calls, check e-mail, and to check social networking sites. Stone refers to this phenomenon as continuous partial attention (CPA). In an effort to avoid missing anything, the individual with continuous partial attention has a false sense of “constant crisis” (p. 1) and only pays partial attention to any given thing. These students with CPA

dislike being talked at, lectured to, and do not like being excluded in the lesson (Prensky, 2006).

Digital natives, unlike the digital immigrant, speak digital as their first language (Jukes, McCain, & Crockett, 2008). They have hypertext/hyperlink minds that continuously change both physically and chemically (Jukes & McCain, 2008). They are indeed “fundamentally different” because they think differently; they access, absorb, interpret, process, and use information differently; they view the world differently; and they interact and communicate differently than digital immigrants (Doidge, 2007; Johnson, 2005; Jukes, McCain, & Crockett, 2008; Pink, 2005; Small & Voron, 2008). Because the digital immigrant is usually uncomfortable with technology, the digital immigrant educator often blocks or limits the use of digital tools in the classroom which often discourages the digital native from actively participating in the lesson(s) being taught (Prensky, 2001).

The Call for Change in Education

The 1983 *Nation at Risk* report to the nation discussed that our nation was at risk due to the “rising tide of mediocrity” (p. 7) that threatened the future of the nation and its citizens (National Commission on Excellence in Education, 1983). In addition, the commission stated in the report that if an unfriendly foreign country had imposed on the United States, the educational mediocrity that existed in the United States, the United States would have considered it an act of war. The findings of this report, according to Barksdale-Ladd & Thomas (2000) and according to the strategies laid out for fighting the

war, were the catalyst for change and accountability in the educational system of the United States.

The report called for higher standards for schools, colleges and universities, better teaching strategies, more time on task for students, tougher graduation requirements, and the addition of technology integration and technology courses to help American students compete on the global level. The commission began to fight the way on the American educational system by not only recommending tough changes, but also by requiring states to become accountable for adequately preparing American students beyond the mediocre system that was being used.

The findings and recommendations of the *Nation at Risk* report ushered in the accountability movement that was the stimulus for high-stakes testing (Barksdale-Ladd & Thomas, 2000). The heads of states began to re-evaluate programs of study by setting higher standards for students and teachers. They also had to decide how to measure student progress based on the new standards (Barksdale-Ladd & Thomas, 2000). Testing appeared to be the logical way to determine if expectations were being met (Barksdale-Ladd & Thomas, 2000). Testing also became the way to hold schools, teachers, and students accountable for reaching the standards (Barksdale-Ladd & Thomas, 2000; Lay & Stokes-Brown, 2008; Zimmerman & Dibenedetto, 2008).

High-Stakes Testing

High-stakes testing, the practice of attaching consequences to standardized scores (Nichols & Berliner, 2008) has historically been used to provide diagnostic information about students, teachers, schools, and districts (Lay & Stokes-Brown, 2008). The high-

stakes tests have traditionally provided information regarding academic strengths and weaknesses for students and curricula. Since the inception of the No Child Left Behind Act requirements, high-stakes testing has gained a new purpose. These tests are now used to make high-stakes decisions such as whether or not a student graduates or is promoted to the next grade level and also to designate teachers and schools for rewards or penalty based on performance (Koretz, Linn, Dunbar, & Shephard, 1991; Lay & Stokes-Brown, 2008; Nichols & Berliner, 2008). In addition, the *Nation at Risk* report called for higher standards with accountability and drastic change in the way schools conduct business. These standards and changes included accountability, technology literacy, and integration.

According to Shriberg and Shriberg (2006), the No Child Left Behind Act of 2001 was developed from President George W. Bush's proposal for education reform as a top priority. President George W. Bush enlisted former superintendent of Houston Public School District, Rod Paige, to lead the initiative by employing the successful Texas model as a guide (Shriberg & Shriberg, 2006). This model was chosen because of Texas' ability to narrow the achievement gap between the white students and all other students in their state on a Texas standardized test during the 1990s (Shriberg & Shriberg, 2006).

The goal of the NCLB Act of 2001 is for all students regardless of race, religion, ethnicity, or socio-economic status to achieve 100% proficiency in language arts and mathematics by 2014 (U. S. Department of Education, 2002). Each state, according to the NCLB Act of 2001, is responsible for setting their own requirements and defining their goals for proficiency scores for tested grades (third-eighth grades) (Shriberg &

Shriberg, 2006). In addition, each school receiving Title I funds is required to meet average yearly progress (AYP) on standardized tests for all subgroups of students (Shriberg & Shriberg, 2006; Wenning, Herdman, Smith, McMahon, & Washington, 2008).

The concept of high-stakes tests has both passionate proponents and opponents. High-stakes testing can drive fundamental change in schools (Abrams, Pedulla, Madaus, 2003). However, the argument is whether or not this change is good and whether there is enough accountability or not. Instead of motivating students and teachers to achieve at higher levels, high-stakes testing can increase stress levels for students and teachers, lower teacher and student morale, and increase anxiety and test fatigue for students (Abrams, et al., 2003). Although some teachers and students experience high anxiety and are less motivated by high-stakes testing (Abrams, et al., 2003), proponents believe that high-stakes testing yields improved performance and increases student academic achievement.

Placing high emphasis on test scores, according to McNeil (2000), can diminish professionalism by forcing the teacher to focus lessons on test preparation. This diminishes the educational exposure to experiences and limits the teacher's skill level (McNeil, 2000). Seventy-seven percent of North Carolina teachers indicated in a survey that since the implementation of their state's high-stakes testing program, morale decreased and work-related stress increased (Jones, et al., 1999). According to Korte, Barron, Mitchell, and Stecher (1996), the majority of Maryland and Kentucky teachers also reported a decline in teacher morale since the inception of their respective state high-

stakes tests. Abrams et al. also report that Texas teachers agreed with North Carolina, Kentucky, and Maryland's teachers regarding stress levels of teachers due to high-stakes testing practices. Kentucky and North Carolina teachers surveyed also reported similar effects on students (Jones, et al., 1999; Korte, et al., 1996). Teachers from Kentucky and North Carolina reported a decrease in student morale and increased levels of general anxiety, fatigue and stress among high-stakes tested students.

Many teachers, such as those surveyed in Kentucky, Maryland, and North Carolina, believe that high-stakes testing has negative connotations attached, but understand the need for higher standards and realize there is a need for some mechanism by which achievement of those higher standards are measured (Abrams, et al., 2003). Although most teachers understand the need for high-stakes testing, they do not see the need for the severe sanctions attached to the test results (Abrams, et al., 2003).

According to Abrams et al. (2003), the National Board on Educational Testing and Public Policy conducted a survey to gather teachers' views on high-stakes testing programs mandated by respective states. These teachers were asked to respond to an eighty item Likert-like survey regarding their attitudes and opinions about high-stakes testing programs, classroom practice, and student learning. Results of this survey indicated that high-stakes testing level versus low-stakes testing level influenced what content was covered and assessed (Abrams, et al., 2003). Teachers in high-stakes testing states spent more time on tested-area instruction than those in low-stakes testing states (Abrams, et al., 2003). In addition, according to Abrams et al., high-stakes testing teachers spent less time than low-stakes testing teachers on fine arts, career preparation

education, enrichment activities and field trips. However, both groups of teachers indicated that testing programs, in general, discouraged them from providing a quality education to students and were uncomfortable with the changes needed to meet the testing program demands (Abrams, et al., 2003).

Both accountability standards and technology integration along with increased rigor of courses were included suggestions for change in the 1983 *A Nation at Risk* report. The effects of technology integration and accountability standards (high-stakes testing) on student achievement should be explored as well as their influence, if any, on one another because accountability, technology literacy of students and teachers, and technology integration in all subjects is required by the No Child Left Behind Act of 2001 (U. S. Department of Education, 2002).

21st Century Skills

The passing of the No Child Left Behind Act of 2001 not only increased testing and made high-stakes testing routine, it also increased the focus on testing specific content knowledge (North Central Regional Educational Laboratory, 2005) and encouraged schools to fully integrate technology into the curriculum (U. S. Department of Education, 2002). The new emphasis on accountability, by way of high-stakes testing, has “prompted greater scrutiny” on what is tested and how this relates to what 21st Century students need to know to succeed in the work force and to compete on a global level (North Central Regional Educational Laboratory, 2005). In an attempt to bridge the gap between what is tested and what is needed by 21st Century students to compete globally, P21 (Partnership for 21st Century Skills, 2009) developed a set of skills that 21st

Century students should have. Those skills are Information and Communication Technology Literacy (ICT). ICT skills include English, math, social studies, science, basic computer literacy, the use of e-mail and the Internet, productivity software skills (i.e. word processing), and basic website design/development (Partnership for 21st Century Skills, 2009).

Partnership for 21st Century Skills uses NCLB's eighth grade literacy requirement as the building block for its' ICT Literacy. According to NCLB of 2001, every student must demonstrate technology literacy by the time the student completes the eighth grade, regardless of race, ethnicity, gender, socio-economic status, disability, or where the student lives. Twenty-first Century skills defined by P21 are critical thinking and problem solving skills; communication skills; collaboration skills; creativity and innovation skills; information, media, and technology skills; life and career skills; initiative and self-directions skills; social and cross-cultural skills; productivity and accountability skills; and leadership and responsibility.

Different terms such as digital natives and digital generation have been used to describe what 21st Century students enjoy and need. However, it is commonly agreed upon that these students need to be able to compete on a global level (U. S. Department of Education, 2002; Partnership for 21st Century Skills, 2009; North Central Regional Educational Laboratory, 2005). In order to compete globally, 21st Century students should be taught based on Information and Communication (ICT) Literacy (Partnership for 21st Century Skills, 2009). ICT Literacy skills will enable students to begin to think more critically, analyze information more carefully, communicate more effectively,

collaborate more often, and problem-solve more efficiently (North Central Regional Educational Laboratory, 2005).

In support of this belief, the Partnership for 21st Century Skills (Partnership for 21st Century Skills, 2009) developed a framework for educators to use in the development of curricula, benchmarks, lesson plans, and testing. The elements of P21's 21st Century student outcomes and support systems are Life and Career skills; Learning and Innovation skills; and Information, Media, and Technology skills. The P21 framework was formed under the belief that schools must, in addition to concentrating on mastery of core subjects (language arts, world languages, arts, mathematics, economics, science, geography, history, government, and civics), weave in 21st Century interdisciplinary themes in order to promote the understanding of academic content (Partnership for 21st Century Skills, 2009). These themes include Global Awareness, Financial, Economic, Business, and Entrepreneurial Literacy; Civic Literacy; Health Literacy; and Environmental Literacy.

Technology Integration

Title II D of the No Child Left Behind Act, Enhancing Education Through Technology (E2T2), requires schools to fully integrate technology in the curriculum. E2T2 was written to help states and school districts develop a system to effectively integrate technology to improve student achievement; to encourage initiatives in both the private and public sectors to increase technology access in schools; to help states and schools to develop and enhance technology environment and infrastructure; to promote high quality professional development for teachers and administrators to effectively

integrate technology into the curricula and instruction; improve professional development of teachers and administrators; to support the development and utilization of electronic networks (i.e. distance learning); to support evaluation of programs and the impact of those programs on student achievement; and to encourage and support local technology initiatives that promote parent and family involvement in education (U. S. Department of Education, 2002).

The main goal of E2T2 is to improve student achievement through the use of technology in elementary and secondary schools (U. S. Department of Education, 2002). Other goals of E2T2 are to ensure every student is technologically literate by the end of the eighth grade regardless of race, ethnicity, gender, family income, geographic location or disability and to encourage effective technology integration by teacher training and curriculum development (U. S. Department of Education, 2002). Also included in E2T2 are provisions for funding to help achieve the technology and student achievement goals.

The acquisition, installation, and implementation of educational technology in schools and classrooms seem to have been the goal commonly achieved by schools and school districts evident by the great increase of computers in public schools (Zuniga, 2010). However, the difficult goal to achieve appears to be the effective integration of the technology in the classroom (Hew & Brush, 2007; Lowther, Strahl, Inan, & Ross, 2008; Morehead & LaBeau, 2005; Zhao & Bryant, 2006). Commonly agreed upon barriers to technology integration include time, training, support, and budget constraints (Hew & Brush, 2007; Lowther, et al., 2008; Morehead & LaBeau, 2005; Zhao & Bryant, 2006; Zuniga, 2010).

As with accountability standards (high-stakes testing), the No Child Left Behind Act of 2001 mandates that teachers fully integrate their curricula with technology as well as show technology proficiency (U. S. Department of Education, 2002). Some educational leaders have simply placed computers and/or software in the classroom while some teachers allow students to play educational games once they have completed their classwork to check the mandated proverbial box (Kleiman, 2004). Neither of these two examples illustrates effective technology integration. The common element of effective technology integration seems to involve using technology to support and/or enhance the teaching and learning process (Hew & Brush, 2007) and extensive professional development of teachers (eMints, 2012; International Society of Technology in Education, 2008).

“Learning 21st century skills requires the use of technology” (p. 6) according to Walden University’s study on the connection between K-12 technology use and 21st Century skills (2010). The results of this study dispel five myths regarding technology integration in the K-2 classroom. Those five myths are:

1. Teachers who are newer to the profession and teachers who have greater access to technology are more likely to use technology for instruction than other teachers.
2. Only high-achieving students benefit from using technology.
3. Given that students today are comfortable with technology, teachers’ use of technology is less important to student learning.

4. Teachers and administrators have shared understandings about classroom technology use and 21st Century skills.
5. Teachers feel well-prepared by their initial teacher preparation programs to effectively incorporate technology into classroom instruction and to foster 21st Century skills (Walden University, 2010).

The results of this study are based on a survey of 783 teachers and 274 principals and assistant principals in the United States (Walden University, 2010). According to the results of this study, the teacher's years of teaching experience and their age had very little effect on the frequency of technology use to support learning in the classroom. Although newer teachers use technology more on a personal level, they did not use technology more frequently than veteran teachers did in the classroom (Walden University, 2010). The main reason why teachers who were surveyed (49%) did not use technology in the classroom was because the teachers that felt technology was not necessary for the lesson. Twenty-two percent of teachers surveyed did not use technology in the classroom because there was limited access to the technology while 10% indicated that the technology was not appropriate for what they taught. The remaining 19% of teachers had a variety of reasons for not incorporating the technology. Those reasons included lack of technology and the lack of knowledge needed to effectively use the technology.

Teachers and principals, according to this study, believe in using technology in the teaching and learning process for high-achieving students. However, teachers and principals also believe that the use of technology in the classroom also helps to engage

others as well, specifically students with academic needs, such as English language learners, and students with emotional and behavioral issues. During 2007, in a small, unpublished study of the influence of technology on student achievement, ancillary findings supported this study's findings and indicated that at-risk students came to school more frequently and were on-time more often when technology was infused in classroom lessons (Daniel, 2007).

The discussion of the expulsion of the second myth leads directly into the dismissal of the third myth, "Given that students today are comfortable with technology, teachers' use of technology is less important to student learning" (Walden University, 2010, p. 6) The report describes how teachers who frequently use technology show more student engagement, greater student learning and skills than the students of the teachers who spend less time using technology for the teaching and learning process. The teachers who use technology in the classroom frequently spent more time developing students' accountability, collaboration, communication, creativity, critical thinking, ethics, global awareness, innovation, leadership, problem solving, productivity, and self-direction, skills (21st Century skills) and exhibited a more positive perception of technology's impact on student achievement and behavior (Walden University, 2010). Teachers who are less frequent users of technology also emphasize 21st Century skills, but with less emphasis and fewer perceived benefits according to the study. Frequent users on the secondary level saw more impact on some student behaviors (coming to class, staying on task, taking initiative, and managing time to meet goals) which contribute to increased student achievement according to the 2010 Walden University

study while behaviors (i.e. completing homework thoroughly, being open to diverse perspectives, analyzing information, communicating thought in written form effectively) had little or no impact.

Contrary to what many believe to be true and contrary to the fifth myth of this study, is the idea that teachers and administrators have differing perceptions of support for classroom technology use and the impact of 21st Century skills (Walden University, 2010). The administrators in this study believe that they are proponents and encouragers of teacher technology use while teachers perceive the administrators to be somewhat less supportive than the administrators believe themselves to be. The Walden University study also reports that administrators have different opinions than teachers do regarding why teachers do not use educational technology. In addition, administrators indicate that technology is more limited and unavailable for use than teachers' report which indicates disparity between the two stakeholders' opinions regarding frequency of technology use in lessons.

According to the Walden University study (2010), unlike myth five, teachers who completed their certification since 2000 do not believe that their teacher preparation courses prepared them to effectively integrate technology in the classroom or teach 21st Century skills (eSchool News, 2010). They did, however, feel that their advanced teacher training programs (advanced degree programs) adequately prepared them for the classroom. Administrators surveyed in this study, on the other hand, felt that teachers had adequate initial preparation and were equipped to effectively integrate technology in the classroom and incorporate 21st Century skills in their respective curricula.

In 2008 the International Society for Technology in Education (International Society for Technology in Education, 2008) published a policy brief that provided insightful information regarding the link between technology and student achievement. For over twenty years, members of ISTE analyzed various programs in schools and school districts in the United States on their influence of educational technology on student achievement (International Society for Technology in Education, 2008). The common finding of the program evaluations was that educational technology not only influenced student achievement, but when effectively implemented, it positively affected student achievement (International Society for Technology in Education, 2008)). Included in the programs observed by ISTE were Missouri's eMints (enhancing Missouri's instructional networked teaching strategies) program and Michigan's Freedom to Learn (FTL) program. These programs showed statistically significant differences between students enrolled in the programs and those not enrolled. The eMints program showed academic gains in elementary and middle school reading, math, and science while Michigan's FTL program showed increased levels of student engagement when compared to students who did not participate in the programs.

eMints is a non-profit organization within the University of Missouri that provides research-based professional development to elementary and secondary schools and institutions of higher learning (eMints, 2012). The professional development sessions of eMints includes in-classroom coaching/mentoring that focuses on helping teachers integrate technology in the curriculum (eMints, 2012). The eMints program requires a commitment from teachers and offers a list of student responsibilities. Teachers in this

program are encouraged to commit to extensive professional development and work preparation, work in collaborative learning groups, create authentic learning experiences for students, plan engaging teaching strategies that are aligned to the curriculum, and prepare and support students while they learn in cooperative groups (eMints, 2012). Students are charged with directing their own learning; becoming more responsible for completing work; using computers and the Internet to create new learning environments; devoting more time to reading for information, scanning for answers, evaluating and comprehending from a variety of information sources; collaborating with peers; and using 21st Century skills (eMints, 2012).

In 2010, the findings from several multi-year evaluations of the eMints program were published. The evaluation results indicated that intermediate elementary students who participated in the program “significantly outperformed” (p. 3) students who were not enrolled in the eMints program. When compared to non-eMints students, participants in the eMints program had higher rates of proficient and advanced scores in communication arts and math. These same students had higher mean scores that grew significantly each year (eMints, 2012). In addition, eMints students in the following subgroups also outperformed peers who were not in the program: Individualized Educational Plan students, minority students, students who qualified for free or reduced lunch, and limited English speaking students.

Michigan’s Freedom to Learn program (FTL) was designed to improve student learning and achievement through technology integration (Ross & Strahl, 2005). FTL provided laptops to participating middle school students and extensive professional

development for teachers that focused on effective technology integration (International Society for Technology in Education, 2008). Students in this program were significantly more engaged in their classwork when compared to the national average and showed an increase in 21st Century skills (International Society for Technology in Education, 2008). In one Freedom to Learn school, the achievement of eighth grade made students doubled while science achievement increased from 68 percent to 80 percent in one year's time.

In the 2008 Policy Brief on Technology and Student Achievement, ISTE suggested seven conditions on which to focus in order to positively affect student achievement with educational technology. These seven factors are:

1. Effective professional development for teacher technology integration
2. The alignment of teacher technology integration with local and state curricula
3. Daily technology integration
4. The use of programs that can provide feedback and be individualized to student needs
5. The use of technology that is project-based and includes real world simulations
6. Technology integration in a collaborative environment
7. Leadership, support, and modeling of effective technology integration by teachers, administrators, parents, and community members

Current educational technologies such as interactive whiteboards, mobile technologies, and social networking are finding their way into the K12 classroom.

Interactive whiteboards such as those developed by Promethean and Smart Technologies

have become a popular tool for educators. Interactive whiteboards allow teachers to actively engage students in a variety of ways that accommodate different learning styles which helps to yield increased student achievement (Marzano, 2009). The research of Robert Marzano indicates that three components of the interactive whiteboard system had a statistically significant relationship with student achievement. Those features include devices and tools that allow students to answer questions and receive immediate feedback in nontraditional, engaging ways (Marzano, 2009).

Mobile devices such as tablet computers, electronic book readers, netbooks, and smart phones as well as “bring your own device” (BYOD) initiatives are also changing the way teaching and learning occurs in schools and classrooms (Devaney, 2012). Tablet computers like the iPad and the Samsung Galaxy Tab are smaller, more mobile devices than laptops, and use a touch screen for data entry instead of a keyboard. In one study of third, fourth, and fifth grader students who used mobile devices, most scored higher on state reading and math tests than their peers who did not use the devices in class (Devaney, 2012). These devices, according to Lucy Gray, project director of the Consortium for School Networking’s Leadership for Mobile Learning Initiative, provide affordable and engaging personalized learning environments (Devaney, 2012).

Although our world is a very social world, many school districts like the ones in the study published by the National School Board Association (NSBA) ban the use of social media sites at school (Deubel, 2009) despite the growing research on the topic. Many schools like the fifty-two percent in the NSBA’s study who ban social networking at school, do so because of fear – fear of teachers engaging in inappropriate relationships

with students and fear of teachers sharing private information (HuffPost Education, 2001). Emerging research on this topic, such as the University of Minnesota study, indicates that the benefits of using social media sites in the classroom outweigh their many risks (University of Minnesota, 2008). A deeper understanding of these new technologies through professional development may be the key to unlocking the potential benefits to student achievement.

Professional Development

Teacher professional development, according to the Walden University study (2010), seems to lack the ability to improve the teachers' capacity to use new educational technologies in the classroom. Teachers surveyed report that many schools use the "train the trainer" approach to technology professional development. This type of training involves training a small number of teachers who are then charged with training other teachers. Sixty-two percent of the teachers surveyed also reported that a district or school technology coordinator also provided training to teachers while 54% reported being sent away for training classes, 49% report having a trainer brought in to train, 26% have support teams for sharing and supporting, and 12% enroll in online classes (Walden University, 2010). The survey findings also indicate that several teacher organizations such as the National Council of Teachers of English and National Council for Social Studies favor the support teams because they foster more professional growth than the other options.

To promote high quality professional development for teachers and administrators to effectively integrate technology into the curricula is another goal of the No Child Left

Behind Act of 2001 (U. S. Department of Education, 2002). However, one of the commonly agreed upon barriers to effective technology integration is professional development (Hew & Brush, 2007; Lowther, Strahl, Inan, & Ross, 2008; Morehead & LeBeau, 2005; Zhao & Bryant, 2006; Zuniga, 2010). Because technology is no longer an option due to the NCLB update, the emphasis has shifted from inclusion of technology to effective integration of educational technology to create new learning opportunities for students and to promote student achievement (Rodriguez, 2000). The key to achieving this goal, according to Rodriguez is professional development.

According to Jobe (2010), the state of Pennsylvania has a “robust” Instructional Technology Coach (ITC) program and has had it since 2006. The Pennsylvania ITC coach volunteers to guide and support teachers in their school or building (Jobe, 2010). These coaches are selected based on their classroom experience and success with incorporating technology in their classroom instruction (Jobe, 2010).

The Pennsylvania instructional technology coaches participate in an intensive three and a half week boot camp (Jobe, 2010). In addition to the coach boot camp, ITCs are supported by Regional Intermediate Unit Technology Integration Mentors who not only offer support and resources to the Instructional Technology Coaches, but collaborate with coaches on how to help teachers move their classrooms into 21st century environments (Jobe, 2010).

Technology professional development can be offered to teachers in a variety of ways depending on resources, administrative support, and school district vision. Types or models of technology professional development can include on-site instructional

coaches and support like used in Pennsylvania, “sit and get” approach, the “train the trainer” model, off-site training, and online/virtual training. The “sit and get” approach is one of the most ineffective forms of training in any field (Rodriguez, 2000). “Sit and get” involves the participants sitting and listening to a presenter. The presenters, in this case, simply present materials to the audience of participants without (or with very little) audience participation, questions, or comments.

Many schools employ the “train the trainer” model that includes training a few teachers on new technologies who, in turn, train other teachers (Walden University, 2010). The Walden University study findings report that sixty-seven percent of teacher respondents indicated that the “train the trainer” model was deployed in their schools. 62% of respondents indicated that a designated school district trainer, such as a technology coordinator or facilitator, provided training (Walden University, 2010). In this approach, the trainer’s job is to prepare district teachers to utilize and integrate new technologies in the curricula. Unlike the trainer in the “train the trainer” model, the technology coordinator/facilitator’s main duty is to provide technology professional development to teachers and administrators.

Alan November (2009) likens teacher technology development to hanging a picture on a wall. In order to hang a picture on the wall with a hook, a hole must be drilled into the wall for the hook. November further describes this process by telling the reader that a drill bit for the drill is desired from the hardware store, but is not really needed. What is actually needed is a hole. In other words, the drill bit is simply the tool that is used to drill the hole in the wall from which the picture will be hung. November

refers to technology staff development as buying drill bits – a few steps removed from what is really needed. In this case, what is really needed it is improved student learning. Student learning, the ultimate goal, is often lost because training teachers to use educational technology has too often become the focus (November, 2009). Technology staff development should shift from teaching technical skills (buying drill bits) to focusing on how students learn with technology (hanging the picture on the wall) according to Alan November.

Alan November (2009) lists four phases of the student-centered model for technology staff development. These four phases are: learn how students learn; engage with students; reflective collegiality; and continued dialog. The last two phases of the four occur after the students are released. November strongly believes that it is important to focus on building new relationships to accomplish the ultimate goal of student learning.

Computer Self-Efficacy

Computer self-efficacy will be explored in this study to determine its possible implication on the level of technology integration in the classroom by teachers. In 1986, Albert Bandura defined the self-efficacy term that he was the first to use in 1977 as “people’s judgments of their capabilities to organize and execute courses of action required to attain designated types of performances” (Khorrami-Arani, 2001, p. 1). Bandura further explained that self-efficacy was the perception of what one was capable of doing with an actual skill set rather than the skill set itself (Khorrami-Arani, 2001).

“Adequate computer skills are important determinants of computer usage” (Smith, 2001, p. 27). More importantly, the confidence of computer technology skills (computer self-efficacy) will yield increased computer usage and possibly increased mastery of computer skills (Smith, 2001). Smith specifies general computer self-efficacy and task-specific computer self-efficacy. According to Smith, general computer self-efficacy is an individual’s belief of their computer skills across multiple computer applications whereas task-specific computer self-efficacy refers to a person’s perception of their ability to perform specific computer-related tasks.

According to Smith (2001), computer self-efficacy was a significant predictor of the desire to learn computer skills based on the findings of a 1998 study by Zhang and Espinoza. In addition, Smith concluded that computer self-efficacy beliefs of individuals derive from four sources: mastery of experiences, vicarious learning (learning from others or watching others), verbal persuasion (encouragement), and affective states (emotional state of mind – stress, anxiety, etc. which affect judgments of capabilities). The most commonly believed influential source, although it varies by gender and ethnicity, was mastery of experiences (Smith, 2001).

Saade and Kira (2009) echoed the beliefs and findings of Smith’s 2001 study. Saade and Kira believe that computer self-efficacy and computer anxiety (an affective state) “impact an individual’s use of computers and performance on computer-based tasks” (p. 1). Saade and Kira found in their study that reduced levels of anxiety along with increased experience (mastery experiences) indirectly improved computer-related

performance by increasing computer self-efficacy. Their results are similar results to those of Smith's 2001 study.

Summary

The behaviorist and constructivist theories provide the theoretical foundation for this study. Behaviorism is largely contributed to observable behavior rather than thinking behavior (Conway, 1997). Learning, according to behaviorists, is a change in behavior resulting from a specific stimulus whether positive or negative (McLeod, 2007). B. F. Skinner, the father of operant conditioning and grandfather of behaviorism, added to the traditional behaviorist theory, by adding the term "reinforcement" (McLeod, 2007). Skinner believed that any desired behavior could be ignited through positive stimuli and reinforcement while non-reinforced behavior would weaken or die out (McLeod, 2007).

The belief that knowledge, on the other hand, is gained through experiences is the foundation for constructivism. This theory appears to undergird the research of Matusевич (1995), Prensky and his digital native/immigrant concept, and Dr. Phillip Schlecty's Working on the Work (WOW) framework. All three bodies of research focus on child-centered environments.

The theoretical foundation included here also appears to be the basis for the No Child Left Behind Act of 2001, which not only mandates accountability (high-stakes testing), but also requires technology literacy, technology integration, and technology professional development (U. S. Department of Education, 2002). Because school districts and schools across the United States have invested millions of dollars on

computers and other educational technology, it is wise to explore how this educational technology is being used and how it is influencing present and future education.

The emphasis on high-stakes testing, in response to the accountability mandate, has prompted scrutinization of what is actually tested and how what is tested relates to 21st century students and if 21st century skills are emphasized. Partnership for 21st Century Skills (2005) has developed a set of skills that 21st century students should have in an attempt to bridge the gap between tested concepts and skills students need to compete on a global level.

A major part of P21 Skills include a technology focus which aligns itself with Enhancing Education Through Technology (E2T2) section of the NCLB. The E2T2 section (Title IID) of the No Child Left Behind Act requires technology integration and technology literacy of teachers and students. Technology integration has been interpreted by some educational leaders as simply placing computers in the classroom (Kleiman, 2004) to fully including educational technology to increase higher-order thinking skills as well as other ICT skills needed by 21st century students (digital natives).

The ultimate goal of both the accountability standards and technology integration mandates is increased student achievement. However, research like the Kulik Study of 1994, the Sivin-Kachala review of several studies from 1990-1997, the Apple Classroom of Tomorrow study of 1985, and the Wenglinsky Study found that the simple inclusion of technology in the classroom did not improve student learning. Clearly defined goals allow technology in the classroom to positively influence student learning (Schacter, 1999).

NCLB also encouraged quality technology professional development for teachers and administrators to effectively integrate technology to promote increased student achievement (U. S. Department of Education, 2002). Professional development for technology can be presented in a variety of ways in the endeavor to encourage teachers and administrators to effectively integrate technology: “sit and get”, on-site technology facilitator, teacher support teams, “train the trainer” model, district trainer, and online/virtual training. The least effective, according to Rodriguez (2000) is the “sit and get” type of professional development. In this model design, workshop participants are lectured to with very little or no participation allowed. The other models or approaches alone or combined are more effective measures (Rodriguez, 2000).

Computer self-efficacy is identified as a barrier to increased computer usage (technology integration) and mastery of computer skills (Smith, 2001). Smith explains that computer self-efficacy was a significant predictor of the desire to learn computer skills in a 1998 study. Furthermore, computer self-efficacy judgments come from four major sources: mastery of experiences, vicarious learning, verbal persuasion, and affective states. Of the four sources, mastery of experiences, along with some gender and ethnicity variations, was the most influential source.

CHAPTER III

METHODOLOGY

Introduction

Millions of dollars have been spent on educational technology with the hope, wish, and intent of the technology to improve student achievement. Additionally, NCLB requires technology inclusion and integration. This study examined the relationship between technology integration and student achievement. Whereas technology inclusion and integration are no longer options, this study analyzed the degree at which teachers integrate technology as well as investigated if a correlation existed between teacher technology integration and their student scores on the Mississippi Subject Area Testing Program (SATP) standardized test. Factors that could possibly influence the level or degree to which teachers integrate technology in the classroom were also evaluated.

Mississippi Subject Area Testing Program (SATP)

The Mississippi Subject Area Testing Program (SATP) includes academic end-of-course examinations in Algebra I, Biology I, English II, and U. S. History (Mississippi Department of Education, 2010a). Students enrolled in these courses for the first time are required to take the respective subject area test(s) (Mississippi Department of Education, 2010a). These tests assess students on the content of the course near the end of the course (Mississippi Department of Education, 2010a). The test, according to Mississippi Department of Education, is designed to assess the competencies of each course's curriculum framework. The Algebra I, Biology I, and U. S. History tests are one-part multiple-choice tests while the English II SATP is a two-part test that includes a multiple

choice portion and a writing prompt to which students are to respond (Mississippi Department of Education, 2010a).

Mississippi students are required to pass these tests in order to graduate and meet the requirements of Title I and the No Child Left Behind Act of 2001 (Mississippi Department of Education, 2010c). The results of these tests are included in the annual report card for each district and each school in Mississippi (Mississippi Department of Education, 2010c). According to the Mississippi Department of Education, the Algebra I and English II test scores are included in the calculations of Average Yearly Progress (AYP) which is required in order to comply with the federal law. A numerical score and a performance level are reported for each test taken. The performance levels for all SATP tests are minimal, basic, proficient, and advanced (Mississippi Department of Education, 2010a). The scale score for each performance level differs for each test while the numerical passing score for each test is 300 (Mississippi Department of Education, 2010a).

The Algebra I SATP consists of sixty-five multiple choice questions from the following competencies: number and operations, algebra, geometry, measurement, and data analysis and probability (Mississippi Department of Education, 2010a). The Biology I SATP includes seventy multiple choice questions distributed throughout the following competencies: inquiry, biochemical basis of life, living organisms and their environment, biological organization, heredity, and diversity and biological change (Mississippi Department of Education, 2010a). The English II SATP exam consists of two parts that are given separately (writing and multiple choice) which measure student knowledge of

language arts, reading comprehension, and effective writing skills based on the Mississippi Language Arts Curriculum Framework (Mississippi Department of Education, 2010b). The U. S. History test is made up of eighty-nine questions that assess students' knowledge of historical knowledge, real-world skills needed to interpret statistical data, maps, charts, and tables from five assessment strands: international relations, domestic affairs, geography, economics, and civics (Mississippi Department of Education, 2010a).

Levels of Technology Integration

Levels of technology implementation can range from simply having a computer in the classroom for student remediation or enrichment to seamless integration that promotes authentic problem solving and product development (Moersch, 2010). Chris Moersch redefined the Levels of Technology Implementation (LoTi) into six levels.

1. Level 0 – Non-use
2. Level 1 – Awareness; technology is used by the teacher to accomplish classroom management tasks and to enhance classroom presentations and by students as a reward.
3. Level 2 – Exploration; students use educational technology for enrichment or remediation and presentation of work.
4. Level 3 – Infusion; student higher-order thinking and engagement is emphasized with digital tools.
5. Level 4 – students use technology to solve authentic problems.

6. Level 5 – Expansion; teacher technology use includes diversity, inventiveness, and spontaneity (p. 1).

Research Design

This study employed a correlational research design using technology integration as the dependent variable and age, gender, computer self-efficacy, technology training received, and student test scores as the independent variables. Additional demographic data including ethnicity, highest degree earned, and years of teaching experience were gathered for additional observation and for future use.

Instrumentation

A self-made survey instrument entitled Subject Area Testing Program Teacher Technology Integration Questionnaire (Appendix A) was used to gather data from the teacher participants. Demographic data including age, gender, ethnicity, highest degree earned, years of teaching experience, Subject Area Testing Program (SATP) course taught and questions regarding computer self-efficacy, personal and professional computer usage, perception of influence on student achievement, and amount of technology training received were collected. An average of latest, available SATP scores were computed by the respondents and reported in the questionnaire.

The survey instrument contained 51 questions. Part I contained eight demographic questions regarding age, gender, ethnicity, teaching experience, SATP subject taught, highest degree earned, and average SATP scores of students taught. Part II, which contained questions nine through thirteen, addressed computer self-efficacy and computer usage. Part III contained thirty-two questions related to technology integration based on

Chris Moersch's LoTi levels. Part IV professional development and training contained five questions (questions 47 through 51).

The instrument's validity was established through a panel of experts. The panel of experts included one instructional technology specialist, one science curriculum specialist, one reading/language arts curriculum specialist, and one secondary school guidance counselor. This panel of experts was used to establish the content and face validity of the instrument as well as clarity of the instrument's questions.

After receiving permission from the Institutional Review Board of The University of Southern Mississippi (Appendix B) and after receiving permission from the superintendents of the participating school districts (Appendix C), a pilot test was given to fourteen participants prior to the study to determine the reliability and question clarity of the questionnaire. Data from the pilot test participants was tested using SPSS. *Cronbach's* alpha reliability coefficients were observed to determine reliability. In order to determine if internal consistency existed, the researcher used a reliability coefficient score of .70 or higher as an indicator of reliability. The *Cronbach's* alpha for technology integration was .917 and professional development was .737. The *Cronbach's* alpha for computer self-efficacy was undefined because most of the participants reported daily use of the technology included in the questions.

The means and standard deviations for the demographic data was analyzed and reported in narrative and table form. A multiple linear regression was run with SPSS using teacher technology integration as the dependent variable while age, gender, ethnicity, years of teacher experience, computer self-efficacy, the amount of technology

training received, and average SATP scores of students were the independent variables. The R^2 was reported and discussed. The standardized Beta values for each predictor were illustrated in Table 17 and discussed in the narrative.

The survey was a semi-anonymous survey. The school district of each participant was documented and noted on each returned questionnaire. The identity of the participants was used only to place them into a drawing for a \$50 gift card by district. After each drawing, the identity of the survey participants was discarded.

Participants

The study included 106 Subject Area Testing Program (SATP) course (Algebra I, Biology I, English II, and U. S. History) teachers from six school districts in Mississippi. Surveys were mailed and hand-delivered to a representative from each school district who was asked to distribute and collect the surveys. After reading the Informed Consent section of the questionnaire (Appendix D), teachers were asked to complete the questionnaire and submit the completed form to the researcher or to the designated school representative who forwarded the completed questionnaire to the researcher. The identity of the teachers was only used for the \$50 gift card drawing.

Research Question

Does a relationship exist between teacher technology integration in the classroom and the teacher's age, gender, computer self-efficacy, technology training received, and state subject-area test scores of students?

Hypothesis

H₁: There is a statistically significant relationship between teacher technology integration in the classroom and the teacher's age, gender, computer self-efficacy, technology training, and student test scores.

Summary

This study explored the research question (Does a relationship exist between teacher technology integration in the classroom and the teacher's age, gender, computer self-efficacy, technology training, and state subject-area test scores of students?) by evaluating the relationship between educational technology and student achievement. This study included a survey of secondary school teachers in Mississippi to determine their level of technology integration in the classroom and to analyze if a correlation existed between technology integration in the classroom and student achievement as measured by the Mississippi Subject Area Testing Program examinations.

Demographic data from the self-made instrument was gathered and reported from 106 Mississippi Subject Area Testing Program teachers from six school districts from southern and northern parts of the state of Mississippi. R^2 , standardized Beta values, and alpha values of the predictors included in the multiple linear regression models were reported.

CHAPTER IV

RESULTS

Introduction

This chapter describes the descriptive data and statistical findings of this study. The main purpose of this study was to evaluate if a relationship existed between teacher technology integration and student achievement as measured by the Mississippi Subject Area Test Program, teacher computer self-efficacy, and technology training. The study also used demographic information to analyze if any significant relationships existed between teacher technology integration and a teacher's age and gender.

Description of the Respondents

One hundred and sixty questionnaires were distributed to seven school districts in Mississippi. Of those 160 questionnaires distributed, 106 completed questionnaires from three middle schools and eight high schools from six school districts responded. This represented a 66.25% survey return rate.

The 106 respondents in this study were secondary school teachers of one of the four Subject Area Test Program (SATP) courses (Algebra I, Biology, English II, and U. S. History) from school districts in the southern and northeastern parts of Mississippi. As illustrated in Table 1, 79 (74.5%) of respondents were female. The majority of respondents were white (71.7%), 26 (24.5%) were black, three (2.8%) Hispanic and one (.9%) of Asian descent as shown in Table 2. The largest group of respondents (56.6%) was in the 31-50 years old age range (Table 3).

Table 4 contains frequency information on respondents' years of teaching experience. Sixty-three (59.4%) had 11 years or more of teaching experience and 43 (40.6%) had 10 years or less of teaching experience. Thirty-two respondents were Algebra I teachers, 30 were English II teachers, 22 were Biology teachers and 21 were U. S. History teachers (Table 5).

The majority of respondents (60.4%) reported proficient SATP test scores for their students while other respondents reported basic scores (21.7%), advanced scores (12.3%), and minimal scores (1.9%) as displayed in Table 6. Of the respondents, the majority (61.2%) earned a Master's degree or higher while 38.7% earned a bachelor's degree (Table 7).

Table 1

Frequencies of gender

Gender	Frequency	Percent
Male	27	25.5
Female	79	74.5
Total	106	100.0

Table 2

Frequencies of race

Race	Frequency	Percent
Black	26	24.5
Hispanic	3	2.8
White	76	71.7
Asian	1	.9
Total	106	100.0

Table 3

Frequencies of age

Age	Frequency	Percent
21 – 30	18	17.0
31 – 40	33	31.1
41 – 50	27	25.5
51 – 60	23	21.7
61 and up	5	4.7
Total	106	100.0

Table 4

Frequencies of teaching experience

Years	Frequency	Percent
2 years or less	11	10.4
3 – 5 years	11	10.4
6 – 10 years	21	19.8
11 – 15 years	17	16.0
16 – 20 years	22	20.8
21 years or more	24	22.6
Total	106	100.0

Table 5

Frequencies of courses taught

SATP Course	Frequency	Percent
English	30	28.3
Algebra I	32	30.2
U. S. History	21	19.8
Biology	22	20.8
Total	102	96.2

Table 6

Frequencies of SATP scores

SATP Score	Frequency	Percent
Minimal	2	1.9
Basic	23	21.7
Proficient	64	60.4
Advanced	13	12.3
Total	102	96.2

Table 7

Frequencies of degree earned

SATP Score	Frequency	Percent
Bachelor's	41	38.7
Master's	54	50.9
Specialist's	3	2.8
Doctoral	8	7.5
Total	102	96.2

Results

This non-experimental, quantitative study used a multiple linear regression statistical test to determine if a statistically significant relationship existed between technology integration (dependent variable) and a teacher's age, gender, computer self-

efficacy, technology training, and student SATP scores (independent variables). Information on respondents' race/ethnicity, years of teaching experience, SATP course taught, years of teaching experience in SATP course, and highest degree earned was collected from respondents' survey questions. The study used only data collected through questionnaires completed by 106 Mississippi Subject Area Test Program teachers.

Data Analysis

Questions 1 – 8 of the survey instrument (see Appendix A) identified the frequency of respondents' demographic data as shown in Tables 1 – 7. Questions 9 – 14 (shown in Table 8) identified frequency and descriptive statistics of teacher computer self-efficacy. Questions 15 – 46 (excluding question 31) identified frequency and descriptive statistics of teacher technology integration and is shown in Table 9. Question 31 is shown in Table 10 and identified frequency and descriptive statistics for the type of access to computers available in teacher technology integration. Questions 47 – 51 (illustrated in Tables 11 – 15) identified frequency and descriptive statistics of professional development and training.

As shown in Table 8 descriptive statistics, question 9 in Part II – Computer Self-efficacy, $M=3.76$ measured how often a personal or home computer was used for work or personal productivity. Question 10, $M=3.68$ measured how often the Internet is used for personal or home use. Question 11, $M=2.44$ measured frequency of participation in social networking for work or personal use. Question 12, $M=2.85$ measured the use of a cellphone, iPod, mp3-type player or internet radio to listen to music. Question 13,

M=2.56 measured the use of a smartphone to access the Internet or e-mail. Question 14, M=4.37 measured computer usage comfort level.

Table 8

Means and Standard Deviations of Computer Self-Efficacy *N=106*

Computer Self-efficacy	Mean	Standard Deviation
9. Personal computer use for work or personal	3.76	.66
10. Internet for personal or home use	3.68	.79
11. Social networking for work or personal	2.44	1.63
12. iPod, cellphone or Internet radio to listen to music	2.85	1.54
13. Smartphone for Internet or e-mail use	2.56	1.88
14. Computer use comfort level (1-5)	4.37	1.10

Note: Questions 9 - 13: Daily (4) - None (0); Question 14: Very Comfortable (5) - Very Uncomfortable (0)

Table 9 illustrates descriptive statistics of Part III – Technology Integration.

Questions 22, 41, 42, 44, and 45 had mean scores higher than 3.6. Question 22, M=4.05 measures the comfort level of teacher technology integration in the classroom and indicated that a high percentage of teachers were comfortable integrating technology in the classroom. Question 41, M=3.84 measured a high percentage of teachers whose students were engaged when multimedia software was used to present lessons. Question 42 indicated a high percentage of teachers whose students were engaged when technology was used for enrichment, reward, or remediation with M=3.73. Question 45 teacher opinion of student engagement when technology was used to analyze, evaluate,

solve problems, experiment, or make decisions with $M=3.68$. Question 44, $M=3.64$ indicated a high percentage of teachers who felt that students were engaged when technology was used to collaborate with other students for classwork or projects. Question 18, $M=.59$ indicated that the lack of administrative support or buy-in had very little or no influence on limiting or preventing technology integration in the classroom. Question 16, $M=1.00$ showed that the lack of training seldom limited or prevented teacher classroom technology integration. Question 40, teacher level of technology integration, $M=2.76$ measured teachers technology integration between levels 2 and 3 which indicated that respondents integrated technology in the classroom, used technology to introduce new lessons, units, or concepts using a presentation tool and respondents' students used technology to identify problems, explore solutions, to gather, and present information.

Table 9

*Means and Standard Deviations of Technology Integration**N=106*

Technology Integration	Mean	Standard Deviation
15. How often does the lack of time limit or prevent TI?	1.49	.796
16. How often does the lack of training limit or prevent TI?	1.00	.717
17. How often does the lack of technical support limit or prevent TI?	1.12	.789
18. How often does the lack of administrative support limit or prevent TI?	.82	.734
19. How often does the lack of hardware limit or prevent TI?	1.22	1.01

Table 9 (continued).

20.	How often does the lack of software program availability limit or prevent TI?	1.16	.84
21.	How often does the lack of desire or interest in technology limit or prevent TI?	.59	.790
22.	How comfortable are you integrating technology in the classroom?	4.05	1.15
23.	How often do you use technology as a reward system?	1.12	1.33
24.	How often do you use technology for assessment or evaluation of students?	1.87	1.33
25.	How often do you use technology for instruction?	3.37	1.01
26.	How often do you use technology for remediation?	2.55	1.28
27.	How often do you use technology for reinforcement of skills?	2.93	1.11
28.	How often do you use technology to present new material?	3.33	1.03
29.	How often do your students use technology for research?	1.73	1.24
30.	Computer access for you and your students in the classroom	1.64	.733
32.	How often do you use office production software in the classroom?	3.55	.927
33.	How often do you use multimedia software in class?	2.94	1.31
34.	How often do your students use student response devices?	1.02	1.23
35.	How often do you use cell phones in the classroom?	1.02	1.37
36.	How often do you use e-book readers in the classroom?	.58	1.19
37.	How often do you use interactive whiteboards in class?	3.51	1.15

Table 9 (continued).

38.	How often do you use online resources in class?	1.97	1.29
39.	How often do you use credit recovery/accrual programs?	.24	.787
40.	Description of level of technology usage	2.76	1.02
41.	How engaged are students when multimedia software is used?	3.84	1.04
42.	How engaged are students when technology is used for enrichment, reward, or remediation?	3.73	1.16
43.	How engaged are students when technology is used for information gathering?	3.54	1.35
44.	How engaged are students when technology is used to collaborate with other students for classwork/projects?	3.64	1.45
45.	How engaged are students when technology is used to analyze, evaluate, solve problems, experiment, or make decisions?	3.68	1.18
46.	What influence does educational technology have on student achievement?	2.78	.620

Note: TI denotes technology integration; Questions 15 -21: Very Often (3) - Never (0); Question 22: Very comfortable (5) - Very Uncomfortable (0); Questions 23 -29, and 32 - 39: Daily (4) - Never (0); Question 30: 4 or more computers (3) - No computer (0); Question 40: Seamless technology integration (4) - No usage (0); Questions 41 - 45: Very engaged (5) - Very unengaged (0); Question 46: Increases student achievement (3) - Has no effect on student achievement (0)

Table 10

Frequencies of computer access

Computers	Frequency	Percent
No lab or computers outside of the classroom for general purpose use	3	2.8

Table 10 (continued).

Several computers in library/media center for general purpose use	36	34.0
One computer lab for general purpose use	23	21.7
Several computer labs for general purpose use	43	40.6
Total	105	99.0

Note: Question 31

Shown in Table 11, 12, 13, 14, and 15 are questions from Part IV – Professional Development and Training. Table 11 illustrates question 47 measured 57.5% of respondents reported receiving two or more full days of training on the use of an interactive whiteboard.

Table 11

Frequencies of interactive whiteboard training

Training	Frequency	Percent
No training	18	17.0
Less than ½ day	7	6.6
½ day	4	3.8
1 full day	16	15.1
2 full days	12	11.3
3 or more full days	49	46.2
Total	106	100.0

Professional development question 48 measured 34% (36) of respondents received three or more full days of training on the software that they use most often in the classroom; 33% (35) reported receiving one to two full days of training and 18.9% (20) indicated receiving no training on the software used most often in the classroom (Table 12).

Table 12

Frequencies of software training

Training	Frequency	Percent
No training	20	18.9
½ day or less	10	9.4
½ day	5	4.7
1 full day	18	17.0
2 full days	17	16.0
3 or more full days	36	34
Total	106	100.0

Question 49 measured the frequency of professional development on integrating technology in the classroom. Table 13 shows 49 respondents (46.2%) have received yearly training, 30 respondents (28.3%) received training on a semester-basis, 15 (14.2%) received no training, 11 (10.4%) received monthly training, and only 1 respondents reported having received weekly technology training.

Table 13

Frequencies of integrating technology in the classroom training

Integrating Technology in the Classroom Training	Frequency	Percent
No training	15	14.2
Yearly	49	46.2
Semester	30	28.3
Monthly	11	10.4
Weekly	1	.9
Total	106	100.0

Table 14 illustrates question 50 which asked the respondents if they have received sufficient professional development technology training. The majority, 61 (57.5%) reported having sufficient technology training, 17.9% indicated barely sufficient training, 12.3% reported abundant amount of training, 10.4% insufficient, and 1.9% indicated no training.

Table 14

Frequencies of overall technology professional development/training

Overall Technology Professional Development	Frequency	Percent
No training	2	1.9
Insufficient	11	10.4
Barely sufficient	19	17.9
Sufficient	61	57.5

Table 14 (continued).

Abundant	13	12.3
Total	106	100.0

Question 51 measured the frequency school/district technology use requirement. 42.5% reported no requirement. 33% reported a daily requirement, 17% reported a weekly requirement, and 6.6% reported a monthly requirement (Table 15).

Table 15

Frequencies of district/school technology use requirement

District/School Requirement	Frequency	Percent
No requirement	45	42.5
Monthly	7	6.6
Weekly	19	17.9
Daily	35	33.0
Total	106	100.0

Descriptive statistics, shown in Table 16, showed computer self-efficacy questions 9 – 14) with the highest mean, $M=3.28$. Professional development and training contained questions 47 – 51 with $M=2.61$. Questions 15 – 46 represent technology integration with $M=2.42$.

Table 16

*Means and Standard Deviations of Subscores**N=106*

Subscores	Mean	Standard Deviation
Computer self-efficacy	3.276	.849
Technology Integration	2.420	.501
Technology Professional Development/Training	2.613	1.716

Hypothesis Results

The hypothesis for this study was stated as follows: H₁ There will be a statistically significant relationship between a teacher's technology integration in the classroom and the teacher's age, gender, computer self-efficacy, technology training, and student test scores. The hypothesis is accepted because the independent variables (age, gender, computer self-efficacy, technology training, and student scores) are jointly significant $F(11,94)=6.226, p<.001, R^2=.421$ (Table 17).

The hypothesis for this study was supported because the independent variables jointly account for 42.1% of the variability with computer self-efficacy and professional development/training as the strongest predictors. Negative predictors were basic, proficient, and advanced student scores. Gender was a slightly negative predictor of technology integration.

Table 17

Regression coefficients

Predictors	Unstandardized Coefficients B	Standardized Coefficients Beta	Sig.
21 – 30 age range	-.036	-.027	.768
41 – 50 age range	.085	.074	.450
51 – 60 age range	.152	.126	.208
61 and older age range	-.036	-.015	.874
Gender	-.147	-.129	.125
Self-efficacy	.308	.521	<.001
Training	.139	.325	<.001
Minimal SATP score	-.085	-.023	.813
Basic SATP score	-.228	-.188	.319
Proficient SATP score	-.281	-.275	.196
Advanced SATP score	-.226	-.148	.342

Note: $F(11,94)=6.226$, $p<.001$, $R^2=.421$

Summary

This study evaluated the influence of teacher technology integration on student achievement (as measured by SATP scores), age, gender, computer self-efficacy, and technology in secondary school in Mississippi. One hundred and six SATP teachers from three middle schools and eight high schools within six Mississippi public school districts participated in the study.

A multiple linear regression statistical test was used to analyze the data. The study showed that there was a statistically significant relationship between technology integration and independent variables jointly. Controlling for all other independent variables, the greatest relationship was between technology integration and computer self-efficacy and professional development/training. While controlling for all other independent variables, age, gender, and student test scores did not have a significant relationship with technology integration.

The results from the data analysis indicated that student test scores, specifically basic, proficient, and advanced scores, had a slightly negative relationship with technology integration as did gender. It should be noted that fewer lower scores were reported from respondents that higher scores. Implications from the study's findings, study limitations, as well as recommendations for further research and recommendations for policy and practice for educational administrators will be included in Chapter V.

CHAPTER V

CONCLUSIONS

Introduction

This chapter will summarize the procedures used in this study, include a discussion of the study's findings and conclusions as well as recommendations for future research and for future educational policy and practice. The main purpose of this study was to examine if a statistically significant relationship existed between teacher technology integration and a teacher's age, gender, computer self-efficacy, technology training, and student test scores as measured by Mississippi Subject Area Testing Program (SATP). Knowing whether or not the independent variables (age, gender, computer self-efficacy, technology training, and student test scores) are influenced by teacher technology integration will provide school administrators and other educational leaders with knowledge that will help them make decisions regarding funding and budgets for educational technology, professional development and training, and teacher placement.

Summary of Procedures

One hundred and six teachers from six school districts in Mississippi provided the data for this study by responding to the self-made instrument entitled Subject Area Testing Program Teacher Technology Integration Questionnaire. Three middle schools and eight high schools from the southern and northern parts of Mississippi participated in the study. The respondents were all secondary teachers of one of the SATP courses (Algebra I, Biology, English II, and U. S. History).

After receiving permission from the Institutional Review Board (IRB) of The University of Southern Mississippi to conduct the study and after receiving permission from the superintendents of the participating school districts to survey their teachers, the researcher distributed questionnaires by mail and by hand to school/district representatives. The school/district representatives distributed the questionnaires to and collected the questionnaires from the SATP teachers and returned them to the researcher. After distribution and collection of surveys, the data was aggregated and analyzed.

A pilot study was conducted to establish internal consistency, face and content validity of survey questions by subset using Cronbach's alpha test of coefficient reliability. The .70 requirement was used to establish reliability in this study. The Cronbach's alpha for technology integration was .917 and for professional development/training was .737. The Cronbach's alpha for computer self-efficacy was undefined because too many pilot study participants responded that they used the technologies included in the questionnaire subsection daily (response 4).

Major Findings

A multiple linear regression statistical test was performed on the data with technology integration as the dependent variable. A statistically significant relationship was found between technology integration and the independent variables (teacher's age, gender, computer self-efficacy, technology training, and student test scores) collectively. When controlling for all other independent variables, computer self-efficacy and technology training were individually significant while age, gender, and student test scores were not individually statistically significant.

Respondents reported that students were more engaged when educational technology was integrated in the classroom. Respondents also indicated that they were very comfortable using technology and have had one or more full days of technology training on a variety of educational technologies. Respondents further indicated that they have had a sufficient amount of technology training and believe that educational technology increases student achievement.

Discussion

The findings of previous research both concur and conflict with many of the findings of this study. The relationship between technology integration and student test scores alone is consistent with the research of Wenglinsky's study (2005) and the Apple Classrooms of Tomorrow project of 1985 and is inconsistent with the Kulik Meta-analysis study of 1994 (Schacter, 1999) and the eMints program evaluation findings (eMints, 2012; International Society for Technology in Education, 2008). Wenglinsky noted that teachers in his study were more comfortable integrating technology because of adequate technology training while the Apple Classrooms of Tomorrow project (1985) had a positive influence on student attitudes, it did not show a significant influence on reading comprehension and math test scores. The Kulik Study found that students who received computer-based instructions scored higher than those who did not (Schacter, 1999). The Sivin-Kachala (2000) research indicated that effective technology integration was influenced by additional factors such as software design, the level of student technology access and the role of the teacher. The evaluation of the eMints program showed that students in the eMints program outperformed their peers who were not in the

program and had higher rates of proficient and advanced scores and higher mean scores that grew significantly each year than non-eMints students (eMints, 2012; International Society for Technology in Education, 2008).

Research data of this study indicated that students were more engaged when technology was integrated into the classroom. These findings support the results of Michigan's Freedom to Learn program (International Society for Technology in Education, 2008; Ross & Strahl, 2005) and previous research by Walden University's study of 2010. Students in the Michigan's Freedom to Learn program were found to be significantly more engaged in their classwork when compared to other students nationwide (International Society for Technology in Education, 2008; Ross & Strahl, 2005). The Walden University Study (2010) indicated that classroom use of technology helped to engage both high-achieving and students with academic deficiencies. The Walden University study also found that teachers who used technology more often in the classroom showed more student engagement. This positive influence is also reported in several other studies (Apple Classrooms of Tomorrow, 1985; Apple Classrooms of Tomorrow-Today, 2008; O'Dwyer et al., 2005).

A significant relationship was found between technology integration and computer self-efficacy. This finding is supported by the research of Smith (2001) that adequate computer skills are predictors of computer usage and that computer self-efficacy yields increased computer usage. Respondents in this study reported having high-levels of computer self-efficacy and an adequate amount of technology training/professional development. The results of this study also found a significant

relationship between technology integration and professional development/training. These results support the literature of Rodriguez (2000) by proving that the key to effective technology integration is professional development and the results of both eMints and Michigan's Freedom to Learn programs. These programs focused on teacher technology professional development which yielded increased teacher technology integration and student achievement (eMints, 2012; International Society for Technology in Education, 2008; Ross & Strahl, 2005).

Limitations

The ability to generalize the findings of this study was limited by several threats to the study's internal validity. The sample size of this study was small. Due to the small sample size, the findings of this study may not be a representative distribution of the population targeted in this study. The inclusion of elementary testing teachers in the study in addition to SATP teachers can provide a larger, more representative sample size for future studies. The student test scores were self-reported by respondents and not verified by school district personnel. The self-reported test scores could have been exaggerated or inaccurately reported by the respondents. The verification of respondents' student test scores would have required personnel from participating school districts to dedicate time to research and report available test scores by teacher to the researcher. Teacher technology integration was not observed by the researcher. The observation of teacher technology integration by the researcher would have required the researcher to obtain permission to observe all of the survey respondents and would have produced more accurate data to include in the regression. Because of these limitations, the findings of

this study regarding the influence of technology integration on student scores cannot be effectively generalized.

Recommendations for Policy and Practice

Due to the emphasis on accountability in education and the substantial cost of integrating technology in the classroom, the need to know what impact teacher technology integration has on student achievement is more important in the 21st Century than ever before (Protheroe, 2005). Furthermore, the question of whether to include technology in the classroom or not is irrelevant due to the No Child Left Behind Act which mandates integrating technology in the curriculum and due to the need to better prepare our students to enter college, military, and the work force and compete with 21st Century technologies and skills (Protheroe, 2005).

It is recommended that educational leaders in school districts across the United States strategically budget, not only for educational technology for the classroom, but also invest funds and allocate time for technology professional development and training that is consistent and specific to the technologies that are available to the teachers and that is aligned with the curriculum. In addition, educational leaders should encourage teachers to stay abreast of current and emerging technologies in order to keep students engaged and collaborate often on technology integration strategies. Students are engaged and show increased motivation in technology-rich environments (International Society of Technology in Education, 2008; O'Dwyer et al., 2005; Prensky, 2006).

Recommendations for Future Research

Additional research on this topic can help to further explain the influence of technology integration on student test scores as well as clarify the relationship between technology integration and other factors.

1. Future research should include the acquisition of actual test scores from district personnel in order to more accurately report the correlation between technology integration and high stakes testing.
2. Future research should include student and researcher observation of teacher technology integration as well as self-reported technology integration to compare the teacher, student, and researcher's view of teachers' technology integration.
3. Future research should explore primary and secondary standardized test scores.
4. Future research should include obtaining actual district requirement for technology use in order to compare and contrast district technology requirements, computer self-efficacy, technology training, and technology integration by district.
5. Future research should also include at least 200 survey respondents.

Summary

Literature and previous research has indicated several factors that possibly influence the relationship between technology integration and student achievement. The main purpose of this study was to explore the relationship between technology integration

and factors that could influence student achievement including teacher's age, gender, computer self-efficacy, technology training, and student test scores as measured by the Mississippi Subject Area Testing Program.

Data was collected from 106 participants from six school districts within the state of Mississippi. Participants were secondary school teachers who taught one of the Mississippi Subject Area Testing Program courses (Algebra I, Biology, English II, and U. S. History). After gathering the data, a multiple linear regression statistical test was performed on the data. The findings indicated that a statistically significant relationship exists between technology integration and teacher's age, gender, computer self-efficacy, technology training, and student test scores. When controlling for all other independent variables, computer self-efficacy and technology training were statistically significant while age, gender, and test scores were not statistically significant. These findings were consistent with the literature and research of the Michigan's Freedom to Learn program (International Society for Technology in Education, 2008; Ross & Strahl, 2005), Walden University (2010), O'Dwyer, et al. (2008), Apple Classrooms of Tomorrow-Today (2008), Prensky (2006), Wenglinsky (2005), and Apple Classrooms of Tomorrow (1985) and inconsistent with the eMints program (eMints, 2012); International Society of Technology in Education (2008), Kulik Study of 1994 (Schacter, 1999). The following conclusions were supported by the research and the findings of this study: computer self-efficacy and effective technology training are key factors of classroom technology integration and student engagement and motivation is increased with teacher technology integration.

Although the ability to make generalizations of this study was limited by a small sample size and unverified, self-reported data, suggestions for policy and practice were recommended for educational leaders. These recommendations include budgeting for educational technology professional development and training that is consistent and specific to the technologies available in the classroom and creating an environment that encourages teachers to stay abreast of current and emerging technologies in order to maintain student engagement.

Several recommendations for further research were made and include a recommendation that future research include acquiring district technology requirement for technology use and actual student test scores in order to more accurately report the correlation between technology integration and test scores. It was also recommended that future research include student and researcher observation of teacher technology integration. Furthermore, it was recommended that future research include primary and secondary standardized test scores and a larger sample size in order to make more generalizations from the correlations.

APPENDIX A

SURVEY INSTRUMENT

Subject Area Testing Program Teacher Technology Integration Questionnaire**Part I - Demographics**

1. Gender ___ Male ___ Female

2. Race/Ethnicity
 ___ African American/Black ___ Hispanic ___ White/Caucasian
 ___ Asian/Pacific Islander ___ Middle Eastern ___ Other

3. Age
 ___ 21 – 30 years old ___ 41 – 50 years old
 ___ 31 – 40 years old ___ 51 – 60 years old
 ___ 61 years old or older

4. Teaching Experience
 ___ 2 years or less ___ 6 – 10 years ___ 16 – 20 years
 ___ 3 – 5 years ___ 11 – 15 years ___ 21 years or more

5. What Subject Testing Area Program (SATP) course do you teach?
 ___ Algebra I ___ Biology I ___ English II ___ U.S. History

6. How long have you taught this SATP course?
 ___ 2 years or less ___ 6 – 10 years ___ 16 – 20 years
 ___ 3 – 5 years ___ 11 – 15 years ___ 21 years or more

7. Please provide the average SATP score (for your course) for students taught by you during your recent SATP testing cycle.
 ___ Minimal (1) ___ Basic (2) ___ Proficient (3) ___ Advanced (4)

8. Highest Degree Earned
 ___ Bachelor's ___ Master's ___ Specialist's ___ Doctoral Degree

- Part II – Computer Self-Efficacy**
9. How often do you use a personal or home computer (desktop pc, laptop, netbook, or tablet pc) for work or personal productivity?

___ Daily (4) ___ Weekly (3) ___ Monthly (2) ___ Yearly (1)
 ___ Never (0)

10. How often do you access the Internet for personal or home use?

___ Daily (4) ___ Weekly (3) ___ Monthly (2) ___ Yearly (1)
 ___ Never (0)

11. How often do you participate in social networking (Facebook, MySpace, Twitter, LinkedIn, PD360, etc.) for work or personal connections?

___ Daily (4) ___ Weekly (3) ___ Monthly (2) ___ Yearly (1)
 ___ Never (0)

12. How often do you use a cellphone, iPod, mp3-type player or Internet radio (Pandora, Jango, etc.) to search for or listen to music?

___ Daily (4) ___ Weekly (3) ___ Monthly (2) ___ Yearly (1)
 ___ Never (0)

13. How often do you use a smartphone (iPhone, Android phone, Blackberry, etc.) to browse the web (Internet) or to check or send email?

___ Daily (4) ___ Weekly (3) ___ Monthly (2) ___ Yearly (1)
 ___ Never (0)

14. Please choose the response that best describes how comfortable you are using a computer?

___ Very comfortable (5) ___ Comfortable(4) ___ Somewhat comfortable (3)
 ___ Somewhat uncomfortable (2) ___ Uncomfortable (1) ___ Very uncomfortable (0)

Part III – Technology Integration

15. How often does the **lack of time** limit or prevent your technology integration of technology in the classroom?

___ Very often (3) ___ Often (2) ___ Seldom (1) ___ Never (0)

16. How often does the **lack of training or professional development** limit or prevent your technology integration of technology in the classroom?

___ Very often (3) ___ Often (2) ___ Seldom (1) ___ Never (0)

17. How often does the **lack of technical support** limit or prevent your technology integration of technology in the classroom?

___ Very often (3) ___ Often (2) ___ Seldom (1) ___ Never (0)

18. How often does the **lack of administrative support/buy-in** limit or prevent your technology integration of technology in the classroom?
___ Very often (3) ___ Often (2) ___ Seldom (1) ___ Never (0)
19. How often does the **lack of hardware (computers, interactive whiteboard, etc.)** limit or prevent your technology integration of technology in the classroom?
___ Very often (3) ___ Often (2) ___ Seldom (1) ___ Never (0)
20. How often does the **lack of software program availability** limit or prevent your technology integration of technology in the classroom?
___ Very often (3) ___ Often (2) ___ Seldom (1) ___ Never (0)
21. How often does **your lack of desire or interest in technology** limit or prevent your technology integration of technology in the classroom?
___ Very often (3) ___ Often (2) ___ Seldom (1) ___ Never (0)
22. Please select the best response that describes how comfortable you are integrating technology into your classroom (assignments, lessons, student projects, etc.)
___ Very comfortable (5) ___ Comfortable (4) ___ Somewhat comfortable (3)
___ Somewhat uncomfortable (2) ___ Uncomfortable (1) ___ Very uncomfortable (0)
23. How often do you use technology as a **reward system** (play games, listen to music, browse the web, etc.) for students in the classroom?
___ Daily (4) ___ Weekly (3) ___ Monthly (2) ___ Yearly (1) ___ Never (0)
24. How often do you use educational technology for the **assessment or evaluation of students** in the classroom?
___ Daily (4) ___ Weekly (3) ___ Monthly (2) ___ Yearly (1) ___ Never (0)
25. How often do you use educational technology for **instruction** in the classroom?
___ Daily (4) ___ Weekly (3) ___ Monthly (2) ___ Yearly (1) ___ Never (0)
26. How often do you use educational technology for **remediation** in the classroom?
___ Daily (4) ___ Weekly (3) ___ Monthly (2) ___ Yearly (1) ___ Never (0)
27. How often do you use educational technology for **reinforcement of skills** in the classroom?
___ Daily (4) ___ Weekly (3) ___ Monthly (2) ___ Yearly (1) ___ Never (0)

28. How often do you use educational technology for **presentation of new material** in the classroom?
 Daily (4) Weekly (3) Monthly (2) Yearly (1) Never (0)
29. How often do your students use educational technology for **research** in the classroom?
 Daily (4) Weekly (3) Monthly (2) Yearly (1) Never (0)
30. Please select the response that best describes the type of access to computers that you and your students have in your **classroom**.
 4 or more computers 2 – 3 computer 1 computer
 no computer access
31. Please select the response that best describes the type of access to computers that you and your students have in your **school**.
 Several computer labs for general purpose use
 One computer labs for general purpose use
 Several computers available in the library/media center or another location for general purpose use
 No lab or computers outside of the classroom setting for general purpose use
32. How often do you use office production software (Microsoft Office, Corel WordPerfect Suite, Open Office, etc.) in the classroom or in preparation for class?
 Daily (4) Weekly (3) Monthly (2) Yearly (1) Never(0)
33. How often do you use multimedia software (Photostory, Prezi, PowerPoint, etc.) in the classroom or in preparation for class?
 Daily (4) Weekly (3) Monthly (2) Yearly (1) Never(0)
34. How often do you use student response devices (clickers, ActiVotes/Expressions, etc.) in the classroom or in preparation for class?
 Daily (4) Weekly (3) Monthly (2) Yearly (1) Never (0)
35. How often do you use cell phones in the classroom or in preparation for class?
 Daily (4) Weekly (3) Monthly (2) Yearly (1) Never (0)
36. How often do you use electronic book readers (Nook, Kindle, Sony e-reader, etc.) in the classroom or in preparation for class?

- ___ Daily (4) ___ Weekly (3) ___ Monthly (2) ___ Yearly (1) ___ Never (0)
37. How often do you use interactive white board (Promethean, Smart, Mimio, etc.) in the classroom or in preparation for class?
 ___ Daily (4) ___ Weekly (3) ___ Monthly (2) ___ Yearly (1) ___ Never (0)
38. How often do you use online resources (Study Island, BrainPop, USA Test Prep, etc.) the classroom or in preparation for class?
 ___ Daily (4) ___ Weekly (3) ___ Monthly (2) ___ Yearly (1) ___ Never (0)
39. How often do you use credit accrual/recovery programs (NovaNet, Odysseyware, Plato, etc.) in the classroom or in preparation for class?
 ___ Daily (4) ___ Weekly (3) ___ Monthly (2) ___ Yearly (1) ___ Never (0)
40. Select the level of technology usage from the list below that best describes how you use technology in the classroom. Select only one.
- ___ 4 Technology is seamlessly integrated into the curriculum and is used daily for instruction by teacher. Students use technology often (weekly or more) for higher-order thinking skills,(analysis, synthesis, engaged learning, experimentation, exploring real world issues and inquiry-based learning).
- ___ 3 Technology is integrated in the classroom by the teachers and used by students to identify problems and explore solutions.
- ___ 2 Teacher usage includes introducing new lesson, units, or concepts using some presentation tool (slideshow, word processor, webpage, etc. and a projector/projection screen or interactive whiteboard). Student usage involves using technology to gather and present information.
- ___ 1 Usage for classroom/instructional management (checking e-mail, posting attendance and grades, etc.) Students use computer for remediation or enrichment purposes.
- ___ 0 No usage
41. How engaged are your students when technology is used to present lessons using multimedia software?
 ___ Very engaged (5) ___ Somewhat engaged (4) ___ Engaged (3)
 ___ Somewhat unengaged (2) ___ Unengaged (1) ___ Very unengaged (0)
42. How engaged are your students when technology is used for enrichment, reward, or remediation?
 ___ Very engaged (5) ___ Somewhat engaged (4) ___ Engaged (3)

- Somewhat unengaged (2) Unengaged (1) Very unengaged (0)
43. How engaged are your students when technology is used for information gathering?
 Very engaged (5) Somewhat engaged (4) Engaged (3)
 Somewhat unengaged (2) Unengaged (1) Very unengaged (0)
44. How engaged are your students when technology is used to collaborate with other students for classwork or projects?
 Very engaged (5) Somewhat engaged (4) Engaged (3)
 Somewhat unengaged (2) Unengaged (1) Very unengaged (0)
45. How engaged are your students when technology is used to analyze, evaluate, solve problems, experiment, or make decisions?
 Very engaged (5) Somewhat engaged (4) Engaged (3)
 Somewhat unengaged (2) Unengaged (1) Very unengaged (0)
46. In your opinion, what influence does educational technology have on student achievement? Check one.
- It increases student achievement.
 It has very little effect on student achievement.
 It decreases student achievement.
 It has no effect on student achievement.

Part IV – Professional Development and Training

47. If you use an interactive whiteboard (Promethean, Smartboard, etc.), how much training have you received?
- | | | |
|--|--|--------------------------------------|
| <input type="checkbox"/> 3 or more full days | <input type="checkbox"/> 2 full days | <input type="checkbox"/> 1 full day |
| <input type="checkbox"/> ½ day | <input type="checkbox"/> less than ½ day | <input type="checkbox"/> No training |
48. Please select the response that best describes how much technology training you have received on the software programs that you use most often in the classroom.
- | | | |
|--|--|--------------------------------------|
| <input type="checkbox"/> 3 or more full days | <input type="checkbox"/> 2 full days | <input type="checkbox"/> 1 full day |
| <input type="checkbox"/> ½ day | <input type="checkbox"/> less than ½ day | <input type="checkbox"/> No training |
49. How often do you participate in training or professional development that focuses on or includes using technology in the classroom?
- | | | |
|-------------------------------------|--------------------------------------|--|
| <input type="checkbox"/> Weekly (4) | <input type="checkbox"/> Monthly (3) | <input type="checkbox"/> Each Semester (2) |
| <input type="checkbox"/> Yearly (1) | <input type="checkbox"/> Never (0) | |

50. Please select the response that best describes the overall amount of technology training or professional development on educational technologies that you have received.

Abundant Sufficient Barely sufficient Insufficient
 No training

51. Please describe your school or district's requirement for technology use in the classroom.

Daily (4) Weekly (3) Monthly (2) Yearly (1)
 No requirement (0)

APPENDIX B

INSITUTIONAL REVIEW BOARD APPROVAL



THE UNIVERSITY OF
SOUTHERN MISSISSIPPI

INSTITUTIONAL REVIEW BOARD

118 College Drive #5147 | Hattiesburg, MS 39406-0001

Phone: 601.266.6820 | Fax: 601.266.4377 | www.usm.edu/irb

NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the “Adverse Effect Report Form”.
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 11110206

PROJECT TITLE: Educational Technology Integration and High-Stakes Testing

PROJECT TYPE: Dissertation

RESEARCHER/S: Tracy D. Daniel

COLLEGE/DIVISION: College of Education & Psychology

DEPARTMENT: Educational Leadership & School Counseling

FUNDING AGENCY: N/A

IRB COMMITTEE ACTION: Expedited Review Approval

PERIOD OF PROJECT APPROVAL: 12/05/2011 to 12/04/2012

Lawrence A. Hosman, Ph.D.

Institutional Review Board Chair

APPENDIX C

PERMISSION REQUEST LETTER AND SAMPLE RESPONSE LETTER

Tracy D. Daniel

1513 Woodward Avenue | Gulfport, MS 39501 | 228.324.6270 | misstdaniel@gmail.com

October 16, 2011

Superintendent Name

District Name

District Address

City, ST Zip

Dear Superintendent:

I am an Educational Leadership doctoral student enrolled in the Educational Leadership and School Counseling Department at The University of Southern Mississippi. I am currently working on my dissertation and would appreciate the participation of teachers from your school district in my study.

The title of my study is **Educational Technology Integration and High-Stakes Testing**. The target population for this study is Mississippi Subject Area Testing Program teachers who have taught Algebra I, English II, Biology I, or U. S. History for at least one full school year. Participation by teachers in this project is purely voluntary. If the teachers participate in this study, they will be asked to complete a 30-minute questionnaire entitled Mississippi Subject Area Testing Program Technology Integration Questionnaire. This semi-anonymous questionnaire contains questions that will obtain demographic information from each participant as well as data regarding each participant's computer self-efficacy, computer usage, classroom technology integration, technology professional development, and an average score (Minimal, Basic, Proficient, or Advanced) for the students taught by the participant in the previous testing cycle.

Please provide a letter on school district letterhead or send an email to me providing permission to survey your SATP teachers. The letter may be sent to the address above. An email may be sent to misstdaniel@gmail.com. A sample response letter for your convenience is attached.

Sincerely,

Tracy D. Daniel

[School Letterhead]

[Date]

Tracy D. Daniel
1513 Woodward Avenue
Gulfport, MS 39501

Dear Ms. Daniel:

I understand that you are a doctoral student at The University of Southern Mississippi in the Educational Leadership and School Counseling Department. I also understand that you are conducting a study entitled Educational Technology Integration and High Stakes Testing and want participation from our school district's Subject Area Testing Program teachers.

I understand that this project will study the relationship between teacher technology integration and student achievement as measured by the Mississippi Subject Area Testing Program. I also understand the benefits of this study to the education arena. Furthermore, I understand that the risks of participating in this study are minimal. I, therefore, support this project and hereby provide permission for our district to participate in this study. I understand that this project has been approved by the Human Subjects Protection Review Committee of The University of Southern Mississippi which ensures that projects involving human subjects follow federal regulations.

Sincerely,

<Signature>

[Typed Name]

APPENDIX D

THE UNIVERSITY OF SOUTHERN MISSISSIPPI
AUTHORIZATION TO PARTICIPATE IN RESEARCH PROJECT
INFORMED CONSENT

Student Researcher: **Tracy D. Daniel**

Title of Project: **Educational Technology Integration and High Stakes Testing**

I would like to have your voluntary participation in my dissertation study. Please read the following information about the study. If you agree to participate in the study, please complete the attached questionnaire entitled *Subject Area Testing Program Teacher Technology Integration Questionnaire*.

Brief Statement of Project Goals: Educational leaders must begin to invest more time and effort in the research and evaluation process of educational technology purchases so that they may be able to make better, more informed decisions regarding the effective uses of educational technology (Bailey, 2004). The aim of this project is to evaluate the relationship between teacher technology integration and student achievement as measured by high-stakes testing. The results of this research will aid educational leaders and classroom teachers in making informed decisions concerning technology purchases, technology curricula, classroom integration of technology, and technology training.

If you participate, you will be asked to complete *Subject Area Testing Program Teacher Technology Integration Questionnaire*. The questionnaire will take approximately thirty (30) minutes for each participant to complete. After completing the survey, participants will be asked to submit completed surveys to a representative of the school or the researcher. At that time, the participant will be offered an opportunity to provide his/her name to be entered into a drawing for a \$50 gift card.

Benefits: The need to know what impact technology integration has on student achievement is more urgent in the 21st century than before due to the emphasis on accountability and substantial cost of purchasing and implementing technology in the classroom (Protheroe, 2005). Having the results of this study can help teachers as well as educational leaders make decision regarding classroom technology integration, technology purchases, and technology training.

Risks: The risks to the participants, although minimal, include possible discomfort in disclosing daily teaching procedures and assessment data.

The anonymity of subjects will be carefully maintained. Data regarding the subjects (including completed questionnaires) will be kept by the researcher and shared with the

researcher's dissertation committee. In addition, the data gathered will be kept by the researcher in a secure location for at least one full year.

Questions concerning the research, at any time during or after the project, should be directed to Tracy Daniel at 228.324.6270. This project and this informed consent form have been reviewed by the Human Subjects Protection Review Committee, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820.

REFERENCES

- Abrams, L. M., Pedulla, J. J. & Madaus, G. F. (2003). Views from the classroom: Teachers' opinions of statewide testing programs. Retrieved September 28, 2010 from http://muse.jhu.edu/journals/theory_into_practice/v042/42.1abrams.pdf
- Apple Classrooms of Tomorrow (1985). Evaluation Study: First- and second-year findings. Retrieved October 10, 2010 from <http://www.apple.com/nl/images/pdf/acotlibrary/rpt7.pdf>
- Apple Classrooms of Tomorrow-Today (2008). Understanding of 21st century skills and outcomes. Retrieved October 22, 2010 from <http://ali.apple.com/acot2/skills>
- Bailey, J., & Mageau, T. (2004). Making the case: Research efforts on educational technology. Retrieved September 16, 2006, from <http://thejournal.com/articles/16777>
- Baker, E. L., Gearhart, M. & Herman, J. L. (1990). Apple classroom of tomorrow evaluation study: First- and second-year findings. Retrieved April 6, 2010 from <http://www.apple.com/euro/pdfs/acotlibrary/rpt7.pdf>
- Baker, E. L., Gearhart, M. & Herman, J. L. (1993). The Apple classrooms of tomorrow: The UCLA evaluation studies (CSE Technical Report No. 353). Los Angeles, CA: University of California-Los Angeles.
- Barksdale-Ladd, M. A. & Thomas, K. F. (2000). What's at stake in high-stakes testing. Retrieved September 28, 2010 from <https://www.secure.hosting.vt.edu/www.soe.vt.edu/elementaryed/barksdale/docs/BarksdaleThomasHST.pdf>

- Conway, J. (1997). Educational technology's effect on models of instruction. Retrieved February 25, 2009, from <http://udel.edu/~jconway/EDST666.htm>
- Cuban, L. (1986). *Teachers and machines: The classroom use of technology since 1920*. New York, NY: Teachers College Press.
- Cuban, L. (2001). *Oversold and underused: Computers in the classroom*. Cambridge, MA: Harvard University Press.
- Daniel, T. (2007). The impact of technology on student achievement. Unpublished manuscript.
- Devaney, L. (2011a). Bring your own device catching on in schools. *eSchool News 14*(2). Retrieved from <http://www.eschoolnews.com/2011/04/29/bring-your-own-device-catching-on-in-schools/>
- Devaney, L. (2011b). Amid economic uncertainty, ed-tech leaders do more with less. *eSchool News 14*(2). Retrieved from <http://www.eschoolnews.com/2011/04/29/bring-your-own-device-catching-on-in-schools/>
- Devaney, L. (2012). Ten strategies for successful mobile learning. Retrieved March 10, 2012 from <http://www.eschoolnews.com/2012/03/01/eschool-news-february-2012/>
- Deubel, P. (2009). Social networking in schools: Incentives for participation. *The Journal*. Retrieved from <http://thejournal.com/Articles/2009/09/16/Social-Networking-in-Schools-Incentives-for-Participation.aspx?Page=1>

Doidge, N. (2007). *The brain that changes itself: Stories of personal triumph from the frontiers of brain science*. New York: Penguin Books.

eMints. (2012). What is eMints? Retrieved March 10, 2012 from

<http://www.emints.org/about/what-is-emints/>

eSchool News. (2010). Research dispels common ed-tech myths. Retrieved October 6, 2010 from [http://www.eschoolnews.com/2010/06/29/research-dispels-common-](http://www.eschoolnews.com/2010/06/29/research-dispels-common-ed-tech-myths)

[ed-tech-myths](http://www.eschoolnews.com/2010/06/29/research-dispels-common-ed-tech-myths)

eSchool News. (2011). Stakeholders decry EETT elimination

Federal Funds Watch (2011). Spotlight: Highlights of recent federal appropriations.

Retrieved from

http://www.lbb.state.tx.us/Federal_Funds/Watch_2011/Federal%20Funds%20-%20041911.pdf

Foltos, L. (2002). Technology and academic achievement. Retrieved August 30, 2010 from

<http://www.edlabgroup.org/media/TechnologyandAcademicAchievement.pdf>

Frazier, M., & Bailey, G. D. (2004). *The technology coordinator's handbook*. Eugene, OR: International Society for Technology in Education.

Hew, K. F. & Brush, T. (2007). Integrating technology into k-12 teaching and learning: Current knowledge gaps and recommendations for future research. Retrieved October 1, 2010 from

http://www.redorbit.com/news/education/959553/integrating_technology_into_K12_teaching_and_learning_current_knowledge_gaps/index.html#

- Huff Post Education (2001). Social networking in schools: Educators debate the merits of technology in classrooms. Retrieved February 16, 2012 from huffingtonpost.com/2011/03/27/social-networking-schools_n_840911.html.
- International Society for Technology in Education (2008). Technology and student achievement – the indelible link. Washington, D.C.: ISTE
- Jobe, H. (2010). Instructional technology coaching in a 1:1 learning environment. *SIG News*. Retrieved from <http://www.iste.org/connect/special-interest-groups/sig-news.aspx>
- Johnson, S. (2005). *Everything bad is good for you: How today's popular culture is actually making us smarter*. New York, NY: Penguin Books.
- Jones, G. M., Jones, B. D., Hardin, B., Chapman, L., Yarbrough, T., & Davis, M. (1999). The impact of high stakes testing on teachers and students. *Phi Delta Kappan*, 81(3), 199-203.
- Jukes, I. & McCain, T. (2008). Understanding digital kids (DKs): Teaching & learning in the new digital landscape. Retrieved April 19, 2009 from http://web.mac.com/iajukes/thecommittedsardine/Handouts_files/udk2.pdf.
- Jukes, I., McCain, T. & Crockett, L. (2008). *Understanding the digital generation: Teaching and learning in the new digital landscape*. Kelowna, BC, Canada: 21st Century Fluency Project.
- Khorrami-Arani, O. (2001). Researching computer self-efficacy. [Electronic version]. *International Education Journal Educational Research Conference 2001*, 2(4), 17-25.

- Kleiman, G. M. (2004). Myths and realities about technology in K – 12 schools: Five years later. *Contemporary Issues in Technology and Teacher Education*, 4(2). Retrieved September 16, 2006, from www.citejournal.org/articles/v4i2seminal2.pdf
- Koretz, D. M., Linn, R. L., Dunbar, S. B. & Shephard, L. A. (1991). The effects of high-stakes testing on achievement: Preliminary findings about generalization across tests. Retrieved September 28, 2010 from <http://epicpolicy.org/files/HighStakesTesting.pdf>
- Kortez, D., Barron, S., Mitchell, K. J. & Stecher, K. M. (1996). Perceived effects of the Kentucky instructional results information system. Retrieved October 1, 2010 from http://www.rand.org/pubs/monograph_reports/2007/MR792.pdf
- Lay, J. C. & Stokes-Brown, A. K. (2008). Put to the test: Understanding differences in support for high-stakes testing. Retrieved August 31, 2010 from <http://apr.sagepub.com/content/37/3/429>
- Learning Technologies at Virginia Tech (2009). Design shop: Lessons in effective teaching. Retrieved October 22, 2010 from <http://www.edtech.vt.edu/edtech/id/assess/assess.html>
- LoTi Connection (2010). LoTi digital framework. Retrieved October 1, 2010 from <http://loticonnection.com/lotilevels.html>
- Lowther, D., Strahl, J., Inan, F., & Ross, S. (2008). Does technology integration “work” when key barriers are removed? Retrieved October 1, 2010 from www.memphis.edu.crep/pdfs/Does_Tech_work.pdf

- Marzano, R. (2009). Teaching with interactive whiteboards. *Educational Leadership*, 67(3), 80-82. Retrieved from <http://www.ascd.org/publications/educational-leadership/nov09/vol67/num03/Teaching-with-Interactive-Whiteboards.aspx>
- Matusevich, M. (1995). School reform: What role can technology play in a constructivist setting? Retrieved April 19, 2009, from <http://pixel.cs.vt.edu/edu/fis/techcons.html>
- McLeod, S. A. (2007). B. F. Skinner: Operant conditioning. *Simply Psychology*. Retrieved April 19, 2009, from <http://www.simplypsychology.pwp.blueyonder.co.uk/>
- McNeil, L. M. (2000). *Contradictions of school reform*. New York, NY: Routledge.
- Mergel, B. (1998). Instructional design & learning theory. *Learning Theories of Instructional Design*. Retrieved February 25, 2009, from <http://www.usask.ca/education/coursework/802papers/mergel/brenda.htm>
- Miller, C. T. (2008). *Games: Purpose and potential in education*. New York, NY: Springer Science and Business Media, LLC.
- Mississippi Department of Education (2010a). *Mississippi subject area testing program, 2nd edition SATP2: Student/parent information guide 2010 – 2011 school year*. Jackson, MS: Pearson.
- Mississippi Department of Education (2010b). Subject area testing program: English II test. Retrieved December 13, 2010 from <http://www.mde.k12.ms.us/acad/osa/English2.html>.

- Mississippi Department of Education (2010c). Subject area testing program (SATP). Retrieved November 29, 2010 from <http://www.mde.k12.ms.us/acad/osa/satp.html>.
- Moersch, C. (2010). LoTi digital-age framework. Retrieved October 1, 2010 from <http://loticonnection.com/lotilevels.html>
- Morehead, P. & Labeau, B. (2005). The continuing challenges of technology for teachers. Retrieved October 1, 2010 from www.usca.edu/essay/vol152005/moreheadrev.pdf
- Nagel, D. (2011). Groups call for reinstatement of federal ed tech program. *The Journal*. Retrieved from <http://thejournal.com/articles/2011/04/14/groups-call-for-reinstatement-of-federal-ed-tech-program.aspx>
- National Commission on Excellence in Education (1983). A nation at risk. Retrieved April 19, 2009 from <http://www.mat.uc.ptln~emsa/PMEnsino/ANationatRisk.pdf>
- Nichols, S. & Berliner, D. (2008). Why has high-stakes testing so easily slipped into contemporary American life? *Education Digest* 74(4), 41-47.
- North Central Regional Educational Laboratory (2005). Critical issue: Using technology to improve student achievement. Retrieved October 1, 2010 from <http://www.ncrel.org/sdrs/areas/issues/methods/technlgy/te800.htm#skill>.
- November, A. (2009). Drill the teachers; educate the kids. Retrieved September 5, 2010 from <http://novemberlearning.com/resources/archive-of-articles/drill-teachers>
- O'Dwyer, L. M., Russell, M., Bebell, D., & Tucker-Seeley, K. R. (2005). Examining the relationship between home and school computer use and students'

- English/language arts test scores. *Journal of Technology, Learning, and Assessment*, 3(3), 1-46.
- Partnership for 21st Century Skills (2009). P21 framework. Retrieved October 1, 2010 from <http://www.p21.org>
- Pink, D. (2005). *A whole new mind: Why right brainers will rule the future*. New York, NY: Riverhead Books.
- Prensky, M. (2001). Digital natives, digital immigrants. Retrieved September 26, 2010 from <http://www.marcprensky.com/writing/prensky%20-%20digital%20natives,%20digital%20immigrants%20-%20part1.pdf>
- Prensky, M. (2006). Listen to the natives. *Educational Leadership*, 63, 20-23.
- Protheroe, N. (2005). Technology and student achievement. NAESP's principal's portal. Principal – Effective Intervention – Research report. *Dissent* 85(2), 46-48.
- Rodriguez, G. (2000). Critical issue: Providing professional development for effective technology use. Retrieved November 23, 2010 from <http://www.ncrel.org/sdrs/areas/issues/methods/technlgy/te1000.htm>
- Ross, S., & Strahl, J. (2005). Evaluation of Michigan's freedom to learn. Retrieved March 10, 2012 from http://www.techlearning.com/techlearning/events/techforum06/LeslieWilson_MI_Evaluation_Brief.pdf
- Saade, R. G., & Kira, D. (2009). Computer anxiety in e-learning: The effect of computer self-efficacy. *Journal of Information Technology Education* 8, 177-191. Retrieved from <http://www.jite.org/documents/Vol8/JITEv8p177-191Saade724.pdf>

- Schacter, J. (1999). The impact of education technology on student achievement: What the current research has to say. Retrieved November 12, 2006, from <http://www.sbceo.k12.ca.us/~ims/techcen/EETT/ImpactofET.pdf>
- Schlechy, P. C. (2002). *Working on the work: An action plan for teachers*. San Francisco, CA: Jossey-Bass.
- Shriberg, D., & Shriberg, A. (2006). High-stakes testing and drop-out rates. Retrieved October 1, 2010 from <http://www.dissentmagazine.org/article/?article=702%20-%2026k>
- Sivin-Kachala, J., Bialo, E., & Rosso, J. (2000). Online and electronic research by middle school students. Retrieved March 14, 2011 from <http://www.mff.org/pubs/IESDReport.pdf>
- Small, G. & Voron, G. (2008). *iBrain: Surviving the technological alteration of the modern mind*. New York, NY: HarperCollins.
- Smith, S. (2001). The four sources of influence on computer self-efficacy. *Delta Pi Epsilon Journal* 43(1), 27-39.
- Spurlin, J. (2006). Technology and learning: Defining what you want to assess. In Oblinger, D. (Ed.). Retrieved October 15, 2010 from <http://net.educause.edu/ir/library/pdf/ELI3005.pdf>
- Stone, L. (2009). Beyond simple multi-tasking: Continuous partial attention. Retrieved October 6, 2010 from <http://lindastone.net/2009/11/30/beyond-simple-multi-tasking-continuous-partial-attention/>

- U. S. Department of Education (2002). The no child left behind act of 2001. Retrieved April 19, 2009 from <http://www.ed.gov/policy/elsec/leg/esea02/107-110.pdf>
- University of Minnesota (2008, June 20). Educational benefits of social networking sites uncovered. Retrieved February 16, 2012, from www.sciencedaily.com/releases/2008/06/080620133907.htm
- Walden University's Richard W. Riley College of Education and Leadership (2010). Educators, technology and 21st century skills: Dispelling five myths: A study on the connection between k-12 technology use and 21st century skills. Retrieved October 6, 2010 from <http://www.waldenu.edu/Degree-Programs/Masters/36427.htm>
- Wambach, C. (2006, September). Smart classroom: From revolutionary to evolutionary: 10 years to 1-to-1 computing. Retrieved September 16, 2006 from http://www.thejournal.com/articles/19176_1
- Wenglinsky, H. (2005). *Using technology wisely: The keys to success in schools*. New York, NY: Teachers College Press, Columbia University.
- Wenglinsky, H. (2005). Technology and achievement: The bottom line. *Educational Leadership* 63(4), 29-32.
- Wenning, R., Herdman, P. A., Smith, N., McMahon, N. & Washington, K. (2008). No child left behind: Testing, reporting, and accountability. Retrieved October 21, 2010 from <http://www.ericdigests.org/2004-2/behind.html>
- Zhao, Y. & Bryant, F. L. (2006). Can teacher technology integration training alone lead to high levels of technology integration? A qualitative look at teacher's

technology integration after state mandated technology training. Retrieved October 1, 2010 from ejite.isu.edu/volume5/zhao.pdf

Zimmerman, B. & Dibenedetto, M. (2008). Mastery learning and assessment: Implications for students and teachers in an era of high-stakes testing. *Psychology in the Schools*. 45(3), 206-216.

Zwang, J. (2010) Duncan: Ed tech can help cut costs. *eSchool News*. Retrieved from <http://www.eschoolnews.com/2010/11/17/duncan-ed-tech-can-help-cut-costs/>

Zuniga, R. (2010). Computer technology integration into the public school classroom – a quantitative update. Retrieved October 1, 2010 from http://www.academicleadership.org/empirical_research/Computer_Technology_Integration_Into_the_Public_School_Classroom-a_Qualitative_Update_printer.shtml