AN EXAMINATION OF THE IMPACT OF A 21ST CENTURY TECHNOLOGY GRANT ON SELECTED SCHOOLS IN A NORTH CAROLINA DISTRICT

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ABSTRACT

SCOTT S. SMITH: An Examination of the Impact of a 21st Century Technology Grant on Selected schools in a North Carolina School District
(Under the direction of Barbara D. Day)

The ever increasing demand on schools to produce students that are technology literate is growing at an alarming rate. Schools find themselves on the brink of the digital age and are faced with vast needs to successfully integrate and infuse technology into the classroom. This technological revolution is changing the face and climate of technology in and out of the classroom. Educators must embrace these changes and take on the challenge to produce students that are well versed in the use of technology. Helping students become 21st century citizens is the ultimate goal; however many needs must be addressed for success to occur. Through a needs assessment survey, the researcher sought trends related to the use technology in the classroom based on conditions in the educational setting.

The purpose of this study was to examine teachers' opinions and needs to determine if meeting certain needs made a significant difference related to technology in the educational setting. A technology needs assessment survey of approximately 1200 certified teachers was used to gain insight into their opinions related to technology and its use in the educational setting. The results of this study found significance in three areas related to technology in the educational setting: Vision and Leadership; Planning, Budgeting and Evaluation; and the Impact of Technology in the Classroom. Statistical

analysis found no significance related to the other seven areas studied: Supportive Environment for Risk Taking; Technical Infrastructure and Support; Resource Media, Software and Tools; Community Linkages; Professional Development Opportunities; Professional Development Participation; and Classroom Practice.

DEDICATION

To Andrea, Andrew and Layne for the love and support to complete this goal, and for being with me all the way! I love you!

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Background/Statement of Problem

History of American society is marked by change and advancements facilitated by the modernization of technology. Since the invention of the light bulb, our culture has transformed from one of occasional technological use to one dependent upon technology. Positive results of technological advancements are evidenced repeatedly in our society. Throughout all facets of humanity, technological use and functionality has become critical. The field of education is not exempt from this phenomenon. The prominent expectation is that all 21st century learners be prolific in the use of technology and in doing so, they must be active and engaged participants in the information and digital age. "The 21st century learner must have the interest, attitude and ability to appropriately use digital technology and communication tools to access, manage, integrate and evaluate information; construct new knowledge; and communicate with others in order to participate effectively in society" (West Virginia, 2006). Use of technology has become an invaluable part of learning and knowledge in the current educational systems in the United States. School administrators, teachers and students engage technology in many aspects of the educational experience, and the ongoing development of technology's use and implementation in the educational setting is redefining the way educators teach and students learn. Technology is no longer a tool educators learn to use and then teach as an additional area of education. Instead, expectations for our educators are not only to teach the mechanics of technology use but to use technology as a vital instructional tool while educating students in all areas of the curriculum.

Over the past several years, the rapid rate of change in the field of technology has drastically affected the way we live, work and play. Since technology change is so rapid, our educational system must adapt quickly to these changes to accommodate new technologies, methodologies, and learning styles. The annual conference, *Technology as an Agent of Change in Teaching and Learning* (TACTL) emphasized the importance of changing with technology to meet the needs of teachers and learners. As a result of these transformations, technology advocates, have introduced technology mediums into all aspects of learning, seeing it as a catalyst for change that will encourage information processing, problem solving, as well as student centered learning and critical thinking (Getting America's Students Ready Report, 1996). This is not a local decision or a sporadically enforced rule; it is a national mandate by the federal government. The federal legislation, "No Child Left Behind: Title II Part D: EETT - Enhancing Education Through Technology," (Bush, 2002) requires technology use and implementation within schools and school districts.

In order to adhere to national guidelines such as this and stay abreast of national trends, institutions of higher learning have heeded these mandates. In her case study, Pierson (2004) concluded that teachers must have diverse experiences to train and prepare them in the appropriate use and implementation of technology in instruction, while placing an emphasis on creating an educator that is ready willing, and fully capable of using the technological tools available. In 1996, The American Federation of Teachers asked its members to closely examine the direction of educational technology and offered the following justification: "We are asking you to do these things because technology already is changing the way we teach, changing the way we do research, and changing

basic employment rights. In short, because we've become convinced that over time the influence of technology in higher education will grow even more pervasive" (p. 3). Whereas this is a positive trend, it can also be overwhelming; thus, additional training and support must be provided and encouraged for educators to be able to learn how to effectively use technology in the classroom. The need for educational technology learning opportunities for educators is of tremendous importance.

Concerns surrounding the use of technology in the educational setting are the lack of proper information, connectivity, hardware, software, training and support that educators should be given. Without adequate support, technology becomes a burden rather than a tool. The bottom line then becomes not how technology is used but if it is used at all. The digital divide was described as a crack or gap in access to technology that manifested itself into inequities in educational, economic, social, and civic opportunities among sectors of the population. (enGague, 2003). This divide between the individuals increases each time technology is a hindrance rather than an asset.

The North Central Regional Educational Laboratory (NCREL, 2000) states that schools must examine all educators to determine how to deal with the varying degrees of proficiency in the use of technology. Some need assistance with merely turning on a particular device while other more advanced users need assistance with more complex tasks such as web page design or blogging. In order for technology to be utilized effectively in the educational setting the individual needs of each teacher must be met. Strategies must be developed and practices must be implemented for teachers to move forward in comprehension and utilization. Meeting teachers' needs for technology plays a major role in the implementation and use of educational technology in the classroom.

The predominate need for technology and the gap in proficiency that exist among students and teachers has caused administrators, teachers, parents, students and even the government to push the infusion of technology. Rohan (2003) describes how the government is awarding contracts to businesses that have a strong technological presence. In essence, the government is telling business and economic communities to "Adapt or Die" as the title of the article states. This push and interweaving of technology into society and into the curriculum is a key component to technology use and is often termed technology integration. According to one definition, technology integration means viewing technology as an instructional tool for the delivery of subject matter in the curriculum already in place (Woodbridge, 2004). In addition, the National Center for Educational Statistics (2006) defines technology integration as:

> The incorporation of technology resources and technology-based practices into the daily routines, work, and management of schools. Technology resources are computers and specialized software, network-based communication systems, and other equipment and infrastructure. Practices include collaborative work and communication, Internet-based research, remote access to instrumentation, network-based transmission and retrieval of data, and other methods. This definition is not in itself sufficient to describe successful integration: it is important that integration be routine, seamless, and both efficient and effective in supporting school goals and purposes (p. 3).

Consequently, true integration requires change. Johnson and Lui (2000) note that everyone is talking about technology integration, but few practicing teachers know exactly how to proceed. What seems to be lacking is a model that teachers can use to

guide them through the necessary changes they need to make in order to be successful in integrating new technology into their classroom. In order to integrate technology, they must first be literate in technology use, yet what does that actually mean?

Technology literacy can be defined in a variety of ways. The International Technology Education Association (ITEA) in 2000 defined technology literacy as "the ability to use, manage, assess, and understand technology" (p. 1). Likewise Pearson and Young (2002) described technology literacy in three different dimensions: knowledge, capabilities, and ways of thinking and acting. The dimension of knowledge refers to the content that we expect students to learn. One's capability references the development of hands-on skills using math, science, technology, and other concepts to solve technological problems. The final dimension of ways of thinking and acting is a student's ability to ask applicable questions about the content and skills they are learning which will inspire them to go farther than before.

The need for technology in the classroom is dependant on the educational setting. The literature does not have one consistent view of technology use, and the opinions about technology in the classroom are varied. Likewise the reasons for technology use and implementation are just as varied. As an example students who need individualized instruction can benefit from the use of technology. Yet, this is only made possible if educators' needs for technology use are being met. Simply having the tools available is not enough; educators must learn how to use technology appropriately and effectively. As educators become versed in what technologies can offer students, success is experienced and some students who previously would not succeed in education find themselves fully benefiting from the educational system.

Technology use in the educational setting must, however, start with a vision and a well organized comprehensive plan to provide an environment with access to technology followed by teacher preparation on the effective use of technology. In order for the above mentioned to occur, schools must have funding, staffing and policies in place to support technology and teachers must be properly equipped, supported and trained to use technology in their daily curriculum..

Due to the nature of technology and its quick obsolesce, funding for technology is a major concern. Sun (1996) states, “Historically, schools across the nation have approached instructional technology as an 'add on' in terms of funding. Although schools have budget lines for staff salaries, transportation, building and facilities maintenance, textbooks, and other essentials, few schools allocate regular funding for the purchase, maintenance, upgrading, support, and professional development related to new technologies”. Without budgets for technology, equipment cannot be purchased and maintained and personnel cannot be hired to assist with the upkeep, use and integration of technology. This causes a multitude of financial concerns for schools, administrators, district personnel and school boards as they try to keep up with this fluidity.

Another significant problem with technology use in schools is the lack of professional development for technology use in the classroom (Fatemi, 1999). Teacher training, professional development, and support seem to be the areas of technology in schools that get the least attention. Increased demands on teachers’ time for standardized testing cause other venues for professional development to be secondary. Technology professional development is no exception. After teachers reach the classroom, ongoing

staff development on the integration of technology into the curriculum must continue and must be used on a regular basis as a tool to enhance and promote education.

Purpose of Study

The purpose of this study was to examine what conditions influence technology use; how professional development activities are offered and implemented; what impact technology has on teaching practice and student outcomes; and to determine if a difference exists between schools meeting some of these specified conditions compared to those who do not. Through a needs assessment, the researcher examined what conditions contributed to and influenced technology use as well as how schools perceive technology and its use in the educational setting.

Specifically, the researcher examined the impact of fulfilling technology conditions that enhanced and engaged students in the educational process. While research has been conducted in the area of planning and budgeting for technology and staff development for teachers on the use of technology in the classroom, this study examined fulfilling certain conditions related to teachers' technology needs, to see if there is a significant difference in use. Through a federal 21st Century Community and Technology Learning Center Grant (CTLC), the researcher had access to three elementary schools in a public school district in western North Carolina that received considerable funding for technology. The CTLC was designed to address the needs of these schools by providing academic and enrichment programs for students; technology being one of the vehicles for this project. Through the funding of this grant, the schools in this district were able to fulfill certain conditions for technology use. Specifically these schools were able to purchase large amounts of hardware and software for students and

teachers. In addition, funding was provided for after school initiatives that involved technology for students, teachers, and the community. Funding was also available to provide specialized technology staff development for these schools. This initiative provided the schools with conditions that do not necessarily exist at other schools within the district.

This grant provided an opportunity to compare the uses of technology of teachers and students in the schools that fulfilled some conditional technology needs to those who had not. Still unknown were what requirements directly caused the effective use of technology in the classroom. Do meeting certain conditions and filling school and teacher needs in certain areas make a difference? Does having access to computers, Personal Digital Assistants (PDA), laptops, computer labs, projectors, and educational software make a significant difference in a school environment? Does prior planning for technology use and integration make a significant difference in its use? Does additional funding for the above said technologies show an increased use? Does having personnel in place to assist with the use of said technologies make a difference? Does professional development for teachers make a significant difference? These are areas where further research should be conducted and therefore the purpose of this study. The research questions are as follows:

Research Questions

1. What are the conditions for technology use in schools related to vision and leadership?
2. What are the conditions for technology use in schools related to planning, budgeting and evaluation?
3. What are the conditions for technology use in schools related to supportive environments for risk taking?
4. What are the conditions for technology use in schools related to technical infrastructure and support?

5. What are the conditions for technology use in schools related to resource media, software and tools?
6. What are the conditions for technology use in schools related to community linkages?
7. What are the professional development opportunities that may affect technology use in your school?
8. What are the professional development participation opportunities as it relates to technology use in your school?
9. How do all above mentioned conditions impact classroom practice and reflect on student activities in the classroom?
10. How do all above mentioned conditions affect the impact of technology in the classroom?
11. How do 21st century schools compare to non-21st century schools related to vision and leadership?
12. How do 21st century schools compare to non-21st century schools related to planning, budgeting and evaluation?
13. How do 21st century schools compare to non-21st century schools related to supportive environments for risk taking?
14. How do 21st century schools compare to non-21st century schools related to technical infrastructure and support?
15. How do 21st century schools compare to non-21st century schools related to resource media, software and tools?
16. How do 21st century schools compare to non-21st century schools related to community linkages?
17. How do 21st century schools compare to non-21st century schools related to professional development opportunities that may affect technology use in your school?
18. How do 21st century schools compare to non-21st century schools related professional development participation opportunities as it relates to technology use in your school?
19. How do 21st century schools compare to non-21st century schools related to the impact on classroom practice and reflect on student activities in the classroom?
20. How do 21st century schools compare to non-21st century schools related to the affect the impact of technology in the classroom?

The researcher believed he would find a vast array of information. From his own anecdotal observations, he believed that the majority of the views held by schools about technology needs would be similar. He believed that most schools recognize the need for students to be technology literate, but felt that technology was an additional subject that must be taught and that they did not have time to be properly trained on its use. He also

believed that educators viewed technology as a never-ending financial hardship. The views would be fairly consistent, with the exception of some schools that fully utilize educational technology as a tool for learning. There would be two extremes, the heavy educational technology schools and the non-users with a moderate number of schools in the middle.

The researcher believed that filling specific conditions and technology needs, with vision and leadership as well as funding for equipment, were significant precursors to the implementation and impact of technology. Before teachers can begin to use and implement technology, it has to be available to them. In addition, the researcher believed that merely placing the technology in the schools was not enough to make a significant difference in the use and integration of technology into instruction. With proper planning and leadership for technology and quality professional development combined with increased financial resources, technology use in the educational system would flourish.

Definition of Terms

21st century schools: For purposes of this study, this identification is used to describe three schools in a western NC school district that received a 21st century community and technology learning center grant.

CTLC: For purposes of this study, this term refers to three schools who received a 21st century community and technology learning center grant to provide two million dollars for technology over a four year period.

Non-21st century schools: For purposes of this study, this identification is used to describe 25 schools in a western NC school district that did not receive a 21st century community and technology learning center grant.

School district in western North Carolina: A medium sized school district in the foothills of North Carolina, consisting of approximately 14,500 students and 1200 certified teachers.

Digital divide: In the 1990s, the digital divide was characterized as a gap in technology access that translated into inequities in educational, economic, social, and civic opportunities among sectors of the population. Since then, education leaders have come to realize that access is simply the first step. Equally important are robust home access and the readiness of individuals to use technology, communication networks, and information efficiently, effectively, and productively (NCREL, 2006).

STNA: School Technology Needs Assessment survey

Teacher technology needs: desires and requests of teachers about technology conditions.

Technology: For purposes of this study, technology will be defined as any electronic hardware or software for students and teachers to use in the classroom. (i.e. Computer, TV, VCR. Overhead, DVD Player, LCD projector, Hand held device, Smart Board, etc.)

Technology conditions: For purposes of this study, technology conditions will be defined as those constructs and sub constructs of the STNA: Vision and Leadership; Technology Planning, Budgeting, and Evaluation; Supportive Environment for Risk Taking; Technical Infrastructure and Support; Resource Media, Software and Tools; Community Linkages; Professional Development Opportunities; and Professional Development Participation.

Technology integration: Seeman (2003) defines technology integration as a curriculum in which a holistic approach and understanding of technology is designed in a way that technology is included in the day to day activities. Eisenberg (1996) says technology integration is using computers effectively and in the general content areas to allow students to learn how to apply computer skills in meaningful ways.

Technology literacy: As stated earlier, the ITEA defined technology literacy as the ability to use, manage, assess, and understand technology (2000).

Significance of the Study

This study has great significance for schools across the world. In determining needs and conditions influencing the use of educational technology, administrators and boards of education can better make decisions related to the classroom. Budgetary constraints alone are a huge consideration; yet teacher attitudes and needs also greatly impact the amount and effectiveness of instruction. If schools understand overall teacher wants, needs and staff development concerns, they will be better able to meet the teachers on the appropriate level and address technology training concerns, while ensuring the tools are available to them. Additionally, the study will assist school districts in planning, decisions making implementation of what they want and need for future endeavors of educational technology. The information gathered will assist school administrators in the budgeting process as well as planning for professional development activities.

Limitations

There are a number of limitations encountered in carrying out this study that must be acknowledged. The final sample obtained for this research, for a number of reasons,

was not random and, therefore, cannot be deemed to be completely representative of all school teachers. However, while the results cannot be generalized for all teachers, the study drew a sample for a specific group of teachers in a specific school system. Consequently, the data give a good indication of the needs of teachers in schools with respect to educational technology in a school district on the major construct and sub construct areas as they relate to the research questions.

In addition, the rapid change of technology gives rise to a multitude of issues and concerns when studying technology. New technologies are developed daily that could advertently or inadvertently affect the results of the survey.

The examination of certain conditions is limited in scope. Many influences and conditions, those listed in this study and others, all contribute to what occurs in the classroom. The STNA measures only a few conditions and other external factors, as noted in the conceptual framework, which could be studied at a more in-depth level for additional research. Student achievement is a topic of interest to many. This topic is one that could be studied extensively to see if technology integration truly makes a difference in student achievement.

Summary

As stated above many issues and conditions exist surrounding the use of technology in the educational setting. The ultimate goal is to have technology become a tool that is fully integrated into the curriculum so that its use is seamless and supportive of learning. Technology must be used effectively as an instructional tool to enhance and engage learners in the educational setting. Simply using technology because of its presence and availability demeans its effectiveness.

Technology is here to stay and its utilization will only increase. Thus, as educational systems continue to grow and change, schools must recognize the needs before them and take the necessary steps to fulfill those needs to properly use technology. In short, schools have a vast variety of needs for using technology in the educational setting. The researcher studied the conditions schools need in order to use technology effectively in the educational setting.

CHAPTER II

LITERATURE REVIEW

Introduction

Teachers and students across the United States are being expected to use and integrate technology. The premise is that teachers must use technology to produce students that are computer literate--active and engaged participants of the digital age and 21st century learners. In addition, schools are being pressured to narrow the gap of technology skills between students and teachers, students and students, and teachers and teachers. The researcher will attempt to identify the literature related to the use of technology in the classroom and what needs, in the form of certain conditions, affect its use. A number of conditions, including leadership, vision for technology use, proper planning and design, budgetary matters, evaluation strategies, supportive environments, available support (technical and instructional), resources, and community support, invariably impact upon the use of technology in the educational arena. Additionally the researcher will examine the role of professional development for educators. Student and teacher learning outcomes linked to technology will also be examined.

Impact of Selected Conditions on Educational Technology Use

Vision and Leadership

Labbo (2006) commented that educators are being challenged to deploy new technologies in their schools and to develop new literacies based on a theoretical foundation that integrates technology into a coordinated curriculum. Unfortunately, Labbo (2006) believes that in the rush to acquire technological tools and facilities, many schools fail to achieve a meaningful vision for how such tools are to be used or to plan

adequately for their integration into curriculum and instructional modalities. This is the responsibility of all educators, but the principal, as the curriculum leader in the school, sets the tone for this environment at the schools, just as the superintendent and other administrative leaders set the tone for the district as a whole.

Leadership, in the area of curriculum integration, is the key to the success of technology in the classroom. "A school that adopts a curriculum that aims for a holistic approach and understanding of technology does so because it produces a better educated person than a curriculum which does not" (Seeman, 2003. p. 2). With leadership in the area of a unified core curriculum, educators can adopt basic principles to guide the use of technology in the classroom. These basic principles will guide the contextual framework and therefore help the teacher decide what best to include in the lesson and what not to include. Technology is simply one of the tools available to the teacher to use. Seeman states that technology education and practice are not only a *how-to* experience, but significantly a *know-why* experience (2003). Leaders are responsible for ensuring that educators know *how-to* use technology, but more importantly that they *know-why* to use technology. We must design this curriculum and conceptual framework in ways that will promote technological literacy. This shift in thinking is the impetus for curriculum change and full technology integration into instruction. Technological knowledge can be sub divided into two categories: procedural knowledge, the know how to manipulate the task or activity, and conceptual knowledge, which relates to the body of content or conceptual framework (Williams, 2000). Setting a vision for content/skills curricula is paramount and must precede all other initiatives; technology is merely a vehicle to help

deliver this curriculum. Students and teachers alike should perceive technology as a seamless part of instruction not an additional subject.

Planning, Budgeting and Evaluation

Swanson (2006) further notes that in the United States, the performance of the state educational authorities regarding technology use in schools is average, at best. In fact, this analyst suggests that in terms of technology access, use and capacity, most states fail to have a coordinated plan for use or to allocate resources adequately. North Carolina, for example, touts 99% of the classrooms are connected to the Internet, yet the state does not have codified plan to fund such an endeavor. In addition, the present technology plan in North Carolina is lacking in the area of curriculum integration and coordination with others areas of the educational system. Hauser and Yuill (2004) described the case of one Indiana middle school where successful deployment and use of technology was achieved by creating interdepartmental teams, but this seems to be relatively rare as most schools lack coordinating committees of this type.

Planning is a key factor in the successful use and integration of technology into the curriculum. In his study, Seeman (2003) found that teachers took the time to plan the curriculum first, not simply when to use the technology. The design and implementation of curriculum, the connections across the curriculum and the content standards all led to the instructional methodology the teachers chose and, if applicable, technology was infused into the lesson. McCracken (2000) shares a unique view:

> As a human is to the body, design is to technology. It is important to understand the interdependence and complimentary nature of technology and design. Like the inseparable relationship between

> body and soul, technology is incomplete without design. Design cannot be fully appreciated without an understanding of technology. If technology is to be fully understood, then the concepts of design need to be understood (p. 86).

Similarly, Rivero (2006) highlighted the importance of ensuring that computer labs – which are increasingly common and often quite costly to establish and maintain – must be developed with instructional needs and learning outcomes as well as achievement standards in mind. All too often, this research suggests, schools have embraced costly new technologies without having first planned appropriately to determine how they are to be integrated into curriculum or made meaningful in the context of curriculum. Strategic planning on the integration of technology into instructional practices promotes learning. Using technology simply because it exist has less value.

Parr (1999) states that the implementation of technology integration should be incremental and teachers need help connecting the technological and pedagogical knowledge. Bailey (1998) compares technology integration to *Maslow's Hierarchy of Needs* and states that there are 11 themes that must be considered when technology is to be integrated effectively: change, planning, ethics, teaching and learning, safety, security, curriculum, staff development, technical support, infrastructure, and leadership.

Planning and design for technology is a very complicated issue due its variable nature. Change is very rapid, and technology is obsolete within several months of purchase. In some instances, either computer laboratories or libraries become the center for technology planning and use. Loertscher (2006) noted, for example, that in many

schools, teacher-librarians become technology leaders because of the availability of computers (and Internet access) in libraries and, as significantly, because of natural synergies between the research carried on in libraries and the new communications technologies. Media specialists can take a lead role in fostering use of technology tools in the school and are advised by Loertscher (2006) to focus on using clear goals as learning is designed through technology, to match learning goals to learning tasks, to design authentic tasks that foster genuine learning, and to encourage students to explore the possibilities of new technologies as learning tools. This invariably calls for cross-departmental planning to ensure that standards are addressed in technology programming.

Are technology initiatives really working in our schools and is the cost, rapid revolution, and special skills required to operate a fully technological educational setting worth the investment of resources that we have supplied? Haycock (1999) argues that if we focus on learning and then weave technology into the curriculum, then we do our students and teachers a great service. For this to occur, proper emphasis must be placed in the area of preparation. Planning is the key to making technology a success, and it provides the vision for technology into the classroom (Vojtek, 1998).

In order for technology integration to be successful in all facets of the school, especially in the classroom, a well-crafted plan that is in alignment with local and school based strategic plans must exist (Vojtek & Vojtek, 1998). Haycock (1999) states that a vision and plan must be based on learning. He states that it is the responsibility of the school board to provide resources and technologies so that students and teachers are able to access information and use it effectively. The schools then must have a strategic plan in place to use these resources appropriately. According to Sliger (1998) the resources

and implementation of this plan come in the form of budgeting, staff development, and evaluation.

Supportive Environments for Risk Taking

"Leadership in the twenty-first century compels envisioning change. In the future, leaders must do more that react to change; they must orchestrate it. Openness and eagerness for change are essential traits of leaders" (Day, 1995). As a leader, creating a supportive environment for this change is also a necessary factor in the implementation and integration of technology. In a study, Whitaker and Coste (2002), found that at the beginning of their study 90% of the teachers reported they used some type of technology in their instruction; however, the vast majority used video presentations (i.e. video tapes) (2002). Additionally, there was a visible lack in the use of the Internet and enhanced presentation tools. Two years later, after an interdisciplinary model of strategic development on the use of information technology had been instituted they found that email use to regularly communicate with their students rose from 50% to over 90%. Use of the Internet rose from 30% to 80% and use of advanced presentation tools rose by 44%. Whereas the methodology applied is an important one, we must not forget the time aspect. This two year span made a significant difference for these teachers to be able to process, experience, review and utilize these skills. In addition, having an environment that afforded teachers the opportunities to explore, learn, use and integrate new technologies was a significant factor.

Our schools, teachers and students must constantly strive to keep up with the technology and the skills needed to use it effectively. The North Carolina Department of Public Instruction (NCDPI) has identified this need and has since instituted a *Technology*

Strand into every grade level and subject area of the *North Carolina Standard Course of Study (SCOS)*. This requirement has been added to insure technology use in the classroom as a seamless and integral activity, not as an additional subject.

With the recent revision of the *NC Technology Skills Curriculum*, NCDPI's SCOS provides such a model for teachers to use. According to NCDPI, our students should be able to pass an eighth grade Computer Competency Test before graduation from high school. The test consists of the following areas: Computer Ethics, Telecommunications, Word Processing, Spreadsheets, and Databases. The test was most recently administered online in the eighth grade and subsequent grades throughout high school for those who do not pass. Before our students can acquire the skills necessary to pass such a test, our teachers must become proficient in the use and integration of technology into instruction. The issue here is much greater than just passing a test. Whereas NCDPI has set these standards, they are merely a starting point for the technology skills one is expected to learn.

Technical Infrastructure and Support

Recently the BETA (Business Education Technology Alliance) Commission led by North Carolina's Lieutenant Governor, Beverly Purdue, was established so that technology could effectively be incorporated into North Carolina public schools. Recognizing that education is the key to economic development and quality of life for North Carolinians, this alliance, created by the NC General Assembly, was also set up to help develop skills for student success in the 21st century global economy. This initiative is helping to create an environment for teachers to feel comfortable taking risks with technology. Initiatives like this show that it is more than just taking and passing a test. It

is about being functioning, productive citizens of a technological world, and our educators help hold the keys to its success.

Technical infrastructure is a prerequisite for success to occur. Just as visioning, planning, leadership and supportive environments are vital; the connectivity must also be in place. The goal of connectivity and acquisition of technology is one of the most important issues facing school districts. The BETA Commission has set forth four initiatives to prepare 21st century students and the top priority for this group is connectivity. In the 2006-2007 school year this commission successfully obtained six million dollars from the NC General Assembly for this purpose. A proposal is before the General Assembly for the 2007-2008 fiscal year to increase this amount to twelve million dollars and plans are in place for additional monies in the following years. The BETA commission recognizes for all pieces to fit together and work properly, the technical piece is the foundation. However, few systems and decision making bodies are actually putting the necessary resources into the skills needed to operate and effectively use this technology and connectivity. "We passed a computer bond issue and have acquired a tremendous amount of technology, but now that we bought computers, nobody uses them" (Middleton, 1997, p. 22). This type of response seems to be echoed by many systems and unfortunately school systems are finding this to be true. Eastwood (1998) describes how his school system finally admitted, after seven years of technology use, they had seen no greater use of educational technology than seven years earlier. Schools must have a vision and a plan for the integration of technology to successfully occur, as well as have the personnel in place to support these technologies. Anecdotal and

empirical observations, statements and references were observed or heard from teachers noting this fact.

In the early 1990's two middle schools in a western North Carolina district were outfitted with the latest and greatest technology. IBM co-sponsored this initiative and touted 'the five computer classroom' as the panacea for educational woes. Years later teachers had the computers stacked in the back of the room not being used by students. Informal discussions revealed lack of proper planning, instruction and support as the main reasons for the non-use. Eventually the schools re-examined their priorities related to technology and its use (and misuse) in the classroom. In 2000, a district wide strategic technology plan was created. This plan was used by the schools to guide and direct the purchase, hiring of personnel (instructional and technical), and integration and use of technology into the schools. Since its inception, this plan has been revised annually.

Resource Media and Software Tools

The Milken Exchange (1998) created seven dimensions (Learners, Learning Environments, Professional Competencies, System Capacity, Community Connections, Technology Capacity, and Accountability) for gauging technology use. It was recognized that, "Technology is finding its way into classrooms across the nation, but that doesn't necessarily guarantee that teachers or students yet have adequate access to technology, or more importantly that they have the knowledge, skills and abilities to use these tools in ways that advance learning" (p. 18). These dimensions are designed to guide schools and educators on a journey to examine technology and its use and implementation in the educational environment. With these resources the Milken

Exchange hopes schools will capitalize on the aspects of the value technology can bring to the learning environment.

The use of technology as an educational tool is solidly grounded in a constructivist view of learning. Only through interaction and inquiry based learning environments do students fully realize the tools they have at hand. Realization of how to use the tools to get the desired result is vital. "When you go to the hardware store to buy a drill, you don't actually want a drill, you want a hole. They don't sell holes at the hardware store but they do sell drills, which are the technology to make the holes. We must not lose sight that technology, for the most part, is a tool and it should be used in applications which address educational concerns" (Fletcher, 1996, p. 87)

Cuban (2001) in his book, *Oversold and Underused – Computers in the Classroom*, offers insight regarding the pressures and the traditions that block many teachers from making more powerful use of these new tools. His book is important for those who wish to promote significant use of new technologies because it dispels the notion that merely installing computers automatically translates into a transformation of classroom activities, otherwise known as curriculum integration. While he does not offer a plan to translate these technology investments into impressive learning gains, his discussion of the roots of disappointment should help technology planners improve their efforts. Technology hardware, software and other resources should be viewed as a tool, one in which students and teachers can re-engineer fundamental activities for learning to occur effectively and efficiently.

Morehead and LaBeau (2004) believe technology can be used as a tool for communications and inquiry through a constructivist approach by fostering student

learning through real-life applications. Through a district technology initiative teachers had the opportunity to change instruction relative to technology integration. Teachers were evaluated on: integration of technology into instruction, transformation of traditional lessons, creating a team environment to support each other, use of the media center as a vital technological resource, and sharing resources and ideas. Through the efforts of the teachers, the realization was made that technology is one of many tools available for teaching and learning and that use and availability of the technology coincide. The placement of computers in the classrooms did not guarantee use. "Technology opens a whole new realm of possibilities for creating exciting learning environments that will ensure our children the opportunity for successful and productive lives in the 21st century. However, as education leaders, we must recognize that technology will not have an optimal impact until schools reorganize their structures, priorities, and methods." (Day, 1995)

Community Linkages

Using community linkages to support technology is also a major contributing factor to technology use in the educational setting. As stated earlier, the BETA Commission is a driving force of educational reform in North Carolina. The alliance between the business and industry sector and education proves the importance of such partnerships. In addition, alliances such as this spur additional communication between the educational system and those outside of that arena. The Milken Exchange (1998) discusses community connections as follows:

> The concept of "school as community center" has been making its way back into cities across the country with a new twist; both local and global communities can

> now get involved. Community investments in technology for schools not only benefit K-12 students, but also pay dividends for citizens in new opportunities. Possibilities include: increased access to computer services, electronic information on the Internet and higher education classes via satellite or interactive video, student access to expertise among local and global community members and some compelling new ways in which students can give back to both communities through their high-tech expertise (p.26).

With the proliferation of electronic communications, email has become a normal and everyday part of life. Educators are embracing this along with the Internet to disseminate information to parents and the public. Students today have grown up with the Internet, email, cell phones and text messaging and consider this type of connectivity and communication commonplace. Educators (from another era) must adopt and adapt to these forms of communication. Schools use technology communication tools to "collaborate, publish, and interact with peers, experts and other audiences. Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences" (Day, 1999).

Professional Development and Technology Use in Education

In-service Teachers

While it is certainly necessary to understand how various conditions impact technology use in the schools, a few of which were mentioned above, the issue of professional development for teachers expected to use technology effectively is also quite important. Rivero (2005) pointed out that all too often, schools acquire technology that teachers are expected to use in instruction and in administrative functions without

providing them with the training needed to master the tools themselves. This analyst suggests that before any new technology tools are introduced into the classroom, teachers should be provided with staff development activities that will enable them to learn how, when and why these tools should be implemented.

In this same context, McCarthy (2006) described the importance of surveying teachers as to their perceptions of the types of professional development or learning activities related to educational technology needed. It is vital that the teacher participate in professional development opportunities; however, research related professional development shows that teachers "expressed a need for continued effective technology training to stay on top of that rapidly evolving field. Significantly, they wanted to have personal control over their own professional development, which included pursuing college courses or advanced degrees, conferences, workshops, and training in new techniques"(Dagenhart, et. al, 2005). Staff development is increasingly seen as an important element in achieving the goals of the No Child Left Behind Act (NCLB), which also calls for using technology to the fullest to improve student achievement. Rather than simply providing staff development programs, schools should determine the level of technology knowledge teachers possess and work forward from that point.

Technology-focused staff development in education, according to Bush (2005), is often best delivered through technology itself rather than in more traditional settings or formats. Teachers should be encouraged to use online programs to become more comfortable with technology and its potential for classroom use. Indeed, NCLB contains provisions for this type of activity and stresses the importance of integrating technology into classroom practice. Due to this, using software programs and other resources

available online to help teachers become conversant with technology and its potential is highly recommended. Such training is cost-efficient and enables teachers to advance at their own pace.

Love and Isles (2006) commented on the fact that state and district curriculum authorities are encouraging students and teachers to use asynchronous online discussion groups to communicate with each other and with others outside of their schools or classes. While this is an important potential source of learning it is a new communication channel for both teachers and students, and does require that teachers learn how to create and maintain online chat rooms, discussion groups, blogs, and monitor online activities. Here again, professional development is needed. The problem, as identified by Love and Isles (2006), is that there is less support than needed for teachers who are attempting to build cyber-communities in school contexts. This is an instance in which the potential of technology maintains a pace greater than the resources (including professional development) available for facilitating its proper use.

One strategy for providing help to teachers who are being asked to integrate computer and other technologies into their classrooms is to create summer school programs for them. Anderson (2004), for example, suggested that Media Specialists who are actively involved in staff development are an ideal source of professional instruction for these kinds of programs. Making provisions for teachers to participate in programs during "down time" and summer breaks from the classroom may also make it possible to offer intensified learning experiences. A successful summer technology program, however, must be based on perceived needs for new instruction and professional development, available resources and financial support for such a program. For many

teachers, summer breaks from the classroom are viewed as a vital time for rest and relaxation; nonetheless, the summer school program is an excellent opportunity to make use of school computer labs and other facilities to enhance teachers' ability to deploy technology appropriately and effectively in their classrooms. Briggs (2006) pointed out that teachers are being challenged to use many mobile or hand held devices in their classrooms. However, they are also expressing concerns that adequate training on the use of such devices is not being provided.

Professional development for teachers is another key ingredient to the success of technology integration. Scheffler (1999) states that regardless of the number of computers placed in the classroom, the key to how those computers are used lies with the teacher. Sources state that 99% of our classrooms are connected to the Internet. This, however, is of no consequence unless our teachers know what to do with the tools in front of them. Vojtek & Vojtek (1997) note that wires and hardware will not make all the technological connections; the human connections must take place as well. The learning process is most important, and the technology is there as a tool to help insure, promote, and encourage the learning process. Teaching and learning, not technology, should be the focus, and teachers feel less overwhelmed when they realize this important point.

Clifford (1998) states that as much as 15 to 20% of our annual technology budgets should be set aside for technology staff development. Due to inadequate training and staff development, teachers are falling increasingly behind in the skills necessary to implement the use of technology as a tool in the classroom. Twenty percent of the annual budget is an outstanding goal. On average systems spend less than 151% of their technology budgets on teacher training (Day, 1996). These staff development activities

need to be worthwhile for the teachers. They should have short and long-term goals, have structure and policies, have an assessment component, provide different delivery options, and should be supportive (Lesey, 1998). The training requirements should also have a hands-on emphasis, should occur over time, should involve modeling, mentoring, and coaching, and should provide post training access (Roblyer, 1998). In other words, "one shot" training efforts do not transfer to the classroom, and therefore, the large investment in the technology is wasted. Agencies such as the National Staff Development Council (2001) have shown staff development training must be ongoing, sustained and supported across the curriculum. In particular,

> …sit-and-get training sessions or one-time-only workshops have not been effective in making teachers comfortable with using technology or adept at integrating it into their lesson plans. Instead, a well-planned, ongoing professional development program that is tied to the school's curriculum goals, designed with built-in evaluation, and sustained by adequate financial and staff support is essential if teachers are to use technology appropriately to promote learning for all students in the classroom (NCREL, 2000).

Teachers are the key to successful integration of technology and must be the center component in that integration (Tinson, 1996). Educators have now realized that technology is a critical part of learning and that staff development for our teachers in this area must be available, continuous, and maintained in order for this transference to occur (Clifford, 1998). In order to incorporate new technologies, teachers need more than just access, they need to discover how to use technology, as well as be able to experiment on how to use these technologies in the classroom (Day, 1996). According to sources such as

NCDPI and the North Carolina SCOS, technology should be used routinely across all grade levels and subject areas as students and teachers perform their work. At that point, technology is no longer the object of the lesson but becomes a means for the lesson. When this happens, technology is fully integrated into the curriculum (Eib, 1998). If technology is woven into the curriculum, it becomes an everyday occurrence, resulting in true integration and infusion.

The need for educational technology as an integral part of the preparation of teachers has been well established. The gap however continues to grow between teacher preparation on technology use and student knowledge of technology use. As an example, university faculty in teacher education programs must become literate and proficient in the use of technology in the classroom and must understand the curricular significance of its use. When this occurs, transference of knowledge and technology skills from professor to student (prospective teacher) will occur. This modeling approach will then flow down to the classroom of those pre-service teachers when they arrive in the classroom.

The integration of technology should be viewed as an evolutional process not a revolutional one (Vann, 1997). We must first define technology integration to our educators. Educators must understand that teaching technology, simply because it is available, is not appropriate. They must understand that the curriculum is primary and that technology is simply a tool to help them teach the curriculum and realize its full potential.

It is not, however, just the pre-service teachers who are lacking. Current classroom practice also lacks the integration of technology in instruction. Teachers must

learn to use technology meaningfully in their instruction. Applicable technology staff development activities must occur to keep current teachers up-to-date on the major concepts and application involving technology and its use in the classroom.

Pre-service Teachers

This change must occur over time, and it must start in the Colleges of Education, and continue through our school districts, buildings, and classrooms (Falba, 1999). Institutions of Higher Education must lead the way with the training of teachers. Additionally, current teachers should continue staff development to hone and continually update their technology skills as related to the curriculum. Learning is a life long process, and teachers are full participants in this process.

Pre-service teacher institutions play an important role in the integration of technology. Ropp (1999) found that attitudes toward technology in pre-service teachers definitely contributed to the effective use of technology in the classroom. She discovered that if teachers demonstrate proficiency in integrating technology into their teaching but do not believe that technology has a use in the classroom, they probably would not teach with technology despite their proficiency. Fox (1996) analyzed efforts to integrate technology into pre-service training and found that students need to be trained in the integration of technology. She found that students (pre-service teachers) are lacking basic skills needed to incorporate technology into their instructional activities. Student practice with educational technologies was modeled after their professors. Therefore, university faculty should embrace this approach of integration of technology (Persichitte, 1999). Stetson and Bagwell (1999) state that initial training, adequate resources and integration into methods courses are three vital parts to technology integration.

In order for technology to be used by our teachers, they must be properly trained, supported and prepared to use and infuse technology into their curriculum. After teachers reach the classroom, professional development on the integration of technology into the curriculum must continue and must be used on a regular basis as a tool to enhance and promote education. In addition, teacher education programs around the nation are examining their own programs and are being challenged to prepare prospective teachers to use technology appropriately in their instruction. The National Council for Accreditation of Teacher Education (NCATE) in October of 2003 revised their accreditation guidelines to include sections for institutions to respond to new standards for initial technology teacher education programs. These standards are based on the International Society for Technology in Education (ISTE) and Council of Technology Teacher Education curriculum standards. In order for technology to be fully integrated, there should be a clear vision and goal; training and continuous support for teachers should exist; systemic planning, evaluation, and revision should be constantly occurring (Eisenberg, 1999).

Professional development is vital; however, as in all areas of professional development, educators need the time to attend to and then implement the skills acquired. Educators, both those in the classroom and those preparing to teach, need staff development opportunities to assist them with the integration of educational technology.

Learning Outcomes of Students and Teachers Linked to Technology

Because new technologies are costly to acquire and to use, it is vital to justify their purchase and use with respect to previously established benchmarks, measures, outcomes and results. The No Child Left Behind (NCLB) Act calls for using standards-

based teaching and assessment methodologies. This is as applicable in the technology arena as elsewhere (Bush, 2005). In many instances, the use of specific technology rubrics is recommended as a means of ensuring that technology tools accomplish what they are meant to accomplish in terms of learning outcomes (Loveland, 2005).

Dillon (2006) underscored this issue in a discussion of the skills required for success in a new century in which communication technologies are becoming a dominant influence over teaching and learning as well as the workplace. This educator suggests what matters is not mastering technology but mastering the skills that can be facilitated through technology use. Teachers and students alike must recognize that technology tools are being used not as an end in themselves but rather as a means to an end. The goal being, naturally, improved skill mastery, learning, and achievement for both students and teachers. Standards-based education is clearly here to stay, and all participants in the educational system are being held to new and higher levels of accountability.

Dornisch and Sperling (2006) noted that technology-enhanced texts are being used in more and more classrooms across the country to improve student learning. Though these researchers focused on the use of a specific learning strategy (Prompted Elaborative Interrogation), their comments regarding the proliferation of online and CD-ROM-based textbooks are relevant herein. These new "texts" are a viable alternative to more traditional print texts that have been the standard for so long. However, when using these new texts, it is vital that instruction be designed so that proper and authentic assessment of learning outcomes can be achieved. Invariably this will mean the new texts must be relevant to the larger course content and curriculum, be amenable to assessment and evaluation, and be subject to rigorous testing standards. It is not enough

to simply assume that any and all texts available online or via CD-ROM are likely to be appropriate for all classroom use.

Teachers and students can also be assessed via ePortfolios which are assemblies of materials and products that are representative of learning activities and which can be assessed with respect to learning outcomes. Wickersham and Chambers (2006), writing about the use of this strategy in teacher education, suggest that there are several benefits to such materials. They can be useful in assisting teachers in developing organizational skills, mastering technology itself, and transferring skills from one domain to another. Most significantly, by educating teachers on how to use such portfolios and the technologies underpinning them, the teachers are being prepared for classroom proficiency in transferring their knowledge to students.

Shields (2004) called for taking a district level approach to assessing technology learning outcomes for students and teachers. The purpose of deploying new technologies in the educational arena is, ultimately, to improve instruction and student learning. Making sure through rigorous testing and standards-driven rubrics that this occurs is necessary. Rubrics provide a framework for identifying what is to be taught, how it will be taught, and what will be learned along with methods for assessing or evaluating learning outcomes. As any educator knows, it is vital to be able to demonstrate that learning has occurred; given the costs of technology-based instruction, this is even more important today than in the past. Unfortunately some of these outcomes are sometimes difficult to measure. Simply looking at End of Grade (EOG) and End of Course (EOC) test scores will not accurately depict what is occurring within a classroom.

Teacher opinions and perceptions are one measure of how technology is changing the face of the learning environment. Starr (2003) reported in a survey of six hundred teachers, 85% felt that technology (classroom computers) improve student performance. In addition, 72% believed that students who had access to technology at home have a major advantage over those who do not, 63% said technology increased their communications with parents and 76% stated that staff development and training is key to technology use. Whereas these are not scores directly related to student achievement they are indicators of success for all students and teachers.

Conceptual Framework

Seeman (2003) believes in a holistic approach to technology education. He believes that three basic principles combine to create this holistic approach: the social principle, the environmental principle and the tool principle. The social principle refers to the necessary human factor as both a resource and a constraint. The environmental principle refers to the environmental setting or conditions both as a resource and constraint. The tool principle refers to anything we give use-value or worth to as both a resource and constraint. These three principles combined design a setting applicable for designing or implementing technological use.

Seeman states that we must design this holistic approach in the curriculum in ways that will promote technological literacy. Building on this design, a conceptual framework has been created that has technology literacy as the overall concept, or holistic model. Within this holistic arena of technology literacy, the categories of the literature review share in the makeup of technology literacy. For purposes of this study, the staff development component parallels the social principle, conditions aligns with the tool

principle and external factors support the notion of the environmental principle. Figure 1, details staff development, conditions and other influential indicators to build the inner core for technology literacy in schools. These three factors combine to create an environment where technology literacy can be achieved.

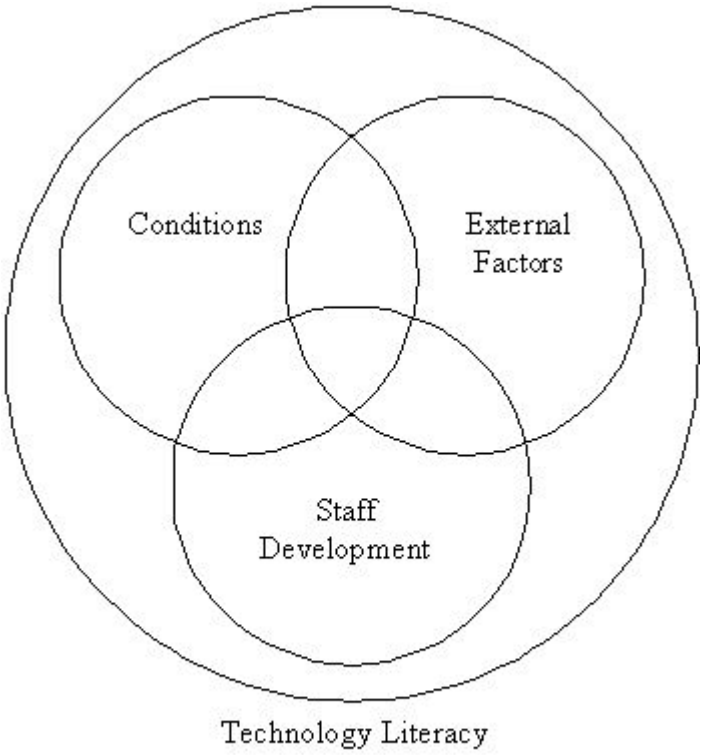

Figure 1

Summary of Literature

Many factors may influence needs in schools related to the integration of educational technology. Through the literature review, the researcher discovered they all tend to fall into one of the above mentioned areas. Several initiatives lay the ground work

for optimal conditions in schools for technology use. Planning and vision are key to technology integration and implementation. A well organized and succinct plan with proper leadership, goals and objectives is paramount. In addition, a concrete and shared plan sets an environment for vision and goals to be attained and for educators to feel comfortable taking the necessary risks involved. Conditions such as adequate technical support and hardware and connectivity also play a key role. Resources such as hardware, software, and access coupled with properly placed personnel fuel the optimal conditions influencing technology use. Initiatives and policies such as North Carolina's Standard Course of Study incorporate a level of technology competency and use in every grade level and subject from kindergarten to twelfth grade to spear head the efforts for technology integration. Other national initiatives such as the ISTE and NCLB also call for technology literacy of our students. Educators will be valuable contributors to the use of technology**.**

The use of technology in the classroom is varied. Likewise the reasons for technology use, or lack of use, are just as varied. The ultimate goal is to have technology fully integrated into the curriculum so that it is a seamless task for students and teachers alike. When this occurs, our students and teachers are well on their way to effectively using technology. However, this must start with teacher preparation. Professional development of our educators is a vital part of technology integration and infusion. If our teachers do not have the proper training on how to use technology, then all other efforts are limited. As the literature reviewed herein suggests, technology is a tool that must be harnessed to well-defined and measurable learning outcomes. Teachers must be trained on how to use these tools appropriately. Technology can facilitate learning while also

preparing students and teachers for improved performance, only if each piece of the technology puzzle fits together.

CHAPTER III

RESEARCH DESIGN

Purpose

The purpose of this chapter is to set out the procedural aspects of the study. To deal with accuracy of information, a quantitative approach using a cross-sectional survey design instrument was chosen. This approach allows a higher degree of objectivity to determine what respondents think independent of the views of the researcher and to reduce researcher bias. This is particularly important in this study because of the researcher's strong involvement on a daily basis in the use of educational technology as a tool to promote learning in this particular school district. This chapter will report on the approach chosen and how the survey instrument was administered and the data were analyzed. The study centered on what conditions influence technology use; how professional development activities are offered and implemented; and what impact technology has on teaching practice and student outcomes; and to determine if a difference exists between 21st century schools and non-21st century schools.

Research Questions

This study proposed the following questions for examination:

1. What are the conditions for technology use in schools related to vision and leadership?
2. What are the conditions for technology use in schools related to planning, budgeting and evaluation?
3. What are the conditions for technology use in schools related to supportive environments for risk taking?
4. What are the conditions for technology use in schools related to technical infrastructure and support?
5. What are the conditions for technology use in schools related to resource media, software and tools?

6. What are the conditions for technology use in schools related to community linkages?
7. What are the professional development opportunities that may affect technology use in your school?
8. What are the professional development participation opportunities as it relates to technology use in your school?
9. How do all above mentioned conditions impact classroom practice and reflect on student activities in the classroom?
10. How do all above mentioned conditions affect the impact of technology in the classroom?
11. How do 21st century schools compare to non-21st century schools related to vision and leadership?
12. How do 21st century schools compare to non-21st century schools related to planning, budgeting and evaluation?
13. How do 21st century schools compare to non-21st century schools related to supportive environments for risk taking?
14. How do 21st century schools compare to non-21st century schools related to technical infrastructure and support?
15. How do 21st century schools compare to non-21st century schools related to resource media, software and tools?
16. How do 21st century schools compare to non-21st century schools related to community linkages?
17. How do 21st century schools compare to non-21st century schools related to professional development opportunities that may affect technology use in your school?
18. How do 21st century schools compare to non-21st century schools related professional development participation opportunities as it relates to technology use in your school?
19. How do 21st century schools compare to non-21st century schools related to the impact on classroom practice and reflect on student activities in the classroom?
20. How do 21st century schools compare to non-21st century schools related to the affect the impact of technology in the classroom?

Participants/Location of Research

In 2002-2003 three elementary schools in this district received a Federal CTLC grant. This grant brought nearly two million dollars to these three 21st century schools over a four year period of time. These funds were used for a vast array of expenses to meet technology needs and to create an environment where optimal conditions existed for technology use. Expenses ranged from the purchase of equipment (computers, projectors, PDAs, laptops, etc.), the hiring of an after school coordinator/instructional

facilitator at each location, after school tutors and assistants, to providing professional development opportunities. The researcher sought to determine if there was a relationship in technology use by comparing these 21st century schools' responses on the survey to the other schools in the district that did not receive the grant. Table 1 below depicts the number of possible respondents per location.

Table 1: Possible Respondents per Location

Name	Teachers Per Location
School 1	19
School 2	16
School 3	3
School 4 *	29
School 5	35
School 6	127
School 7	66
School 8	39
School 9	154
School 10 *	40
School 11	48
School 12	21
School 13	57
School 14	36
School 15 *	32
School 16	28
School 17	46
School 18	11
School 19	33
School 20	32
School 21	42
School 22	43
School 23	22
School 24	42
School 25	58
School 26	32
School 27	36
School 28	49
Grand Total	1196

* Twenty-first century schools

Researcher Role

The researcher used Survey Monkey (an online survey site: www.surveymonkey.com) to set up the questionnaire where the data resided, thus the researcher did not have access to the data until the survey was completed. Survey Monkey did not track the messages for the source of the sender. Thus, neither the researcher nor the managers of Survey Monkey were able to identify the individual completing the survey.

The researcher, at no time, had access to each participant or the actual email addresses, ensuring confidentiality for the participants. Since the instrument chosen was emailed to a group of individuals, the researcher had no idea which recipients responded and therefore anonymity was maintained. Since this questionnaire involved no more than minimal risk, privacy for recruitment was not applicable. There was a small chance for persons to be identifiable based on the information requested but the researcher assured anonymity and confidentiality.

Instrumentation

Respondents (certified school teachers (n = 1196)) were surveyed, and asked to self-identify the number of years they have been teaching, and what grade they currently teach. In addition, they were asked to identify what school they represented. There was a small chance for persons to be identifiable based on the information requested but again, the researcher assured anonymity and confidentiality. All data obtained in this study were reported as group data. The only person who had access to these data was the investigator. This allowed the researcher to compare the three schools who received the CTLC Grant to those who did not.

Informed consent was obtained through an introduction letter emailed to all possible participants (1196 certified teachers) in the public school district. Actual participation in this survey implied consent to participate. Through the introduction letter, explanation was given regarding the anonymity of the survey participants. This survey posed nothing more than minimal risk and did not require a signature for consent.

Participants were emailed the informed consent letter and invitation to participate in the survey in February 2007. A follow-up letter to participants and a letter to administrators was sent approximately a week to ten days later encouraging participation in the survey. All certified teachers were invited to participate; all had an email address and access to the Internet in every classroom and media center.

This study required teachers to complete an online survey, the School Technology Needs Assessment (STNA) developed by SEIR*TEC **(**SouthEast Initiatives Regional Technology in Education Consortium) to assess their needs related to technology in the educational setting. The STNA was designed to gather data for the NCLB EETT projects mentioned earlier in the literature review. Furthermore, the STNA was created to assess the needs of a school staff collectively in the areas of conditions influencing technology use, professional development opportunities offered and taken, and the impact of technology on classroom practice and student learning outcomes (Corn, 2006). Prior to the development of this study, the researcher conducted a literature review to identify possible instruments appropriate for examining technology needs in schools. The result was the STNA which was used in this study.

The STNA was used in this public school district to survey 1196 teachers to better understand their needs related to technology in the classroom. The instrument consists of the following major constructs and sub constructs addressed by the STNA:

- Section I: Professional Profile
- Section II: Conditions for Technology Use
  - Vision and Leadership
  - Technology Planning, Budgeting, and Evaluation
  - Supportive Environment for Risk Taking
  - Technical Infrastructure and Support
  - Resource Media, Software and Tools
  - Community Linkages
- Section III: Professional Development – Opportunities
  - Skills, Policies and Structures
- Section IV: Professional Development – Participation
  - Instructional Strategies
- Section V: Classroom Practices
  - Instructional Strategies
  - Planning
- Section VI: Student Activities
  - Tools and Tasks
- Section VII: Impact of Technology
  - Teaching Practices
  - Student Outcomes

The instrument consists of seven major sections or constructs:

Section I: Professional Profile for obtaining demographic information consisting of the three items (items 1-3): school, number of years in education (0-3, 4-10, 10-20, 20-30, 30+) and the grade level(s) (PK, K, 1,2,3,4,5,6-8, 9-12).

Section II: Conditions for Technology Use (Table 2) which consist of 32 likert scale questions (questions 4 through 35) containing six sub constructs to address the conditions related to research questions 1 through 6 and 11 through 16.

Section III: Professional Development – Opportunities (Table 3), covering one sub construct, consist of eight likert scale questions (questions 36 through 44) to address the conditions related to research questions 7 and 17.

Section IV: Professional Development – Participation (Table 4), covering one sub construct, consist of seven yes/no questions (questions 45 through 51) to address the conditions related to research questions 8 and 18.

Sections V and VI: Classroom Practices and Student Activities respectively (Table 5), covering three sub constructs, consist of 20 likert scale questions (questions 52 through 72) to address the conditions related to research questions 9 and 19.

Section VII: Impact of Technology (Table 6), covering two sub constructs, consist of nine likert scale questions (questions 73 through 81) to address the conditions related to research questions 10 and 20.

Table 2: Conditions for Technology Use

Section II. Conditions for Technology Use
Respondents were asked to rate the questions on a likert scale with the following responses: “Strongly Agree," "Agree," "Disagree," or "Strongly Disagree.”

Sub Construct	*Questions*
Vision and Leadership	4) A shared vision for technology has been developed through an effective collaboration among stakeholder groups—teachers, other staff members, students, parents, and members of the community.
	5) The vision for technology use has been effectively communicated to the community.
	6) Administrators model effective uses of technology.
	7) Administrators support changes in school-level systems, policies, and practice related to technology.
	8) Administrators guide the school toward more effective uses of technology.

Technology Planning, Budgeting, and Evaluation	9) An effective long-range school technology plan is in place.
	10) The school technology plan is developed by a leadership team or committee involving a variety of school stakeholders (i.e., media coordinator, technology facilitator, teachers, students, and community members).
	11) The school technology plan is monitored and updated adequately.
	12) The budget for technology resources is adequate in size to support decisions arising from planning and to continuously update and replace technology systems as they become outdated.
	13) Supplemental sources of funding are actively pursued to support technology (e.g., external grants, collaboration with community or parent groups, and support from businesses).
	14) Teachers and other staff members support the school technology plan.
	15) Multiple sources of data are used to evaluate the implementation of technology programs.
	16) Multiple sources of data are used to evaluate the impact of technology programs on teacher practice and productivity.
	17) Multiple sources of data are used to evaluate the impact of technology programs on academic achievement and other student outcomes.
Supportive Environment for Risk Taking	18) Teachers are encouraged to take risks and be inventive with technology use.
	19) Teachers who are innovators with technology receive incentives or rewards for their hard work (e.g., funding, perks, waivers, special opportunities).
	20) The media center can be flexibly scheduled to provide equitable access to resources and instruction.
	21) Computer labs can be flexibly scheduled for equitable access to resources and instruction.
	22) Mobile computers can be flexibly scheduled to provide equitable access to resources and instruction.
Technical Infrastructure and Support	23) An adequate technology base is available (e.g., computers, digital cameras, projection devices, scanners, printers).
	24) Communication systems within the school are adequate (e.g., e-mail among teachers and staff, network drives to upload lesson plans and grades to the main office).
	25) Systems to communicate with parents and the community are adequate (e.g., e-mail, teacher, and/or school Web pages).
	26) Reliability and speed of connections to the external Internet, online databases and resources, etc., are adequate.
	27) Adequate access to technical support is available (e.g., to troubleshoot hardware or software problems, maintain systems).
	28) Adequate staffing is readily available in library media coordinator and/or media assistant positions.

	29) Adequate staffing is readily available in technology facilitator and/or technology assistant positions.
Resource Media, Software Tools	30) Adequate access to student productivity software is provided (e.g., graphic organizer, word processing, slide presentation, or drawing applications).
	31) An adequate cataloguing system is readily available, with which staff members can search and locate teaching materials.
	32) An adequate collection of print, multimedia, and electronic resources is readily available.
	33) Both the curriculum and the needs of learners are considered in making resource media and software selection decisions.
Community Linkages	34) Community and/or business partnerships are successfully engaged to support and advance the technology program.
	35) Parent and community stakeholders are kept informed of successes and progress with the technology program.

Table 3: Professional Development - Opportunities

Section III. Professional Development – Opportunities
Respondents were asked to rate the questions on a likert scale with the following responses: “Strongly Agree," "Agree," "Disagree," or "Strongly Disagree.”

Sub Construct	*Questions*
Skills, Policies, and Structure	36) Teachers and staff members have a strong base of knowledge, skills, and understanding about contemporary technologies.
	37) Technology literacy and leadership are actively considered when seeking and hiring teachers.
	38) Teachers have a say in the selection and evaluation of professional development topics.
	39) Professional development opportunities are provided to observe classrooms where effective technology integration is taking place.
	40) Professional development opportunities are provided to work with small groups of peers on real projects intended for use in classrooms.
	41) Professional development opportunities are provided that require keeping a journal or otherwise reflecting on how professional development will be employed in classrooms.
	42) The impact of professional development is tracked by looking for evidence of improved classroom practice and/or student learning.
	43) Technical and instructional support staff members (e.g., media coordinator, technology facilitator) are given adequate opportunities for professional development.

	44) Professional development activities can be applied to meet licensure and/or renewal requirements.

Table 4: Professional Development - Participation

Section IV. Professional Development – Participation
Respondents were asked to rate the questions "Yes" if you did participate in the described professional development opportunity in the past 12 months or "No" if you did not.

Sub Construct	*In the Past 12 Months…*
Instructional Strategies	45) I participated in professional development opportunities, examining research-based practices in technology-enhanced classrooms.
	46) I participated in professional development opportunities examining identification, location, and evaluation of technology resources (e.g., websites).
	47) I participated in professional development opportunities examining student assessment in technology-enhanced classrooms.
	48) I participated in professional development opportunities examining learner-centered teaching strategies in technology-enhanced classrooms (e.g., project-based or cooperative learning).
	49) I participated in professional development opportunities examining online security and safety.
	50) I participated in professional development opportunities examining the uses of technology to improve individual teacher productivity.
	51) I participated in professional development opportunities examining ways to involve parents and the community in student learning with technology.

Table 5: Classroom Activities and Student Activities

Section V. Classroom Practices and VI. Students Activities
Respondents were asked to rate the questions on a likert scale with the following responses: "Daily," Weekly," "Monthly," "Once per Grading Period," or "Never."

Instructional Strategies	52) I consult publications, online journals, or other resources to identify research-based practices in teaching with technology.
	53) I identify, locate, and evaluate technology resources (e.g., websites).
	54) I apply performance-based student assessment to technology-enhanced lessons (e.g., student portfolios, student presentations).
	55) I use technology to collect and analyze student assessment data.
	56) My lessons include technology-enhanced, learner-centered teaching strategies (e.g., project-based learning).

	57) I apply policies and practices to enhance online security and safety.
	58) I use technology to support and increase teacher productivity.
	59) I use technology to increase my access to professional development resources.
	60) I use technology to support communication and interaction with parents and the community.
	61) I use technology to support communication and interaction among staff members.
Planning	62) My lesson plans refer to both content standards and student technology standards.
	63) I do research or action research projects, or apply the results of my research to improve technology-enhanced classroom practice.
	64) I use multiple sources of data to reflect on professional practice and make decisions about the use of technology.
Tools and Tasks	65) Students use a range of technologies (i.e., productivity, visualization, research, and communication tools).
	66) Students communicate and collaborate with peers, content experts, or others outside the classroom using technology.
	67) Students use technology to access online resources and information as a part of classroom activities.
	68) Students use advanced, professional research tools and information (e.g., simulations, databases, satellite imagery).
	69) Students work on relevant, technology-enhanced projects that have meaning and approach real-world applications of technology.
	70) Students use technology to help solve problems.
	71) Students use technology to support higher-order thinking (i.e., analysis, synthesis, and evaluation of ideas and information).
	72) Students use technology to create new ideas and representations.

Table 6: Impact of Technology

Section VII. Impact of Technology
Respondents were asked to rate the questions on a likert scale with the following responses: “Strongly Agree," "Agree," "Disagree," or "Strongly Disagree.”

Sub Construct	*In my Classroom…*
Teaching Practice	73) Teaching is more student-centered and interactive when technology is integrated into instruction.
	74) Teaching practices emphasize teacher uses of technology skills to support instruction.

	75) Teaching practices emphasize student uses of productivity applications (e.g., word processing, spreadsheet).
	76) Teaching practices emphasize student uses of technology as a regular part of specific teaching strategies (e.g., project-based or cooperative learning).
Student Outcomes	77) Technology has helped students become more socially aware, confident, and positive about their future.
	78) Technology has helped students become independent learners and self-starters.
	79) Technology has helped students work more collaboratively.
	80) Technology has increased students' engagement in their learning.
	81) Technology has helped students achieve greater academic success.

Procedures/Data Collection Methods

The initial request for participation went out in February 2007. An ethical review protocol was completed as required by the University of North Carolina at Chapel Hill Institutional Review Board (IRB). The ethical review protocol submitted provided details of how the survey was conducted including information on how anonymity and confidentially were maintained.

After the initial survey instrument was approved by the various committees, the researcher met with the Superintendent in the school district to seek approval to administer the survey to the teachers. The researcher distributed the invitation to answer a questionnaire through electronic mail (e-mail) with a link to a webpage on Survey Monkey. The main factors leading to this type of administration were the speed of the expected return and this method of distribution being the least expensive and labor intensive. SEIR*TEC allows for the STNA to be reproduced, thus an electronic-based survey was created to collect the data while also ensuring confidentiality and anonymity. The survey in no way identified participants. Survey Monkey provided the researcher

with raw data, and the researcher tabulated the results for further analysis. The software used was the Statistical Package for Social Sciences, commonly known as SPSS.

The reports, along with all the necessary computer files, were analyzed by the researcher with assistance from the Odium Institute on the campus of the University of North Carolina at Chapel Hill. These data were burned to a compact disk and were stored in a safe location both at the researcher's work and home offices.

Data Analysis

Quantitative Methodology

All completed raw survey data were exported from the STNA on Survey Monkey to SPSS. Descriptive statistics were reported on the demographic data as well as a summary report by question that included frequencies, percentages. Likert scale questions have a range of answers that is discrete, not continuous. The researcher averaged teacher responses within each section so that each teacher had one value per section. Reporting of descriptive statistics on each section was administered to assess research questions one through ten. In addition, the researcher calculated a Cronbach Alpha to assess internal consistency and reliability and to compare results to the survey designers to seek compatibility. The researcher ran a t-test to assess potential differences between 21st century schools and non-21st century schools to answer research questions 11 through 20. The researcher sought to find a significant difference in mean answers between 21st century schools and non-21st century schools on each sub construct (i.e. Vision and Leadership). In this analysis, an alpha level of .05 was used to test for statistically significant associations. The analysis of the data was carried out using the advanced analytical tools found in SPSS.

Reliability and Validity

The STNA was chosen to meet the needs of the study because the questions were found to be highly reliable as indexes for this study. A reliable change can be defined in terms of the reliability of the measurement instrument (Jacobson & Truax, 1991). Reliability relates to the consistency of the measurement. To what extent are the scores the same from one administration to the next (i.e. administration of the STNA by SEIR*TEC versus this survey). A very reliable instrument produces nearly identical scores each time the instrument is used. Psychological instruments are not as reliable as the physical measurement of distance, however, when one measures a person again using the same psychological scale they typically do not get exactly the same score. The error variance in a set of scores that is due to the unreliability of the scale is called the standard error of measurement. Scales that are highly reliable will have a small standard error of measurement. If one has a reliability scale (typically measured as Cronbach's alpha) and the standard deviation of the raw scores on that scale, the expected standard deviation of the variability of the error scores can be found.

According to Corn (2006) the STNA constructs and sub constructs all show high internal consistency reliability at an alpha of .80 or higher. Three main construct areas (conditions for technology use, professional development, and classroom practices) had an alpha of .967, .919, and .948 respectively. These alpha scores prove that the STNA is a high quality survey instrument that can provide schools and school districts with valuable information on needs related to technology use in the educational setting. In addition, Corn has shown construct validity by aligning each question on the STNA with

at least one national standard or best practice. This linkage is supporting evidence that the STNA has construct validity.

Limitations

In addition to the above mentioned limitations, the decision to have anonymity limited the researcher's ability to follow up individually with the non respondents. This limitation possibly affected the response rates, and therefore inadvertently contributed to a lower response rate.

Summary of Methodology

This chapter described the procedures and methods used in this study. The purpose, research questions, researcher role, participants/location of research, instrumentation, procedures and data collection methods and data analysis of quantitative methodology and validity were presented in detail. The survey instrument, the STNA, was described to understand its relevance to the study and how each construct and sub construct related to the research questions. The chapter concluded with the data collection and analysis methodologies.

CHAPTER IV

RESEARCH FINDINGS

Demographic Results

As described in the previous chapter, approximately 1200 teachers in this school district were invited to participate in the study by responding to the online survey. All teachers in 28 schools, three of which were 21st century schools, were given the opportunity to participate. Data collection took place over a ten day period allowing teachers the opportunity to respond. Following the invitation to participate, 485 teachers completed the survey producing a survey response rate of 41%. According to SuperSurvey.com, who conducted a meta-data analysis if 199 different surveys and over 520,000 invitations, an average total response rate of 13.25% was realized. In surveys with less than 1000 invitations, a 41.21% response rate was reported. These data support the response rates and results of this particular survey. Response rate was monitored daily during the deployment period to gauge the need for reminders to teachers participating in the survey. Table 7 details a break down of respondents by school to display response rates.

Table 7: Survey Response Rates

Name	Teachers Per Location	Respondents	Percentage
School 1	19	6	32%
School 2	16	9	56%
School 3	3	3	100%
School 4 *	29	14	48%
School 5	35	16	46%
School 6	127	42	33%
School 7	66	28	42%
School 8	39	17	44%

School 9	154	35	23%
School 10 *	40	20	50%
School 11	48	16	33%
School 12	21	13	62%
School 13	57	16	28%
School 14	36	16	44%
School 15 *	32	19	59%
School 16	28	15	54%
School 17	46	19	41%
School 18	11	10	91%
School 19	33	18	55%
School 20	32	6	19%
School 21	42	17	40%
School 22	43	15	35%
School 23	22	8	36%
School 24	42	34	81%
School 25	58	18	31%
School 26	32	16	50%
School 27	36	24	67%
School 28	49	15	31%
Grand Total	1196	485	41%

* Twenty-first century schools

The majority of the teachers completed the survey within the first five days (approximately 35%) of deployment. The remaining responses were gathered after a reminder was sent out after five days. The average time spent taking the survey was 14 minutes. There were no reports of technology glitches which may have interfered with successful completion of the survey. A total of 636 surveys were initially started; 485 were completed. Schools 4, 10, and 15 were the 21st century schools and had response rates of 48%, 50%, and 59% respectively, exceeding the 41% for all schools combined. In addition, school number 3, who only had 3 teachers, reported a 100% response rate. Also, school number 18 (a special needs school) had 91% or 10 of the 11 teachers respond.

Section I of the survey requested demographic information (school, number of years in education, and grade level(s)). The majority of the teachers participating in the survey have been in education 4-10 years (33%) with 10-20 years (31%) experience making up the next largest group. In addition, the majority of the teachers were from the elementary level (41%), 19% from middle schools, 18% from high schools and 22% from other. Tables 8a and 8b represent the characteristics of the teachers who participated in this survey. It includes survey items that were recorded as categorical data: nominal and ordinal data, meaning that the values have no numeric meaning and represent intervals between adjacent scale values, respectively (Publication Manual, 2001).

Table 8b details the responses by 21st century schools and non-21st century schools, then by years in education and grade. Of noteworthy attention is the fact that the 21st century schools 9grades PK-5) had an overall response rate of 51% as compared to the non-21st century schools for the same grade levels.

Table 8a: Demographic Results

	Item Response		Statistics (Responses of teachers)			
Survey Item	n	Percentage	Response	n	Percentage	
Years in education?	485	100%	0-3	76	15%	
			4-10	158	33%	
			10-20	152	31%	
			20-30	75	16%	
			30+	24	5%	
Grade?	485	100%	PK	15	3%	
			K	25	5%	
			1	23	5%	Sum of PK-5
			2	32	7%	41%
			3	43	9%	
			4	29	6%	
			5	33	7%	

			6-8	91	19%
			9-12	87	18%
			Other	107	22%

Table 8b: Demographic Results

n=485		Number of Years in Education?											Total		
			0-3		4-10		10-20		20-30		30+				
Non 21st Century School	Grade Level?	PK	3	4%	5	4%	4	3%	0	0%	0	0%	12	3%	
n=432		1	4	6%	2	1%	8	6%	5	7%	1	5%	20	5%	
		2	4	6%	8	6%	8	6%	3	4%	0	0%	23	5%	Sum PK-5
		3	10	15%	11	8%	11	8%	4	6%	4	19%	40	9%	34%
		4	1	1%	13	9%	10	7%	0	0%	0	0%	24	6%	
		5	5	7%	8	6%	11	8%	2	3%	3	14%	29	7%	
		6-8	14	21%	32	23%	24	18%	16	24%	5	24%	91	21%	
		9-12	14	21%	23	17%	29	21%	18	27%	3	14%	87	20%	
		Other	11	16%	30	22%	24	18%	18	27%	3	14%	86	20%	
		K	2	3%	7	5%	8	6%	1	1%	2	10%	20	5%	
	Total		68	100%	139	100%	137	100%	67	100%	21	100%	432	100%	
21st Century School	Grade Level?	PK	0	0%	1	5%	1	7%	1	13%	0	0%	3	6%	
n=53		1	1	13%	2	11%	0	0%	0	0%	0	0%	3	6%	
		2	3	38%	1	5%	3	20%	2	25%	0	0%	9	17%	Sum PK-5
		3	0	0%	2	11%	1	7%	0	0%	0	0%	3	6%	51%
		4	0	0%	4	21%	0	0%	1	13%	0	0%	5	9%	
		5	2	25%	0	0%	1	7%	1	13%	0	0%	4	8%	
		Other	2	25%	6	32%	9	60%	1	13%	3	100%	21	40%	
		K	0	0%	3	16%	0	0%	2	25%	0	0%	5	9%	
	Total		8	100%	19	100%	15	100%	8	100%	3	100%	53	100%	

Item Analysis

Section II of the survey included 29 likert scale questions to address the construct of Conditions for Technology Use, and the sub constructs: Vision and Leadership; Technology Planning, Budgeting, and Evaluation; Supportive Environment for Risk Taking; Technical Infrastructure and Support; Resource Media, Software and Tools; and Community Linkages. Questions appeared with a 5-point likert scale ranging from

"Strongly Agree" to "Strongly Disagree." Of noteworthy attention in this section is that "Strongly Disagree" was not chosen by any respondent. The data are reported here (Table 9) by sub construct for ease of analysis and later discussion. For all items, the response rate was 100% with n=485.

Table 9: Conditions for Technology Use

A shared vision for technology has been developed through an effective collaboration among stakeholder groups-teachers, other staff members, students, parents, and members of the community.			
		Frequency	Percent
Vision and Leadership	Strongly Agree	48	9.9
	Agree	203	41.9
	Neither Agree or Disagree	118	24.3
	Disagree	116	23.9
	Total	485	100.0
The vision for technology use has been effectively communicated to the community.			
		Frequency	Percent
Vision and Leadership	Strongly Agree	41	8.5
	Agree	150	30.9
	Neither Agree or Disagree	139	28.7
	Disagree	155	32.0
	Total	485	100.0
Administrators model effective uses of technology.			
		Frequency	Percent
Vision and Leadership	Strongly Agree	64	13.2
	Agree	265	54.6
	Neither Agree or Disagree	83	17.1
	Disagree	73	15.1
	Total	485	100.0
Administrators support changes in school-level systems, policies, and practice related to technology.			
		Frequency	Percent
Vision and Leadership	Strongly Agree	90	18.6
	Agree	269	55.5
	Neither Agree or Disagree	97	20.0

	Disagree	29	6.0
	Total	485	100.0
Administrators guide the school toward more effective uses of technology.			
		Frequency	Percent
Vision and Leadership	Strongly Agree	73	15.1
	Agree	262	54.0
	Neither Agree or Disagree	87	17.9
	Disagree	63	13.0
	Total	485	100.0
An effective long-range school technology plan is in place.			
		Frequency	Percent
Planning, Evaluation, and Budgeting	Strongly Agree	30	6.2
	Agree	183	37.7
	Neither Agree or Disagree	200	41.2
	Disagree	72	14.8
	Total	485	100.0
The school technology plan is developed by a leadership team or committee involving a variety of school stakeholders (i.e., media coordinator, technology facilitator, teachers, students, and community members).			
		Frequency	Percent
Planning, Evaluation, and Budgeting	Strongly Agree	44	9.1
	Agree	204	42.1
	Neither Agree or Disagree	157	32.4
	Disagree	80	16.5
	Total	485	100.0
The school technology plan is monitored and updated adequately.			
		Frequency	Percent
Planning, Evaluation, and Budgeting	Strongly Agree	31	6.4
	Agree	183	37.7
	Neither Agree or Disagree	181	37.3
	Disagree	90	18.6
	Total	485	100.0
The budget for technology resources is adequate in size to support decisions arising from planning and to continuously update and replace technology systems as they become outdated.			
		Frequency	Percent
Planning, Evaluation, and Budgeting	Strongly Agree	6	1.2
	Agree	67	13.8
	Neither Agree or Disagree	91	18.8
	Disagree	321	66.2
	Total	485	100.0

Supplemental sources of funding are actively pursued to support technology (e.g., external grants, collaboration with community or parent groups, support from businesses).			
		Frequency	Percent
Planning, Evaluation, and Budgeting	Strongly Agree	17	3.5
	Agree	141	29.1
	Neither Agree or Disagree	192	39.6
	Disagree	135	27.8
	Total	485	100.0

Teachers and other staff members support the school technology plan.			
		Frequency	Percent
Planning, Evaluation, and Budgeting	Strongly Agree	46	9.5
	Agree	253	52.2
	Neither Agree or Disagree	145	29.9
	Disagree	41	8.5
	Total	485	100.0

Multiple sources of data are used to evaluate the implementation of technology programs.			
		Frequency	Percent
Planning, Evaluation, and Budgeting	Strongly Agree	20	4.1
	Agree	167	34.4
	Neither Agree or Disagree	233	48.0
	Disagree	65	13.4
	Total	485	100.0

Multiple sources of data are used to evaluate the impact of technology programs on teacher practice and productivity.			
		Frequency	Percent
Planning, Evaluation, and Budgeting	Strongly Agree	19	3.9
	Agree	146	30.1
	Neither Agree or Disagree	225	46.4
	Disagree	95	19.6
	Total	485	100.0

Multiple sources of data are used to evaluate the impact of technology programs on academic achievement and other student outcomes.			
		Frequency	Percent
Planning, Evaluation, and Budgeting	Strongly Agree	23	4.7
	Agree	184	37.9
	Neither Agree or Disagree	186	38.4
	Disagree	92	19.0
	Total	485	100.0

Teachers are encouraged to take risks and be inventive with technology use.			
		Frequency	Percent
Supportive	Strongly Agree	60	12.4

Environment for Risk Taking	Agree	249	51.3
	Neither Agree or Disagree	95	19.6
	Disagree	81	16.7
	Total	485	100.0

Teachers who are innovators with technology receive incentives or rewards for their hard work (e.g., funding, perks, waivers, special opportunities).

		Frequency	Percent
Supportive Environment for Risk Taking	Strongly Agree	13	2.7
	Agree	59	12.2
	Neither Agree or Disagree	167	34.4
	Disagree	246	50.7
	Total	485	100.0

The media center can be flexibly scheduled to provide equitable access to resources and instruction.

		Frequency	Percent
Supportive Environment for Risk Taking	Strongly Agree	99	20.4
	Agree	259	53.4
	Neither Agree or Disagree	43	8.9
	Disagree	84	17.3
	Total	485	100.0

Computer labs can be flexibly scheduled for equitable access to resources and instruction.

		Frequency	Percent
Supportive Environment for Risk Taking	Strongly Agree	70	14.4
	Agree	236	48.7
	Neither Agree or Disagree	55	11.3
	Disagree	124	25.6
	Total	485	100.0

Mobile computers can be flexibly scheduled to provide equitable access to resources and instruction.

		Frequency	Percent
Supportive Environment for Risk Taking	Strongly Agree	38	7.8
	Agree	147	30.3
	Neither Agree or Disagree	155	32.0
	Disagree	145	29.9
	Total	485	100.0

An adequate technology base is available (e.g., computers, digital cameras, projection devices, scanners, printers).

		Frequency	Percent
Technical Infrastructure and Support	Strongly Agree	28	5.8
	Agree	174	35.9
	Neither Agree or Disagree	50	10.3

	Disagree	233	48.0
	Total	485	100.0
Communication systems within the school are adequate (e.g., e-mail among teachers and staff, network drives to upload lesson plans and grades to the main office).			
		Frequency	Percent
Technical Infrastructure and Support	Strongly Agree	54	11.1
	Agree	314	64.7
	Neither Agree or Disagree	52	10.7
	Disagree	65	13.4
	Total	485	100.0
Systems to communicate with parents and the community are adequate (e.g., e-mail, teacher, and/or school Web pages).			
		Frequency	Percent
Technical Infrastructure and Support	Strongly Agree	48	9.9
	Agree	291	60.0
	Neither Agree or Disagree	69	14.2
	Disagree	77	15.9
	Total	485	100.0
Reliability and speed of connections to the external Internet, online databases and resources, etc., are adequate.			
		Frequency	Percent
Technical Infrastructure and Support	Strongly Agree	48	9.9
	Agree	257	53.0
	Neither Agree or Disagree	42	8.7
	Disagree	138	28.5
	Total	485	100.0
Adequate access to technical support is available (e.g., to troubleshoot hardware or software problems, maintain systems).			
		Frequency	Percent
Technical Infrastructure and Support	Strongly Agree	54	11.1
	Agree	266	54.8
	Neither Agree or Disagree	78	16.1
	Disagree	87	17.9
	Total	485	100.0
Adequate staffing is readily available in library media coordinator and/or media assistant positions.			
		Frequency	Percent
Technical Infrastructure and Support	Strongly Agree	49	10.1
	Agree	244	50.3
	Neither Agree or Disagree	66	13.6
	Disagree	126	26.0
	Total	485	100.0

Adequate staffing is readily available in technology facilitator and/or technology assistant positions.			
		Frequency	Percent
Technical Infrastructure and Support	Strongly Agree	31	6.4
	Agree	218	44.9
	Neither Agree or Disagree	93	19.2
	Disagree	143	29.5
	Total	485	100.0

Adequate access to student productivity software is provided (e.g., graphic organizer, word processing, slide presentation, or drawing applications).			
		Frequency	Percent
Resource Media, Software	Strongly Agree	21	4.3
	Agree	233	48.0
	Neither Agree or Disagree	132	27.2
	Disagree	99	20.4
	Total	485	100.0

An adequate cataloguing system is readily available, with which staff members can search and locate teaching materials.			
		Frequency	Percent
Resource Media, Software	Strongly Agree	27	5.6
	Agree	194	40.0
	Neither Agree or Disagree	170	35.1
	Disagree	94	19.4
	Total	485	100.0

An adequate collection of print, multimedia, and electronic resources is readily available.			
		Frequency	Percent
Resource Media, Software	Strongly Agree	23	4.7
	Agree	236	48.7
	Neither Agree or Disagree	110	22.7
	Disagree	116	23.9
	Total	485	100.0

Both the curriculum and the needs of learners are considered in making resource media and software selection decisions.			
		Frequency	Percent
Resource Media, Software	Strongly Agree	40	8.2
	Agree	269	55.5
	Neither Agree or Disagree	123	25.4
	Disagree	53	10.9
	Total	485	100.0

Community and/or business partnerships are successfully engaged to support and advance the technology program.

		Frequency	Percent
Community Linkages	Strongly Agree	7	1.4
	Agree	73	15.1
	Neither Agree or Disagree	232	47.8
	Disagree	173	35.7
	Total	485	100.0
Parent and community stakeholders are kept informed of successes and progress with the technology program.			
		Frequency	Percent
Community Linkages	Strongly Agree	8	1.6
	Agree	92	19.0
	Neither Agree or Disagree	233	48.0
	Disagree	152	31.3
	Total	485	100.0

Section III of the survey included nine likert scale questions to address the construct of Professional Development Opportunities. Questions again appeared with a 5-point likert scale ranging from "Strongly Agree" to "Strongly Disagree." The data are reported here (Table 10) by construct for ease of analysis and later discussion. Again, no one chose strongly disagree as a choice. For all items, the response rate was 100% with n=485.

Table 10: Professional Development Opportunities

Teachers and staff members have a strong base of knowledge, skills, and understanding about contemporary technologies.			
		Frequency	Percent
Professional Development - Opportunities	Strongly Agree	20	4.1
	Agree	212	43.7
	Neither Agree or Disagree	96	19.8
	Disagree	157	32.4
	Total	485	100.0
Technology literacy and leadership are actively considered when seeking and hiring teachers.			
		Frequency	Percent

Professional Development - Opportunities	Strongly Agree	18	3.7
	Agree	140	28.9
	Neither Agree or Disagree	243	50.1
	Disagree	84	17.3
	Total	485	100.0

Teachers have a say in the selection and evaluation of professional development topics.			
		Frequency	Percent
Professional Development - Opportunities	Strongly Agree	17	3.5
	Agree	167	34.4
	Neither Agree or Disagree	145	29.9
	Disagree	156	32.2
	Total	485	100.0

Professional development opportunities are provided to observe classrooms where effective technology integration is taking place.			
		Frequency	Percent
Professional Development - Opportunities	Strongly Agree	16	3.3
	Agree	117	24.1
	Neither Agree or Disagree	173	35.7
	Disagree	179	36.9
	Total	485	100.0

Professional development opportunities are provided to work with small groups of peers on real projects intended for use in classrooms.			
		Frequency	Percent
Professional Development - Opportunities	Strongly Agree	16	3.3
	Agree	160	33.0
	Neither Agree or Disagree	180	37.1
	Disagree	129	26.6
	Total	485	100.0

Professional development opportunities are provided that require keeping a journal or otherwise reflecting on how professional development will be employed in classrooms.			
		Frequency	Percent
Professional Development - Opportunities	Strongly Agree	17	3.5
	Agree	116	23.9
	Neither Agree or Disagree	195	40.2
	Disagree	157	32.4
	Total	485	100.0

The impact of professional development is tracked by looking for evidence of improved classroom practice and/or student learning.			
		Frequency	Percent
Professional Development -	Strongly Agree	18	3.7
	Agree	218	44.9

Opportunities	Neither Agree or Disagree	164	33.8
	Disagree	85	17.5
	Total	485	100.0

Technical and instructional support staff members (e.g., media coordinator, technology facilitator) are given adequate opportunities for professional development.			
		Frequency	Percent
Professional Development - Opportunities	Strongly Agree	23	4.7
	Agree	181	37.3
	Neither Agree or Disagree	228	47.0
	Disagree	53	10.9
	Total	485	100.0

Professional development activities can be applied to meet licensure and/or renewal requirements.			
		Frequency	Percent
Professional Development - Opportunities	Strongly Agree	40	8.2
	Agree	336	69.3
	Neither Agree or Disagree	88	18.1
	Disagree	21	4.3
	Total	485	100.0

Section IV of the survey included seven yes/no questions to address the construct of Professional Development Participation. The data are reported here (Table 11) by construct for ease of analysis and later discussion. For all items, the response rate was 100% with n=485.

Table 11: Professional Development Participation

I participated in professional development opportunities, examining research-based practices in technology-enhanced classrooms.			
		Frequency	Percent
Professional Development - Participation	Yes	229	47.2
	No	256	52.8
	Total	485	100.0

I participated in professional development opportunities examining identification, location, and evaluation of technology resources (e.g., websites).

		Frequency	Percent
Professional Development - Participation	Yes	263	54.2
	No	222	45.8
	Total	485	100.0

I participated in professional development opportunities examining student assessment in technology-enhanced classrooms.

		Frequency	Percent
Professional Development - Participation	Yes	181	37.3
	No	304	62.7
	Total	485	100.0

I participated in professional development opportunities examining learner-centered teaching strategies in technology-enhanced classrooms (e.g., project-based or cooperative learning).

		Frequency	Percent
Professional Development - Participation	Yes	233	48.0
	No	252	52.0
	Total	485	100.0

I participated in professional development opportunities examining online security and safety.

		Frequency	Percent
Professional Development - Participation	Yes	141	29.1
	No	344	70.9
	Total	485	100.0

I participated in professional development opportunities examining the uses of technology to improve individual teacher productivity.

		Frequency	Percent
Professional Development - Participation	Yes	231	47.6
	No	254	52.4
	Total	485	100.0

I participated in professional development opportunities examining ways to involve parents and the community in student learning with technology.

		Frequency	Percent
Professional Development - Participation	Yes	102	21.0
	No	383	79.0
	Total	485	100.0

Sections V and VI of the survey included 21 likert scale questions to address the constructs of Classroom Practices and Student Activities, and the sub constructs

Instructional Strategies and Planning. Questions appeared with a 5-point likert scale related to frequency of use ranging from "Daily" to "Never" The data are reported here (Table 12) by construct for ease of analysis and later discussion. For all items, the response rate was 100% with n=485.

Table 12: Classroom Practices and Student Activities

I consult publications, online journals, or other resources to identify research-based practices in teaching with technology.			
		Frequency	Percent
Classroom Practices	Daily	36	7.4
	Weekly	117	24.1
	monthly	144	29.7
	Once Per Grading Period	90	18.6
	Never	98	20.2
	Total	485	100.0
I identify, locate, and evaluate technology resources (e.g., websites).			
		Frequency	Percent
Classroom Practices	Daily	91	18.8
	Weekly	196	40.4
	monthly	107	22.1
	Once Per Grading Period	44	9.1
	Never	47	9.7
	Total	485	100.0
I apply performance-based student assessment to technology-enhanced lessons (e.g., student portfolios, student presentations).			
		Frequency	Percent
Classroom Practices	Daily	35	7.2
	Weekly	80	16.5
	monthly	120	24.7
	Once Per Grading Period	99	20.4
	Never	151	31.1
	Total	485	100.0
I use technology to collect and analyze student assessment data.			
		Frequency	Percent
Classroom Practices	Daily	82	16.9
	Weekly	133	27.4

	monthly	78	16.1
	Once Per Grading Period	80	16.5
	Never	112	23.1
	Total	485	100.0
My lessons include technology-enhanced, learner-centered teaching strategies (e.g., project-based learning).			
		Frequency	Percent
Classroom Practices	Daily	54	11.1
	Weekly	102	21.0
	monthly	127	26.2
	Once Per Grading Period	110	22.7
	Never	92	19.0
	Total	485	100.0
I apply policies and practices to enhance online security and safety.			
		Frequency	Percent
Classroom Practices	Daily	228	47.0
	Weekly	71	14.6
	monthly	85	17.5
	Once Per Grading Period	22	4.5
	Never	79	16.3
	Total	485	100.0
I use technology to support and increase teacher productivity.			
		Frequency	Percent
Classroom Practices	Daily	223	46.0
	Weekly	110	22.7
	monthly	83	17.1
	Once Per Grading Period	26	5.4
	Never	43	8.9
	Total	485	100.0
I use technology to increase my access to professional development resources.			
		Frequency	Percent
Classroom Practices	Daily	140	28.9
	Weekly	139	28.7
	monthly	137	28.2
	Once Per Grading Period	32	6.6
	Never	37	7.6
	Total	485	100.0
I use technology to support communication and interaction with parents and the community.			
		Frequency	Percent
Classroom Practices	Daily	83	17.1
	Weekly	139	28.7

	monthly	146	30.1
	Once Per Grading Period	35	7.2
	Never	82	16.9
	Total	485	100.0
I use technology to support communication and interaction among staff members.			
		Frequency	Percent
Classroom Practices	Daily	354	73.0
	Weekly	94	19.4
	monthly	19	3.9
	Once Per Grading Period	5	1.0
	Never	13	2.7
	Total	485	100.0
My lesson plans refer to both content standards and student technology standards.			
		Frequency	Percent
Classroom Practices	Daily	87	17.9
	Weekly	123	25.4
	monthly	100	20.6
	Once Per Grading Period	53	10.9
	Never	122	25.2
	Total	485	100.0
I do research or action research projects, or apply the results of my research to improve technology-enhanced classroom practice.			
		Frequency	Percent
Classroom Practices	Daily	41	8.5
	Weekly	78	16.1
	monthly	105	21.6
	Once Per Grading Period	108	22.3
	Never	153	31.5
	Total	485	100.0
I use multiple sources of data to reflect on professional practice and make decisions about the use of technology.			
		Frequency	Percent
Classroom Practices	Daily	60	12.4
	Weekly	127	26.2
	monthly	134	27.6
	Once Per Grading Period	89	18.4
	Never	75	15.5
	Total	485	100.0
Students use a range of technologies (i.e., productivity, visualization, research, and communication tools).			
		Frequency	Percent

Student Activities	Daily	89	18.4
	Weekly	153	31.5
	monthly	121	24.9
	Once Per Grading Period	76	15.7
	Never	46	9.5
	Total	485	100.0

Students communicate and collaborate with peers, content experts, or others outside the classroom using technology.

		Frequency	Percent
Student Activities	Daily	71	14.6
	Weekly	104	21.4
	monthly	75	15.5
	Once Per Grading Period	50	10.3
	Never	185	38.1
	Total	485	100.0

Students use technology to access online resources and information as a part of classroom activities.

		Frequency	Percent
Student Activities	Daily	70	14.4
	Weekly	163	33.6
	monthly	116	23.9
	Once Per Grading Period	86	17.7
	Never	50	10.3
	Total	485	100.0

Students use advanced, professional research tools and information (e.g., simulations, databases, satellite imagery).

		Frequency	Percent
Student Activities	Daily	34	7.0
	Weekly	79	16.3
	monthly	92	19.0
	Once Per Grading Period	69	14.2
	Never	211	43.5
	Total	485	100.0

Students work on relevant, technology-enhanced projects that have meaning and approach real-world applications of technology.

		Frequency	Percent
Student Activities	Daily	42	8.7
	Weekly	97	20.0
	monthly	101	20.8
	Once Per Grading Period	121	24.9
	Never	124	25.6
	Total	485	100.0

Students use technology to help solve problems.			
		Frequency	Percent
Student Activities	Daily	88	18.1
	Weekly	153	31.5
	monthly	87	17.9
	Once Per Grading Period	83	17.1
	Never	74	15.3
	Total	485	100.0
Students use technology to support higher-order thinking (i.e., analysis, synthesis, and evaluation of ideas and information).			
		Frequency	Percent
Student Activities	Daily	75	15.5
	Weekly	155	32.0
	monthly	95	19.6
	Once Per Grading Period	81	16.7
	Never	79	16.3
	Total	485	100.0
Students use technology to create new ideas and representations.			
		Frequency	Percent
Student Activities	Daily	53	10.9
	Weekly	131	27.0
	monthly	97	20.0
	Once Per Grading Period	115	23.7
	Never	89	18.4
	Total	485	100.0

Section VII of the survey included nine likert scale questions to address the construct of Impact of Technology and sub constructs of Teaching Practice and Student Outcomes. Questions again appeared with a 5-point Likert scale ranging from "Strongly Agree" to "Strongly Disagree." The data are reported here (Table 13) by sub construct for ease of analysis and later discussion. For all items, the response rate was 100% with n=485, even with no respondent reporting strongly disagree.

Table 13: Impact of Technology

Teaching is more student-centered and interactive when technology is integrated into instruction.			
		Frequency	Percent
Impact of Technology	Strongly Agree	122	25.2
	Agree	209	43.1
	Neither Agree or Disagree	134	27.6
	Disagree	20	4.1
	Total	485	100.0

Teaching practices emphasize teacher uses of technology skills to support instruction.			
		Frequency	Percent
Impact of Technology	Strongly Agree	82	16.9
	Agree	237	48.9
	Neither Agree or Disagree	143	29.5
	Disagree	23	4.7
	Total	485	100.0

Teaching practices emphasize student uses of productivity applications (e.g., word processing, spreadsheet).			
		Frequency	Percent
Impact of Technology	Strongly Agree	71	14.6
	Agree	211	43.5
	Neither Agree or Disagree	160	33.0
	Disagree	43	8.9
	Total	485	100.0

Teaching practices emphasize student uses of technology as a regular part of specific teaching strategies (e.g., project-based or cooperative learning).			
		Frequency	Percent
Impact of Technology	Strongly Agree	72	14.8
	Agree	204	42.1
	Neither Agree or Disagree	172	35.5
	Disagree	37	7.6
	Total	485	100.0

Technology has helped students become more socially aware, confident, and positive about their future.			
		Frequency	Percent
Impact of Technology	Strongly Agree	101	20.8
	Agree	198	40.8
	Neither Agree or Disagree	129	26.6
	Disagree	57	11.8
	Total	485	100.0

Technology has helped students become independent learners and self-starters.			
		Frequency	Percent
Impact of Technology	Strongly Agree	90	18.6
	Agree	264	54.4

	Neither Agree or Disagree	100	20.6
	Disagree	31	6.4
	Total	485	100.0
Technology has helped students work more collaboratively.			
		Frequency	Percent
Impact of Technology	Strongly Agree	74	15.3
	Agree	239	49.3
	Neither Agree or Disagree	132	27.2
	Disagree	40	8.2
	Total	485	100.0
Technology has increased students' engagement in their learning.			
		Frequency	Percent
Impact of Technology	Strongly Agree	121	24.9
	Agree	283	58.4
	Neither Agree or Disagree	60	12.4
	Disagree	21	4.3
	Total	485	100.0
Technology has helped students achieve greater academic success.			
		Frequency	Percent
Impact of Technology	Strongly Agree	103	21.2
	Agree	221	45.6
	Neither Agree or Disagree	99	20.4
	Disagree	62	12.8
	Total	485	100.0

Descriptive Statistics on Construct and Sub Construct Averages

As stated earlier, each teacher response was averaged per question, so that an average could be obtained for each set of questions (i.e. Vision and Leadership would result in one average score for a particular teacher instead of five individual scores for that sub construct). Those averages were then averaged to obtain a mean score for each section of the survey. The mean and standard deviation of those results are reported below in Table 14. Overall, based on the phrasing of the questions, the results produced somewhat favorable results, meaning that each section had a mean value around a 2.5

which translates to a response leaning toward the "agree" side. Whereas this is not statistically significant, it does imply that perceptions related to technology needs and use are somewhat positive.

Table 14: Descriptive Statistics – Mean and Standard Deviation

Descriptive Statistics					
	n	Minimum	Maximum	Mean	Std. Deviation
Vision and Leadership Average	485	1.00	4.00	2.4454	0.7155
Technology Planning, Budgeting, and Evaluation Average	485	1.00	4.00	2.7688	0.5870
Supportive Environment for Risk Taking Average	485	1.00	4.00	2.6577	0.6350
Technical Infrastructure and Support Average	485	1.00	4.00	2.5526	0.6140
Resource Media, Software and Tools Average	485	1.00	4.00	2.5918	0.6570
Community Linkages Average	485	1.00	4.00	3.1340	0.6769
Professional Development – Opportunities Average	485	1.00	4.00	2.7718	0.5722
Professional Development – Participation Average	485	1.00	2.00	1.5935	0.3374
Classroom Practices and Student Outcomes Average	485	1.05	5.00	2.8804	0.7463
Impact of Technology Average	485	1.00	4.00	2.2202	0.6341

Internal Consistency

A confirmatory factor analysis indicated that the Impact of Technology and Classroom Practices and Student Outcomes yielded a Cronbach's Alpha of 0.910 and 0.900 respectively showing very strong cohesion among survey questions for each section. According to (Carmines & Zeller, 1971) a satisfactory Cronbach Alpha is 0.80 or higher. In addition, the other sections yielded Cronbach's Alpha scores ranging from 0.888 to no less than 0.713 (Table 15). When the STNA was administered by SEIR*TEC as part of the NCLB EETT initiative, the Cronbach Alpha scores for Internal Consistency Reliability Measures all had scores ranging from 0.807 to 0.967 (Corn, 2006). The survey designers proved the internal consistency of each set of questions, see Table 16,

with a greater degree of certainty than did this administration of the survey in all categories but two.

Table 15: Cronbach Alpha Scores of STNA

	Cronbach's Alpha	n of Items
Classroom Practices and Student Activities	0.900	21
Community Linkages	0.803	2
Impact of Technology	0.910	9
Professional Development - Opportunities	0.870	9
Professional Development - Participation	0.831	7
Resource Media, Software and tools	0.780	4
Supportive Environments for Risk Taking	0.713	5
Technical Infrastructure and Support	0.773	7
Technology Planning, Budgeting, and Evaluation	0.888	9
Vision and Leadership	0.857	5

Table 16: STNA Designers' Cronbach Alpha Scores

Internal Consistency Reliability Measures for STNA 2.0 (N=2094)	Cronbach's Alpha
Classroom Practices and Student Outcomes	0.934
Community linkages	0.847
Impact of Technology	0.888
Professional development Opportunities	0.919
Professional development Participation	0.886
Resource media, software tools	0.860
Supportive environment for risk taking	0.807
Technical infrastructure and support	0.854
Technology planning, budgeting, and evaluation	0.928
Vision and leadership	0.900

21st Century Schools versus non-21st Century Schools

Of the 485 teachers who responded to the survey, 432 were from non-21st century schools and 53 were from 21st century schools. Table 17 displays the constructs and sub constructs for 21st century and non-21st century schools, with the corresponding means and standard deviations for each average score.

Table 17: Comparison of 21st Century Schools to non-21st Century Schools Means

Group Statistics				
	21st Century School (Y/N)?	N	Mean	Std. Deviation
Vision and Leadership Average	Non-21st Century School	432	2.4625	0.70890
	21st Century School	53	2.2038	0.63910
Technology Planning, Budgeting, and Evaluation Average	Non-21st Century School	432	2.7470	0.58444
	21st Century School	53	2.5358	0.49772
Supportive Environment for Risk Taking Average	Non-21st Century School	432	2.6648	0.62764
	21st Century School	53	2.6000	0.69614
Technical Infrastructure and Support Average	Non-21st Century School	432	2.5582	0.62077
	21st Century School	53	2.5067	0.55933
Resource Media, Software and Tools Average	Non-21st Century School	432	2.5816	0.65946
	21st Century School	53	2.6745	0.63659
Community Linkages Average	Non-21st Century School	432	3.1354	0.67578
	21st Century School	53	3.1226	0.69272
Professional Development – Opportunities Average	Non-21st Century School	432	2.7806	0.56985
	21st Century School	53	2.7002	0.59140
Professional Development – Participation Average	Non-21st Century School	432	1.5936	0.33248
	21st Century School	53	1.5930	0.37838
Classroom Practices and Student Outcomes Average	Non-21st Century School	432	2.8886	0.73853
	21st Century School	53	2.8140	0.81137
Impact of Technology Average	Non-21st Century School	432	2.2294	0.63064
	21st Century School	53	1.9853	0.59916

The following analysis (Table 18) represents an independent samples t-test of the data. An independent samples t-test is an appropriate statistical method as there is a single dependent variable (the construct or sub construct) which is continuous and a

single independent variable with two categories (21st century schools and non-21st century schools). The t-test is used to see if there are statistically significant differences between the two independent groups (21st century schools and non-21st century schools) on the continuous dependent variable (the construct or sub construct). A t-test is used to determine if a given statistic was significant or if it was due to chance. The "Sig (2 tailed)" column represents the probability that the observed statistic is due to chance. An observed statistic was significant when the value of "Sig" was less than the chosen probability of type 1 error, alpha (commonly .05). If the value of "Sig" is greater than alpha (commonly .05), the corresponding statistic may have arisen due to chance and therefore is not statistically significant. Table 18 displays the significance of the various constructs and sub constructs.

One of the assumptions of a t-test is equal variances among the groups of the independent variable. This assumption is sometimes referred to as homogeneity of variance. In the context of this research, it means that the spread of scores for 21st century schools and non-21st century schools is approximately equal. A Levene's test can be used to test this assumption. A non-significant Levene's test suggests that the variance of the construct and sub constructs scores is approximately equal for the 21st century schools and non-21st century schools groups. If the Levene's test is non-significant, equal variances are assumed. If the Levene's test is significant, this implies that the variance of the scores is not equal for the groups. If this is the case, equal variances are not assumed. All scores assumed equal variances except Professional Development – Participation.

Of the ten sections to address the research questions, 1 through 10 and 11 through 20, three areas were found to have significance. Vision and Leadership; Technology Planning, Budgeting, and Evaluation; and the Impact of Technology were found to have significance levels of 0.012, 0012, and 0.008 respectively. In a side by side comparison, the other areas had means for the 21st century schools to be less (in all categories but one - Resource Media, Software and Tools) than non-21st century schools, but not enough to be considered statistically significant (Table 17).

Table 18: Statistical Significance

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Vision and Leadership Average	Equal variances assumed	1.463	0.227	2.533	483	0.012	0.25873	0.10213	0.05805	0.45940
Technology Planning, Budgeting, and Evaluation Average	Equal variances assumed	1.859	0.173	2.520	483	0.012	0.21114	0.08379	0.04650	0.37579
Supportive Environment for Risk Taking Average	Equal variances assumed	0.795	0.373	0.701	483	0.484	0.06481	0.09247	-0.11689	0.24652
Technical Infrastructure and Support Average	Equal variances assumed	0.109	0.741	0.575	483	0.565	0.05146	0.08943	-0.12425	0.22718
Resource Media, Software and Tools Average	Equal variances assumed	0.050	0.823	-0.972	483	0.332	-0.09293	0.09563	-0.28083	0.09497
Community Linkages Average	Equal variances assumed	0.026	0.871	0.130	483	0.897	0.01278	0.09862	-0.18101	0.20656
Professional Development – Opportunities Average	Equal variances assumed	0.185	0.668	0.965	483	0.335	0.08040	0.08328	-0.08324	0.24404

Professional Development – Participation Average	Equal variances not assumed	3.993	0.046	0.011	62.251	0.991	0.00059	0.05438	-0.10810	0.10929
Classroom Practices and Student Outcomes Average	Equal variances assumed	0.083	0.774	0.686	483	0.493	0.07454	0.10868	-0.13900	0.28808
Impact of Technology Average	Equal variances assumed	0.066	0.797	2.674	483	0.008	0.24410	0.09130	0.06470	0.42350

Summary of Research Findings

In summary, this analysis examined particular technology needs in the following sections: Vision and Leadership; Technology Planning, Budgeting, and Evaluation; Supportive Environment for Risk Taking; Technical Infrastructure and Support; Resource Media, Software and Tools; Community Linkages; Professional Development – Opportunities; Professional Development – Participation; Classroom Practices and Student Activities; Impact of Technology. Two types of schools were compared: 21st century schools and non-21st century schools. Twenty first century schools were schools that received a great deal of capital monies for technology use and integration over a four year period, and thus setting the groups distinctively apart from one another.

Of the possible 1196 possible participants, 41% or 485 participants from two groups of 432 and 53 took part in this study to answer ten sections of 81 questions. Three of the ten sections stood out to show a significant difference between the groups: Vision and Leadership; Technology Planning, Budgeting, and Evaluation; and Impact of Technology. The other areas did not show a significant difference between groups. The following chapter, Chapter Five - Discussion, will examine the results displayed here and offer suggestions for future practice and further research. Chapter Five will return to the original 20 research questions as a point of focus for discussing the ramifications of this

study with respect to the research literature. The discussion will examine each of the ten sections and relate them back to the original research questions. The repercussions of the study for both researchers and daily practitioners include suggestions for educators to help best meet the needs of schools related to technology in the educational setting.

CHAPTER V

DISCUSSION

Review of Findings

The analysis in the previous chapter and the discussion of findings in this chapter represent 465 self-administered online surveys completed by certified teachers in a medium sized school district in western North Carolina. This chapter interprets these results and discusses implications. The discussion revisits the 20 research questions and each section is organized by the topics of the three main categories of the Literature Review: Impact of Selected Conditions on Educational Technology Use, Staff Development and Technology Use in Education Learning Outcomes of Students and Teachers Linked to Technology. The following ten areas address the 20 questions individually: Vision and Leadership; Technology Planning, Budgeting, and Evaluation; Supportive Environment for Risk Taking; Technical Infrastructure and Support; Resource Media, Software and Tools; Community Linkages; Professional Development – Opportunities; Professional Development – Participation; Classroom Practices and Student Activities; and Impact of Technology. For each section and underlying question, conclusions are drawn based on study results. Outcomes of the study are related back to relevant past research. Relevant limitations of this study are then discussed in the context of the results. The chapter concludes with implications for future practice and further research.

Discussion

The demographic data collected, grade and years in education, reflects the makeup of this particular set of data and cannot be said to be representative of a larger group (i.e. an entire state). It is however, a sufficient cross section of the teachers in this particular school district. Of the 1196 possible participants, 485 responded to result in a 41% response. This is considered to be a representative sample of the group as a whole.

It may be said that this study identified common perceived needs and perceptions of teachers in the classroom related to technology and its use. Survey items were calculated between 21st century schools and non-21st century schools. Of the sections surveyed, a difference was seen in the areas of Vision and Leadership; Planning, Budgeting and Evaluation and Impact of Technology. It is the hope of the researcher that these results will be used by K-12 curriculum specialists, administrators, school boards and others who have an influence on technology implementation and use.

Impact of Selected Conditions on Educational Technology Use

Vision and Leadership

Research questions 1 and 11 are explored in this section:

1. What are the conditions for technology use in schools related to vision and leadership?
11. How do 21st century schools compare to non-21st century schools related to vision and leadership?

As referenced in the literature review, Seeman (2003) believes that leadership grounded in the core curriculum will assist educators to adopt basic guiding principles related to technology use in the classroom. Additionally, Day (1995) is noted for stating

that leaders must do more than react to change; they must orchestrate it. Whereas leadership is important, Labbo (2006) believes that if schools rush to acquire additional tools and technologies, without a meaningful vision, failure is imminent. From the teachers surveyed, this study supports the literature related to Leadership and Vision as it relates to technology. Table 9 displays the frequency of responses for each of the five questions in this section and to address research question one. An item analysis of the likert scale questions (Table 14) shows for the questions related to vision and leadership that an average mean of 2.445 was achieved where 1=Strongly Agree and 5 = Strongly Disagree. Of noteworthy attention is the fact that no one selected "strongly disagree" on any of these questions. More than half the teachers surveyed agree that a strong vision and leadership model are important conditions related to technology use in the educational environment.

To answer research question 11, a significant difference (Sig t-tailed = 0.012) was discovered between 21st century schools and non-21st century schools as related to Vision and Leadership. This result speaks mainly to the climate and atmosphere in the school, not the physical changes that occurred at the 21st century schools. The researcher believes that all the hardware and software placed in the school had an indirect impact on the leadership and vision of the school. As part of the initial grant, the leaders at the schools were intimately involved in the application, submission, and further receipt of the grant. Their vision and leadership helped bring this project to fruition.

The data closely reflect that of the study by Coste (2002), who found that when a model of strategic development was instituted, the teachers had an example to follow and technology use increased. Likewise, Coste notes that an important factor not to overlook

was the time period. This grant spanned a four year period. Of particular interest is the fact that all three 21st century schools had a change in administration at least once during the four year period, yet a significant difference related to vision and leadership was still realized.

Technology Planning, Budgeting and Evaluation

Research questions 2 and 12 are explored in this section:

2. What are the conditions for technology use in schools related to planning, budgeting and evaluation?
12. How do 21st century schools compare to non-21st century schools related to planning, budgeting and evaluation?

Planning is a key to making technology a success, and it provides vision for technology in the classroom (Vojtek, 1998). Seeman (2003) agrees with this philosophy. He states that planning is a key factor for the use and implementation of technology into the curriculum. The respondents of this survey agree with Vojtek and Seeman. Table 8 displays the frequency of responses for each of the nine questions in this section and to address research question two. Again likert scale questions were used, and no one chose "strongly disagree". As Table 14 displays, the average mean for planning, budgeting and support was 2.7688 indicating that the respondents agree that these variables are important related to technology and its use in the educational setting.

The North Carolina Standard Course of Study depicts a plan or curriculum that is aligned vertically and horizontally to integrate and infuse technology into all subject areas and all grade levels. Additionally the BETA Commission is striving to implement a similar plan to realign the curriculum and prepare students for the 21st century by

pushing a 21st Century Skills Curriculum. This curriculum is based on a plan to prepare students to be globally aware and ready to face the technological challenges of this new era, thus an area lawmakers and decision makers are touting. To address research question 12, this survey found a significant difference between 21st century schools and non-21st century schools. Respondents of this survey showed a significance level (Sig t-tailed = 0.012) that supports these initiatives and efforts.

Supportive Environments for Risk Taking

Research questions 3 and 13 are explored in this section:

3. What are the conditions for technology use in schools related to supportive environments for risk taking?
13. How do 21st century schools compare to non-21st century schools related to supportive environments for risk taking?

This sub construct of the survey is closely aligned with Vision and Leadership. In order to have a Supportive Environment for Risk Taking, good leadership must be in place. Day (1995) states that a leader must be able to create a supportive environment for change to be able to occur. This is vital and necessary for the implementation and integration of technology to be a success. In this study, to address research question three, the average mean for the respondents of this sub construct on the 1-5 likert scale was 2.6577. Again, not one of the 485 respondents chose "strongly disagree".

When comparing 21st century schools to non-21st century schools, for research question 13, no significant difference was realized. A Sig of 0.484 is not statistically significant; however a side by side comparison of means of the two groups shows a slightly higher average (2.6648) for the non-21st century schools compared to a slightly

lower average (2.600) for the 21st century schools. As Labbo (2006) reminds us, setting the tone (i.e. Supportive Environment) is the responsibility of the principal. As stated this sub construct is closely related to Vision and Leadership but the 21st century schools have failed to create an environment that accepts a level of risk that is considered significantly different.

Technical Infrastructure and Support

Research questions 4 and 14 are explored in this section:

4. What are the conditions for technology use in schools related to technical infrastructure and support?
14. How do 21st century schools compare to non-21st century schools related to technical infrastructure and support?

As stated earlier, the BETA Commission is pushing 21st Century Skills. As a precursor to this, BETA realizes that infrastructure and connectivity are vital as underlying elements. One cannot expect students, and teachers for that matter, to use and infuse the technology and apply such skills without the connections and linkages required to do so. Simply putting the hardware and infrastructure in place however does not necessitate transference of success. Middleton (1997) cites a situation where simply acquiring the technology made no difference as no one was using it. Likewise Eastwood (1998) points out a circumstance where a particular school district finally admits that after seven years of technology, they were no better off than before. Simply put, if you build it they "may come" but it is more likely that they "may not." The results to answer research question four are found in this sub construct. Table 9 again shows the frequencies of the seven questions related to this topic with an average mean of 2.5526.

As with the previous section, no one answered "strongly disagree" to these questions, thus implying that it is important to the respondents (they agree) that technical infrastructure and support are evident.

To address question 14, one must examine Table 18 to compare 21st century schools to non-21st century schools for this sub construct. No significant difference was realized. This information may be one of the most important in the entire study. These data support the related literature and also the assertion that simply putting the technical infrastructure and support in place makes no difference. As the reader will recall, the major difference in 21st century schools and non-21st century schools is the amount of capital money for technology that was available to them. These three schools shared over two million dollars over a four year period. The data also support the anecdotal data of the researcher, when he cites a situation in previous years in this school district.

Resource Media, Software and tools

Research questions 5 and 15 are explored in this section:

5. What are the conditions for technology use in schools related to resource media, software and tools?
15. How do 21st century schools compare to non-21st century schools related to resource media, software and tools?

The 1998 Milken report stated that seven areas of resources need to be met in order for technology to flourish. Loertscher (2006) noted an example where the resources were available (in the media center) and the school even had personnel (the media specialist as technology leader) but those were useless unless clear learning goals were in place to design technology to be used in an interdisciplinary fashion. From the teachers surveyed,

this study supports the literature related to Resource Media, Software and Tools as it relates to technology. Table 9 displays the frequency of responses for each of the four questions in this section and address research question five. An item analysis of the likert scale questions (Table 15) shows for the questions related to this sub construct that an average mean of 2.5918 was achieved where the 1-5 likert scale was again used. Again, noteworthy attention should be given to the fact that no one selected "strongly disagree" on any of these questions. Thus, it can be summarized that the majority of teachers surveyed agree that resources are important conditions related to technology use in the educational environment.

To answer research question 15, a significant difference (Sig t-tailed = 0.332) was not discovered between 21st century schools and non-21st century schools. The literature again supports these findings, specifically Cuban (2001) who displays how traditional teaching methodologies block the use of these powerful tools and resources. Morehead and LaBeau sum this up extremely well by stating that technology and related resources open up a whole new world of possibilities, but we as educators must realize that technology's impact on schools will not be realized until schools reorganize their structures, priorities and methods.

Community Linkages

Research questions 6 and 16 are explored in this section:

6. What are the conditions for technology use in schools related to community linkages?
16. How do 21st century schools compare to non-21st century schools related to community linkages?

Milken states that schools as community centers are making their way back into cities across the country. This trend is neither supported nor unsupported by the data of this survey. Again, no respondents strongly disagreed that community linkages were not important, yet the average mean of the two questions in this sub construct was 3.1340 (Table 13). In essence the respondents were somewhat ambivalent about community involvement. This statistic was surprising, given the BETA recommendations stating that community involvement has a tremendous impact on technology in schools. In this particular study, the school and community climates could have also been a contributing factor.

Even more surprising, however, was that there was no significant difference between 21st century and non-21st century schools related to this topic. This is surprising due to the fact that one intent and purpose of the grant – a 21st Century Community Technology Learning Center Grant – was to be a community resource. One of the CTLC goals was to reach out to the community to have parents and others involved in the school, but especially at activities in the evenings and on weekends. Activities that involved classes for parents and children such as *Mother Read* were organized to assist mothers with reading to their children. Classes to help the community obtain their GED or ESL (English as Second Language) skills were offered. Classes on how to use the computer to search for jobs or write a resume were also offered. Still no significant differences were seen between 21st century schools and non-21st century schools.

Professional Development - Opportunities

Research questions 7 and 17 are explored in this section:

7. What are the professional development opportunities that may affect technology use in your school?
17. How do 21st century schools compare to non-21st century schools related to professional development opportunities that may affect technology use in your school?

Since this is an area of importance to all teachers the researcher was very interested in the findings of this section. McCarthy (2006) shares how important it is to offer the right opportunities for teachers, for the type of staff development they want and need, especially in the area of technology. The National Staff Development Council states that "sit-and-get" training sessions are not effective. Staff development must be offered where it is tied to the goals and curriculum of the school. Rivero (2004) points out that if we expect our teachers to use technology, they must be offered the training to master the tools themselves. Additionally, Briggs (2006) shares that adequate training on some technologies is not being offered. This construct consisted of nine likert scale questions ranging from 1-5 on the same scale mentioned previously. Table 10 depicts the frequencies and percentages of the nine questions to answer research question seven. The average of the means for this construct was 2.7718 indicating a slight propensity to agree with the questions. The questions were stated in a way that asked the respondents if they agreed with staff development opportunities and offerings.

Research question 17 can be addressed with a Sig = 0.335 (Table 18); thus showing that no significant difference existed between 21st century and non-21st century schools. This information was surprising to the researcher because part of the grant monies were set aside for staff development opportunities. The offerings were relevant to the topics at

hand and were on the equipment and resources available to the teachers at the 21st century schools. Staff development offerings were available to the 21st century schools ranging from to the basics of the equipment to using the equipment to integrate technology into instruction.

Professional Development – Participation

Research questions 8 and 18 are explored in this section:

8. What are the professional development participation opportunities as they relate to technology use in your school?
18. How do 21st century schools compare to non-21st century schools related professional development participation opportunities as it relates to technology use in your school?

Vojtek & Vojtek (1997) emphasize how important the human factor is for technology to be used effectively in the classroom. Scheffler agrees and argues that no matter how many computers are placed in a classroom, the key element to how they are used is the teacher. As stated earlier, it is vital that the teacher participate in professional development opportunities; however, as Dagenhart et. al. (2005) found, teachers want a voice in what staff development is offered and taken. In fact, Clifford (1998) feels so strongly that he suggests that as much as 20% of any annual technology budget should be spent on professional development. This construct consisted of seven yes/no questions. To address research question eight, refer to Table 11 to examine the frequencies and percentages of the seven questions. Table 14 indicates a mean of 1.5935 (1 = yes and 2 = no), thus giving no conclusive data about participation in professional development opportunities as they relate to technology.

Research question 18 is aligned with this construct as well. As with the other construct on Professional Development no significant differences (Sig = 0.991) were realized between 21st century and non-21st century schools. Again this was surprising to the researcher given the opportunities teachers had to attend professional development offerings at the 21st century schools. One plausible conclusion, however anecdotal, is that many of the teachers presently at the 21st century schools were not there the first few years of the grant. One school in particular lost over 50% of their staff the third year of the grant. Most likely teachers, who were not given a choice and voice as to the staff development topics, did not have a vested interest in the activities. In addition, participation in these activities was not mandatory; therefore many teachers did not participate.

Classroom Practices and Student Outcomes

Research questions 9 and 19 are explored in this section:

9. How do all above mentioned conditions impact classroom practice and reflect on student activities in the classroom?
19. How do 21st century schools compare to non-21st century schools related to the impact on classroom practice and reflect on student activities in the classroom?

As the literature review references, Dillon (2006) shares how communications technologies are becoming the dominate force over teaching and learning as it mirrors today's workplace. Educators in general uphold the belief that teachers and students need to know how to master the skills that can be facilitated by technology use. Loveland (2005) believes that one must be cognizant that technology tools are used in a way to ensure they are meant to accomplish tasks in terms of learning outcomes. Using

technology for technology's sake does the students and teachers a disservice. NCLB calls for standards based teaching and methodologies. Classroom practices and student outcomes as related to technology use are no exception to this expectation. The respondents of this survey agreed only slightly with the 21 questions asked on this construct. To address research question nine, a likert scale was used for frequency of use, however the scale consisted of a range of values from 1-5 where 1 represented daily and 5 represented never. An average mean was calculated to be 2.8804 (Table 14), again not showing a strong inclination of use. Frequencies and percentages are shown in Table 12.

In a side by side comparison of means of 21st century schools compared to non-21st century schools, almost no difference could be noted. Table 15 illustrates values of 2.8140 and 2.8886. Table 18 shows a Sig = 0.493 thus proving no statistical significance between 21st century and non-21st century schools and therefore answering research question 19.

Impact of Technology

Research questions 10 and 20 are explored in this section:

10. How do all above mentioned conditions affect the impact of technology in the classroom?
20. How do 21st century schools compare to non-21st century schools related to the affect the impact of technology in the classroom?

The last construct addressed by this study centers around the impact of technology in the classroom. Starr in 2003 reported in a study that 85% of the 600 teachers surveyed believed that technology made an impact on the lives of their students. Specifically he noted that 72% of teachers surveyed believed that students who had access to technology

at home have a major advantage over those who do not. Shields (2004) noted that the ultimate goal and purpose for deploying new technologies in the educational arena is to ultimately improve student instruction and learning. Whereas this is a worthwhile sentiment, the researcher does not completely agree philosophically with this statement. If Shields is not talking about student achievement and test scores, then the researcher accepts this premise of improving instruction and learning. Moreover, technology is making an impact in the lives of students and teachers today. Research question 20 can be addressed with Tables 13, 14 and 15. The frequencies and percentages of each of the nine questions are reported (Table 13, 14 and 15). In addition, the average mean for these questions was 2.2202, the lowest of any of the questions in this survey. This leads the researcher to believe that the majority of respondents of this survey agree that technology is making an impact on the lives of our students.

Research question 20 is the culminating question of this entire study and has great significance. Table 18 shows a significance level of Sig = 0.008 proving that there is a significant difference related to the impact of technology at 21st century schools versus non-21st century schools. These data are the crux of the entire study and shows the transference of effort to impact. The respondents shared that technology is making an impact in the lives of our students.

Of the ten constructs and sub constructs, seven were found to show no significance levels to be reported as statistically significant between 21st century and non-21st century schools, only three were found to show significance. The researcher believes this supports the hypothesis. As stated in Chapter I, *the researcher believed that filling specific conditions and technology needs, with vision and leadership as well as funding*

for equipment, were significant precursors to the implementation and impact of technology. As evidenced by the three areas where a significant difference was found (Leadership and Vision; Planning, Budgeting and Evaluation; and Impact of Technology) the hypothesis has been supported.

Limitations

Again, there are a number of limitations that exist in carrying out this study that must be addressed. The final sample was not random and, therefore, cannot be deemed to be representative of all school teachers, yet can represent a generalization for all teachers. Consequently, the data give a good indication of the needs of teachers in schools with respect to educational technology in a school district on the major construct and sub construct areas as they relate to the research questions. In addition, the researcher's choice to maintain anonymity limited the ability to follow-up with non-respondents. One major limitation not to be ignored is the fact that a 41% response rate leaves 59% of the surveyed population with no voice. Non-response can, but need not, induce non-response bias in survey estimates. This combined with the anonymity begs to answer the question, if anonymity had not been used, could a higher response rate been achieved?

While there are significant advantages to taking this online survey approach, there is a major concern not to be ignored. Will the use of a research instrument administered electronically favor a response from those teachers who are already using educational technology and eliminate those teachers who are uncomfortable with or simply avoid the use of educational technology? While the use of the Internet to administer a research instrument electronically is becoming more commonplace today, especially in the educational environment, it is a possible limitation as it may influence those who choose

to respond. This question is even more important when the administered instrument deals with teacher perceptions about technology as it raises the possibility that those who choose not to respond may be less comfortable with using technology.

Further Research

One area for additional research and one of significance would be to closely examine the impact technology has on student achievement. A study of this nature, however could be longitudinal and possibly a mixture of a qualitative and quantitative research design. In particular, additional research is needed to explore the long-term effects of technology in the educational setting.

The question still ever present remains: Does the use of technology make a difference in student achievement? This study shows that teachers believe that technology does make an impact; yet, additional research, possibly tied to academic achievement, could more closely answer this conundrum. Research could be done to solidify and quantify the impact of technology use. Is there a relationship between technology use and NC SCOS benchmarks? In addition, does the use of technology by students outside of school (i.e. in the home) have a significant impact on technology use? Is there a relationship between technology use and accountability and assessment measures? Finally, still unknown is why teachers actually decide to use technology in their instruction and therefore another area for further research.

Future Practice

This study contributes greatly to the body of research on teaching and learning as they relate to technology in the educational setting. The strong correlations between leadership, planning, and the impact of technology are ones that cannot be overlooked.

Teachers, boards of education, and administrators are all impacted by the information gleaned from this study.

This study offers an interesting perspective for the classroom teacher as they think about their own teaching environment and how they use, infuse and integrate technology into instruction. Information gathered from this study should change the way we teach as well as how we offer staff development to teachers. Teachers, and especially those who embrace a more traditional role, should examine if and how they use technology in their classrooms. This study implies that students are more engaged, participate more, and achieve greater academic success when technology is used. Cooperative and project based learning are two areas where technology can foster learning. Teachers should be the role model in the use of technology.

The strong relationship between leadership and vision and technology has shown significance, yet professional development seems unaffected by this finding. This is of concern and should be examined in detail. As mentioned earlier in the research, teachers want a voice in professional development offerings and leadership is important, yet no significance was found on this construct. Does this mean that our leaders may be steering us in the wrong direction, or that they should reexamine the direction and vision for professional development?

In addition, these data inform decision makers of the appropriate steps in order to insure technology permeates the educational setting. It should not be viewed as just another financial hardship. As school boards, administrators and educators move forward into the 21st century, one must be acutely aware of the opportunities and challenges that come from technology. This study implies that simply placing a lot of emphasis on the

technology itself (i.e. the hardware and software) does not make a significant difference, thus school boards and decision makers should use these data as a justification for implementation and appropriations. Resources should not be allocated unless strong leadership and proper planning are in place to deal with the ramifications of increased technology in schools. In addition, these data lay the foundation for a grassroots reform in the way that technology is implemented. As a 21st Century Skills Curriculum is being implemented, decisions related to technology and it use should be made based on sound educational practice, principles, and plans. Often times, resources are "thrown at" an issue in hopes that a one shot bundle of resources will solve the issue. Technology has been treated as such, yet this study implies that the educational community is in need of a paradigm shift related to technology implementation.

Whereas technology implementation is an entirely new venue for some, it is not for others. One thing is for certain, technology is reshaping the way we live, work, play and educate. As the study did imply, having the technology available did have, in the teachers' opinion, an impact on students and teachers, however, the placement of technology alone, does not make the difference. It takes strong leadership and vision, followed closely by planning for its use. Other contributing factors must also be considered. If you "build it", this does not necessitate they will come, but if you do not "build it" they will not come, and will be left behind.

APPENDIX A

School Technology Needs Assessment (STNA)

I. Conditions for Technology Use

Selecting Responses – Section I

1. For each item, check the box below the response that best matches how much you agree with the statement - “Strongly Agree," "Agree," "Disagree," or "Strongly Disagree.”
2. If you do not have enough information to form an opinion about the topic of an item, select “Do Not Know.”
3. If you have enough information to form an opinion but are simply split between “Agree” and “Disagree,” select “Neither Agree nor Disagree.”

	In My School…	**Strongly Agree**	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly Disagree**
Vision and Leadership	4) A shared vision for technology has been developed through an effective collaboration among stakeholder groups—teachers, other staff members, students, parents, and members of the community.	☐	☐	☐	☐	☐
	5) The vision for technology use has been effectively communicated to the community.	☐	☐	☐	☐	☐
	6) Administrators model effective uses of technology.	☐	☐	☐	☐	☐
	7) Administrators support changes in school-level systems, policies, and practice related to technology.	☐	☐	☐	☐	☐
	8) Administrators guide the school toward more effective uses of technology.	☐	☐	☐	☐	☐
Technology Planning, Budgeting, and Evaluation	9) An effective long-range school technology plan is in place.	☐	☐	☐	☐	☐
	10) The school technology plan is developed by a leadership team or committee involving a variety of school stakeholders (i.e., media coordinator, technology facilitator, teachers, students, and community members).	☐	☐	☐	☐	☐
	11) The school technology plan is monitored and updated adequately.	☐	☐	☐	☐	☐

	12) The budget for technology resources is adequate in size to support decisions arising from planning and to continuously update and replace technology systems as they become outdated.	☐	☐	☐	☐	☐
	13) Supplemental sources of funding are actively pursued to support technology (e.g., external grants, collaboration with community or parent groups, support from businesses).	☐	☐	☐	☐	☐
	14) Teachers and other staff members support the school technology plan.	☐	☐	☐	☐	☐
	15) Multiple sources of data are used to evaluate the implementation of technology programs.	☐	☐	☐	☐	☐
	16) Multiple sources of data are used to evaluate the impact of technology programs on teacher practice and productivity.	☐	☐	☐	☐	☐
	17) Multiple sources of data are used to evaluate the impact of technology programs on academic achievement and other student outcomes.	☐	☐	☐	☐	☐
Supportive Environment for Risk Taking	18) Teachers are encouraged to take risks and be inventive with technology use.	☐	☐	☐	☐	☐
	19) Teachers who are innovators with technology receive incentives or rewards for their hard work (e.g., funding, perks, waivers, special opportunities).	☐	☐	☐	☐	☐
	20) The media center can be flexibly scheduled to provide equitable access to resources and instruction.	☐	☐	☐	☐	☐
	21) Computer labs can be flexibly scheduled for equitable access to resources and instruction.	☐	☐	☐	☐	☐
	22) Mobile computers can be flexibly scheduled to provide equitable access to resources and instruction.	☐	☐	☐	☐	☐
Technical Infrastructure and Support	23) An adequate technology base is available (e.g., computers, digital cameras, projection devices, scanners, printers).	☐	☐	☐	☐	☐
	24) Communication systems within the school are adequate (e.g., e-mail among teachers and staff, network drives to upload lesson plans and grades to the main office).	☐	☐	☐	☐	☐
	25) Systems to communicate with parents and the community are adequate (e.g., e-mail, teacher, and/or school Web pages).	☐	☐	☐	☐	☐
	26) Reliability and speed of connections to the external Internet, online databases and resources, etc., are adequate.	☐	☐	☐	☐	☐
	27) Adequate access to technical support is available (e.g., to troubleshoot hardware or software problems, maintain systems).	☐	☐	☐	☐	☐
	28) Adequate staffing is readily available in library media coordinator and/or media assistant positions.	☐	☐	☐	☐	☐

	29) Adequate staffing is readily available in technology facilitator and/or technology assistant positions.	☐	☐	☐	☐	☐
Resource Media, Software Tools	30) Adequate access to student productivity software is provided (e.g., graphic organizer, word processing, slide presentation, or drawing applications).	☐	☐	☐	☐	☐
	31) An adequate cataloguing system is readily available, with which staff members can search and locate teaching materials.	☐	☐	☐	☐	☐
	32) An adequate collection of print, multimedia, and electronic resources is readily available.	☐	☐	☐	☐	☐
	33) Both the curriculum and the needs of learners are considered in making resource media and software selection decisions.	☐	☐	☐	☐	☐
Community Linkages	34) Community and/or business partnerships are successfully engaged to support and advance the technology program.	☐	☐	☐	☐	☐
	35) Parent and community stakeholders are kept informed of successes and progress with the technology program.	☐	☐	☐	☐	☐

II. Professional Development – Opportunities

Selecting Responses – Section II

1. For each item, check the box below the response that best matches how much you agree with the statement - “Strongly Agree," "Agree," "Disagree," or "Strongly Disagree.”
2. If you do not have enough information to form an opinion about the topic of an item, select “Do Not Know.”
3. If you have enough information to form an opinion but are simply split between “Agree” and “Disagree,” select “Neither Agree nor Disagree.”

	In My School…	**Strongly Agree**	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly Disagree**
Skills, Policies, and Structures	36) Teachers and staff members have a strong base of knowledge, skills, and understanding about contemporary technologies.	☐	☐	☐	☐	☐
	37) Technology literacy and leadership are actively considered when seeking and hiring teachers.	☐	☐	☐	☐	☐

	38) Teachers have a say in the selection and evaluation of professional development topics.	☐	☐	☐	☐	☐
	39) Professional development opportunities are provided to observe classrooms where effective technology integration is taking place.	☐	☐	☐	☐	☐
	40) Professional development opportunities are provided to work with small groups of peers on real projects intended for use in classrooms.	☐	☐	☐	☐	☐
	41) Professional development opportunities are provided that require keeping a journal or otherwise reflecting on how professional development will be employed in classrooms.	☐	☐	☐	☐	☐
	42) The impact of professional development is tracked by looking for evidence of improved classroom practice and/or student learning.	☐	☐	☐	☐	☐
	43) Technical and instructional support staff members (e.g., media coordinator, technology facilitator) are given adequate opportunities for professional development.	☐	☐	☐	☐	☐
	44) Professional development activities can be applied to meet licensure and/or renewal requirements.	☐	☐	☐	☐	☐

III. Professional Development – Participation

Selecting Responses – Section III

1. For each item, **check the box below "Yes" if you did participate** in the described professional development opportunity in the **past 12 months** or **"No"** if you did not.
2. If you do not remember or do not know if you participated in the described professional development, **"Do Not Know."**

	In the Past 12 Months…	**Yes**	**No**
Instructional Strategies	45) I participated in professional development opportunities, examining research-based practices in technology-enhanced classrooms.	☐	☐
	46) I participated in professional development opportunities examining identification, location, and evaluation of technology resources (e.g., websites).	☐	☐
	47) I participated in professional development opportunities examining student assessment in technology-enhanced classrooms.	☐	☐

	48) I participated in professional development opportunities examining learner-centered teaching strategies in technology-enhanced classrooms (e.g., project-based or cooperative learning).	☐	☐
	49) I participated in professional development opportunities examining online security and safety.	☐	☐
	50) I participated in professional development opportunities examining the uses of technology to improve individual teacher productivity.	☐	☐
	51) I participated in professional development opportunities examining ways to involve parents and the community in student learning with technology.	☐	☐

IV. Classroom Practices

Selecting Responses – Section IV

1. For each item, check the box below the response that comes closest to indicating how often you do the described activity - "Daily," Weekly," and so on.
2. If you do not have enough information to select a number response for an item, select "Do Not Know."
3. If you are not a classroom teacher, "In my classroom" should be interpreted to mean "in the settings in which I work with students."

	In My Classroom…	Daily	Weekly	Monthly	Once per Grading Period	Never
Instructional Strategies	52) I consult publications, online journals, or other resources to identify research-based practices in teaching with technology.	☐	☐	☐	☐	☐
	53) I identify, locate, and evaluate technology resources (e.g., websites).	☐	☐	☐	☐	☐
	54) I apply performance-based student assessment to technology-enhanced lessons (e.g., student portfolios, student presentations).	☐	☐	☐	☐	☐
	55) I use technology to collect and analyze student assessment data.	☐	☐	☐	☐	☐
	56) My lessons include technology-enhanced, learner-centered teaching strategies (e.g., project-based learning).	☐	☐	☐	☐	☐

	57) I apply policies and practices to enhance online security and safety.	☐	☐	☐	☐	☐
	58) I use technology to support and increase teacher productivity.	☐	☐	☐	☐	☐
	59) I use technology to increase my access to professional development resources.	☐	☐	☐	☐	☐
	60) I use technology to support communication and interaction with parents and the community.	☐	☐	☐	☐	☐
	61) I use technology to support communication and interaction among staff members.	☐	☐	☐	☐	☐
Planning	62) My lesson plans refer to both content standards and student technology standards.	☐	☐	☐	☐	☐
	63) I do research or action research projects, or apply the results of my research to improve technology-enhanced classroom practice.	☐	☐	☐	☐	☐
	64) I use multiple sources of data to reflect on professional practice and make decisions about the use of technology.	☐	☐	☐	☐	☐

V. Students Activities

Selecting Responses – Section V

1. For each item, check the box below the response that comes closest to indicating how often students do the described activity - "Daily," Weekly," and so on.
2. If you do not have enough information to select a number response for an item, select "Do Not Know."
3. If you are not a classroom teacher, "In my classroom" should be interpreted to mean "in the settings in which I work with students."

	In My Classroom…	**Daily**	**Weekly**	**Monthly**	**Once per Grading Period**	**Never**
Tools & Tasks	65) Students use a range of technologies (i.e., productivity, visualization, research, and communication tools).	☐	☐	☐	☐	☐
	66) Students communicate and collaborate with peers, content experts, or others outside the classroom using technology.	☐	☐	☐	☐	☐

	67) Students use technology to access online resources and information as a part of classroom activities.	☐	☐	☐	☐	☐
	68) Students use advanced, professional research tools and information (e.g., simulations, databases, satellite imagery).	☐	☐	☐	☐	☐
	69) Students work on relevant, technology-enhanced projects that have meaning and approach real-world applications of technology.	☐	☐	☐	☐	☐
	70) Students use technology to help solve problems.	☐	☐	☐	☐	☐
	71) Students use technology to support higher-order thinking (i.e., analysis, synthesis, and evaluation of ideas and information).	☐	☐	☐	☐	☐
	72) Students use technology to create new ideas and representations.	☐	☐	☐	☐	☐

VI. Impact of Technology

Selecting Responses – Section VI

1. For each item, check the box below the response that best matches how much you agree with the statement - “Strongly Agree," "Agree," "Disagree," or "Strongly Disagree.”
2. If you do not have enough information to form an opinion about the topic of an item, select “Do Not Know.”
3. If you have enough information to form an opinion but are simply split between “Agree” and “Disagree,” select “Neither Agree nor Disagree.”
4. If you are not a classroom teacher, **“in my classroom”** should be interpreted to mean **“in the settings in which I work with students.”**

	In My Classroom…	**Strongly Agree**	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly Disagree**
Teaching Practice	73) Teaching is more student-centered and interactive when technology is integrated into instruction.	☐	☐	☐	☐	☐
	74) Teaching practices emphasize teacher uses of technology skills to support instruction.	☐	☐	☐	☐	☐

	75) Teaching practices emphasize student uses of productivity applications (e.g., word processing, spreadsheet).	☐	☐	☐	☐	☐
	76) Teaching practices emphasize student uses of technology as a regular part of specific teaching strategies (e.g., project-based or cooperative learning).	☐	☐	☐	☐	☐
Student Outcomes	77) Technology has helped students become more socially aware, confident, and positive about their future.	☐	☐	☐	☐	☐
	78) Technology has helped students become independent learners and self-starters.	☐	☐	☐	☐	☐
	79) Technology has helped students work more collaboratively.	☐	☐	☐	☐	☐
	80) Technology has increased students' engagement in their learning.	☐	☐	☐	☐	☐
	81) Technology has helped students achieve greater academic success.	☐	☐	☐	☐	☐

APPENDIX B

Academic Affairs Institutional Review Board Approval

TO: Scott Smith
School of Education

FROM: Behavioral IRB

APPROVAL DATE: 2/19/2007

EXPIRATION DATE OF APPROVAL: 2/18/2008

RE: Notice of IRB Approval by Expedited Review (under 45 CFR 46.110)
Submission Type: Initial
Expedited Category: 7.Survey/group chars
Study #: 07-0206
Other #: School of Education - SOE 07-020
Study Title: Technology Needs in Schools

This submission has been approved by the above IRB for the period indicated. It has been determined that the risk involved in this research is no more than minimal.

Federal regulations require that all research be reviewed at least annually. It is the Principal Investigator's responsibility to submit for renewal and obtain approval before the expiration date. You may not continue any research activity beyond the expiration date without IRB approval. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.

When applicable, enclosed are stamped copies of approved consent documents and other recruitment materials. The expectation is that you will copy these for use with subjects.

You are required to obtain IRB approval for any changes to any aspect of this study before they can be implemented (use the modification form at ohre.unc.edu/forms). Should any adverse event or unanticipated problem involving risks to subjects or others occur it must be reported immediately to the IRB using the adverse event form at the same web site.

Study Description:
Purpose: To examine what conditions contribute to and influence technology use and instruction in public schools.
Procedures: Administer a survey.
Participants: 1200 teachers in Burke County, NC public schools.

Details:
This research meets criteria for a waiver of written (signed) consent according to 45 CFR 46.117(c)(2).

This study was reviewed in accordance with federal regulations governing human subjects research, including those found at 45 CFR 46 (Common Rule), 45 CFR 164 (HIPAA), and 21

CFR 50 & 56 (FDA), where applicable.

The University of North Carolina at Chapel Hill holds a Federal Wide Assurance approved by the Office for Human Research Protections, Department of Health and Human Services (FWA # 4801).

If you have any questions about your study, please contact the IRB at 966-3113, or email the Behavioral IRB at aa-irb-chair@unc.edu. You can now access IRB status information at my.research.unc.edu.

Good luck with your study!

****

Lawrence B. Rosenfeld, Ph.D.
Office of Human Research Ethics
Co-Chair, Behavioral Institutional Review Board
CB# 7097, Medical School, Bldg 52
University of North Carolina at Chapel Hill
Chapel Hill, NC 27599-7097
aa-irb-chair@unc.edu
phone 919-962-7760; fax 919-843-5576

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CC: Barbara Day, School Of Education, CB:3500 307d Peabody Hall, Faculty Advisor
Kesha Tysor, (School of Education), Non-IRB Review Contact

APPENDIX C

Institutional Review Board Application

OFFICE OF HUMAN RESEARCH ETHICS
Institutional Review Board

APPLICATION FOR IRB APPROVAL OF HUMAN SUBJECTS RESEARCH
Version 5-Oct-2006

For IRB Use
Behav Biomed PH-Nurs

Part A.1. Contact Information, Agreements, and Signatures

Title of Study: Technology Needs in Schools **Date:** 11-27-06

Name and degrees of Principal Investigator: Scott S. Smith - MA Instructional Technology, Appalachian State University, BS Mathematics Education, Appalachian State University

Department: School of Education Mailing address/CB #: 6096 Jupiter Court, Denver, NC 28037
UNC-CH PID: 701066932 Pager: 828.312.5595
Phone #: 828.448.0152 Fax #: 828.397.6681 Email Address: smithss@burke.k12.nc.us

For trainee-led projects: __ undergraduate __ graduate __ postdoc __ resident __ other
Name of faculty advisor: Dr. Barbara Day
Department: School of Education Mailing address/CB #: 307D Peabody Hall, CB 3500
Phone #: 919.962.7793 Fax #: 919.962.1533 Email Address: bday1@email.unc.edu

Name, phone number, email address of project manager or coordinator, if any:
List **all other project personnel** including co-investigators, and anyone else who has contact with subjects or identifiable data from subjects:

Name of funding source or sponsor:
_X_ not funded __ Federal __ State __ industry __ foundation __ UNC-CH
__ other (specify): **Sponsor or award number**:

Include following items with your submission, where applicable.

- Check the relevant items below and include one copy of all checked items 1-11 in the order listed.
- Also include two additional collated sets of copies (sorted in the order listed) for items 1-7.

→ Applications may be returned if these instructions are not followed.

Check	Item	Total No. of Copies
X	1. This application. One copy must have original PI signatures.	3
X	2. Consent and assent forms, fact or information sheets; include phone and verbal consent scripts.	3
n/a	3. HIPAA authorization addendum to consent form.	3

X	4. All recruitment materials including scripts, flyers and advertising, letters, emails.	3
X	5. Questionnaires, focus group guides, scripts used to guide phone or in-person interviews, etc.	3
n/a	6. Protocol, grant application or proposal supporting this submission; (e.g., extramural grant application to NIH or foundation, industry protocol, student proposal).	3
n/a	7. Documentation of reviews from any other committees (e.g., GCRC, Oncology Protocol Review Committee, or local review committees in Academic Affairs).	3
n/a	8. Addendum for Multi-Site Studies where UNC-CH is the Lead Coordinating Center.	1
n/a	9. Data use agreements (may be required for use of existing data from third parties).	1
n/a	10. Only for those study personnel *not* in the online UNC-CH ethics training database (http://cfx3.research.unc.edu/training_comp/): Documentation of required training in human research ethics.	1
n/a	11. Investigator Brochure if a drug study.	1

Principal Investigator: I will personally conduct or supervise this research study. I will ensure that this study is performed in compliance with all applicable laws, regulations and University policies regarding human subjects research. I will obtain IRB approval before making any changes or additions to the project. I will notify the IRB of any other changes in the information provided in this application. I will provide progress reports to the IRB at least annually, or as requested. I will report promptly to the IRB all unanticipated problems or serious adverse events involving risk to human subjects. I will follow the IRB approved consent process for all subjects. I will ensure that all collaborators, students and employees assisting in this research study are informed about these obligations. All information given in this form is accurate and complete.

_____ _____

Signature of Principal Investigator Date

Faculty Advisor if PI is a Student or Trainee Investigator: I accept ultimate responsibility for ensuring that this study complies with all the obligations listed above for the PI.

_____ _____

Signature of Faculty Advisor Date

Department or Division Chair, Center Director (or counterpart) of PI: (or Vice-Chair or Chair's designee if Chair is investigator or otherwise unable to review): I certify that this research is appropriate for this Principal Investigator, that the investigators are qualified to conduct the research, and that there are adequate resources (including financial, support and facilities) available. If my unit has a local review committee for pre-IRB review, this requirement has been satisfied. I support this application, and hereby submit it for further review.

_____ _____

Signature of Department Chair or designee Date

_____ _____

Print Name of Department Chair or designee Department

Part A.2. Summary Checklist

Are the following involved?

	Yes	No
A.2.1. Existing data, research records, patient records, and/or human biological specimens?	__	_X_
A.2.2. Surveys, questionnaires, interviews, or focus groups with subjects?	_X_	__
A.2.3. Videotaping, audiotaping, filming of subjects (newly collected or existing)?	__	_X_
A.2.4. Do you plan to enroll subjects from these vulnerable or select populations:		
a. UNC-CH students or UNC-CH employees?	__	_X_
b. Non-English-speaking?	__	_X_
c. Decisionally impaired?	__	_X_
d. Patients?	__	_X_
e. Prisoners, others involuntarily detained or incarcerated, or parolees?	__	_X_
f. Pregnant women?	__	_X_
g. Minors (less than 18 years)? ***If yes***, give age range: to years	__	_X_
A.2.5. a. Is this a multi-site study (sites outside UNC-CH engaged in the research)?	__	_X_
b. Is UNC-CH the sponsor or lead coordinating center?	__	_X_
If yes, include the ***Addendum for Multi-site Studies where UNC-CH is the Lead Coordinating Center***.		
If yes, will any of these sites be outside the United States?	__	_X_
If yes, provide contact information for the foreign IRB.		
A.2.6. Will there be a data and safety monitoring committee (DSMB or DSMC)?	__	_X_
A.2.7. a. Are you collecting sensitive information such as sexual behavior, HIV status, recreational drug use, illegal behaviors, child/physical abuse, immigration status, etc?	__	_X_
b. Do you plan to obtain a federal Certificate of Confidentiality for this study?	__	_X_
A.2.8. a. Investigational drugs? (provide **IND #** _____)	__	_X_
b. Approved drugs for "non-FDA-approved" conditions?	__	_X_
All studies testing substances in humans must provide a letter of acknowledgement from the UNC Health Care Investigational Drug Service (IDS).		
A.2.9. Placebo(s)?	__	_X_
A.2.10. Investigational devices, instruments, machines, software? (provide **IDE #** _____)	__	_X_
A.2.11. Fetal tissue?	__	_X_
A.2.12. Genetic studies on subjects' specimens?	__	_X_
A.2.13. Storage of subjects' specimens for future research? ***If yes***, *see instructions for* ***Consent for Stored Samples***.	__	_X_
A.2.14. Diagnostic or therapeutic ionizing radiation, or radioactive isotopes, which subjects would not receive otherwise? ***If yes***, *approval by the* ***UNC-CH Radiation Safety*** ***Committee*** *is required.*	__	_X_
A.2.15. Recombinant DNA or gene transfer to human subjects? ***If yes***, *approval by the* ***UNC-CH Institutional Biosafety*** ***Committee*** *is required.*	__	_X_
A.2.16. Does this study involve UNC-CH cancer patients? ***If yes***, *submit this application directly to the* ***Oncology Protocol Review Committee***.	__	_X_
A.2.17. Will subjects be studied in the General Clinical Research Center (GCRC)? ***If yes***, *obtain the* ***GCRC Addendum*** *from the GCRC and submit complete application (IRB application and Addendum) to the GCRC.*	__	_X_

Part A.3. Conflict of Interest Questions and Certification

The following questions apply to **all investigators and study staff** engaged in the design, conduct, or reporting results of this project **and/or their immediate family members.** For these purposes, "family" includes the individual's spouse and dependent children. "Spouse" includes a person with whom one lives together in the same residence and with whom one shares responsibility for each other's welfare and shares financial obligations.

A.3.1. Currently or during the term of this research study, does any member of the research team or his/her family member have or expect to have:		
(a) A personal financial interest in or personal financial relationship (including gifts of cash or in-kind) with the sponsor of this study?	__ yes	X_ no
(b) A personal financial interest in or personal financial relationship (including gifts of cash or in-kind) with an entity that owns or has the right to commercialize a product, process or technology studied in this project?	__ yes	X_ no
(c) A board membership of any kind or an executive position (paid or unpaid) with the sponsor of this study or with an entity that owns or has the right to commercialize a product, process or technology studied in this project?	__ yes	X_ no
A.3.2. Has the University or has a University-related foundation received a cash or in-kind gift from the Sponsor of this study for the use or benefit of any member of the research team?	__ yes	X_ no
A.3.3. Has the University or has a University-related foundation received a cash or in-kind gift for the use or benefit of any member of the research team from an entity that owns or has the right to commercialize a product, process or technology studied in this project?	__ yes	X_ no

If the answer to ANY of the questions above is *yes*, the affected research team member(s) must complete and submit to the Office of the University Counsel the form accessible at http://coi.unc.edu. List name(s) of all research team members for whom any answer to the questions above is *yes*:

Certification by Principal Investigator: By submitting this IRB application, I (the PI) certify that the information provided above is true and accurate regarding my own circumstances, that I have inquired of every UNC-Chapel Hill employee or trainee who will be engaged in the design, conduct or reporting of results of this project as to the questions set out above, and that I have instructed any such person who has answered "yes" to any of these questions to complete and submit for approval a Conflict of Interest Evaluation Form. I understand that as Principal Investigator I am obligated to ensure that any potential conflicts of interest that exist in relation to my study are reported as required by University policy.

_____ _____

Signature of Principal Investigator Date

Faculty Advisor if PI is a Student or Trainee Investigator: I accept ultimate responsibility for ensuring that the PI complies with the University's conflict of interest policies and procedures.

_____ _____

Signature of Faculty Advisor Date

Part A.4. Questions Common to All Studies

For all questions, if the study involves only secondary data analysis, focus on your proposed design, methods and procedures, and not those of the original study that produced the data you plan to use.

A.4.1. **Brief Summary**. Provide a *brief* non-technical description of the study, which will be used in IRB documentation as a description of the study. Typical summaries are 50-100 words.

The ever increasing demand on schools to produce students that are technology literate is growing at an alarming rate. Schools find themselves on the brink of the digital age faced with great needs to successfully use, integrate and infuse technology into the classroom. Helping students become 21st century citizens is the ultimate goal, however many needs must be addressed for success to occur. Through a needs assessment survey, the researcher will seek trends related to technology use based on conditions in the educational setting. The School Technology Needs Assessment (STNA) developed by SEIR*TEC (SouthEast Initiatives Regional Technology in Education Consortium), will be administered to approximately 1200 certified teachers in Burke County Public Schools, Morganton, North Carolina.

A.4.2. **Purpose and Rationale**. Provide a summary of the background information, state the research question(s), and tell why the study is needed. If a complete rationale and literature review are in an accompanying grant application or other type of proposal, only provide a brief summary here. If there is no proposal, provide a more extensive rationale and literature review, including references.

The purpose of this study is to examine the conditions for technology use in the educational setting to see if there is a relationship between schools meeting some specified conditions compared to those who do not. Through a needs assessment, the researcher will examine what conditions contribute and influence technology use and how schools perceive technology and its use in the educational setting. Still unknown are what requirements directly cause the effective use of technology in the classroom and thus the need for this study.

Research Questions

12. What are the conditions for technology use in schools?
    a. related to vision and leadership?
    b. related to planning, budgeting and evaluation?
    c. related to supportive environments for risk taking?
    d. related to technical infrastructure and support?
    e. related to resource media, software and tools?
    f. related to community linkages?
13. What are the professional development opportunities that may affect technology use in your school?
14. What are the professional development participation opportunities as it relates to technology use in your school?
15. How do all above mentioned conditions impact classroom practice and reflect on student activities in the classroom?
16. How do all above mentioned conditions affect the impact of technology in the classroom?
17. How do 21st century schools compare to non-21st century schools?

A.4.3. **Subjects.** *You should describe the subject population even if your study does not involve direct interaction (e.g., existing records).* Specify number, gender, ethnicity, race, and age. Specify whether subjects are healthy volunteers or patients. If patients, specify any relevant disease or condition and indicate how potential subjects will be identified.

Certified school teachers (n = 1200) in Burke County will be invited to participate in this research study via email. Burke County Public Schools maintains a group email of all "Certified Staff" (certified@burke.k12.nc.us). This address will be used to contact all certified teachers in the district. All school teachers have an opportunity to participate because they all have an email address and access to the Internet. In addition, the researcher will email school administrators seeking their endorsement of participation in the STNA. Participants/volunteers are healthy and from both genders, multiple races, ethnicities, and ages.

A.4.4. **Inclusion/exclusion criteria.** List required characteristics of potential subjects, and those that preclude enrollment or involvement of subjects or their data. Justify exclusion of any group, especially by criteria based on gender, ethnicity, race, or age. If pregnant women are excluded, or if women who become pregnant are withdrawn, specific justification must be provided.

All certified school teachers (n = 1200) in Burke County Public Schools will be invited to participate in this research study via email. No certified teacher will be excluded.

A.4.5. **Full description of the study design, methods and procedures.** Describe the research study. Discuss the study design; study procedures; sequential description of what subjects will be asked to do; assignment of subjects to various arms of the study if applicable; doses; frequency and route of administration of medication and other medical treatment if applicable; how data are to be collected (questionnaire, interview, focus group or specific procedure such as physical examination, venipuncture, etc.). Include information on who will collect data, who will conduct procedures or measurements. Indicate the number and duration of contacts with each subject; outcome measurements; and follow-up procedures. If the study involves medical treatment, distinguish standard care procedures from those that are research. If the study is a clinical trial involving patients as subjects and use of placebo control is involved, provide justification for the use of placebo controls.

In 2002-2003 three elementary schools in Burke County Public Schools received a Federal 21st Century Community and Technology Learning Center Grant. This grant brought nearly four million dollars to these three 21st century schools over a four year period. These funds were used for a vast array of expenses to meet technology needs and to create an environment where optimal conditions existed for technology use. Expenses ranged from the purchase of equipment (computers, projectors, PDAs, laptops, etc.), the hiring of instructional facilitators, professional development opportunities, to providing after school tutors. The researcher will seek to determine if there is a relationship in technology use by comparing these 21st century school's responses on the STNA to the other schools in Burke County who did not receive the grant.

Respondents (certified school teachers (n = 1200)) will be surveyed with the STNA, and asked to self-identify the number of years they have been teaching, and what grade they currently teach. In addition, they will be asked to identify what school they represent. There is a small chance for persons to be identifiable based on the information requested but the researcher assures anonymity and confidentiality. All data obtained in this study will be reported as group data. The only person who will have access to these data is the investigator. This will allow the

researcher to compare the three schools who received the 21st Century Community and Technology Learning Center Grant to those who did not.

A.4.6. **Benefits to subjects and/or society.** Describe any potential for direct benefit to individual subjects, as well as the benefit to society based on scientific knowledge to be gained; these should be clearly distinguished. Consider the nature, magnitude, and likelihood of any direct benefit to subjects. If there is no direct benefit to the individual subject, say so here and in the consent form (if there is a consent form). Do not list monetary payment or other compensation as a benefit.

This study has great significance for schools across the world. In determining needs and conditions influencing the use of educational technology, administrators and Boards of Education can better make decisions related to the classroom. Budgetary constraints alone are a huge consideration. Teacher attitudes also greatly impact the amount and effectiveness of instruction. If schools understand overall teacher needs and staff development concerns, they will be better able to meet the teachers on the appropriate level and address technology training concerns. Additionally, the study will assist school districts to plan, decide, and implement what they want and need for future endeavors of educational technology. The information gathered will assist school administrators in the budgeting process as well as planning for professional development activities. Individuals who respond will most likely not see direct benefits to participating in the survey. The results will be used to determine school wide trends of technology use.

A.4.7. **Full description of risks and measures to minimize risks.** Include risk of psychosocial harm (e.g., emotional distress, embarrassment, breach of confidentiality), economic harm (e.g., loss of employment or insurability, loss of professional standing or reputation, loss of standing within the community) and legal jeopardy (e.g., disclosure of illegal activity or negligence), as well as known side effects of study medication, if applicable, and risk of pain and physical injury. Describe what will be done to minimize these risks. Describe procedures for follow-up, when necessary, such as when subjects are found to be in need of medical or psychological referral. If there is no direct interaction with subjects, and risk is limited to breach of confidentiality (e.g., for existing data), state this.

The researcher, at no time, will have access to the actual email addresses of the participants adding a degree of confidentiality for the participants. To ensure confidentiality, the researcher will use Survey Monkey (an online survey site: www.surveymonkey.com) to set up the STNA so that Survey Monkey will maintain the data, not the researcher. Survey Monkey will not track the messages for the source of the sender. Thus, neither the researcher nor the managers of Survey Monkey are able to identify the individual completing the survey. Again, there is a small chance for persons to be identifiable based on the information requested but the researcher assures anonymity and confidentiality.

A.4.8. **Data analysis.** Tell how the qualitative and/or quantitative data will be analyzed. Explain how the sample size is sufficient to achieve the study aims. This might include a formal power calculation or explanation of why a small sample is sufficient (e.g., qualitative research, pilot studies).

With the quantitative survey, all completed raw survey data will be exported from the STNA on Survey Monkey to SPSS. A summary report by question that includes frequencies, percentages and all comments will be prepared for review. Likert scale questions have a range of answers that is discrete, not continuous. The researcher will average teacher responses within each sub

construct so that each teacher will have one value per sub construct. Reporting of descriptive statistics on each sub construct will be analyzed to assess the research questions. In addition, the researcher will calculate a Cronbach Alpha to assess internal consistency and reliability and to compare results to the survey designers to seek compatibility. The researcher will run a t-test to assess potential differences between 21st Century schools and non-21st century schools. The researcher will seek to find a significant difference in mean answers between 21st century schools and non-21st century schools on each sub construct (i.e. Vision and Leadership). In this analysis, an alpha level of .05 will be used to test for statistically significant associations. The analysis of the data will be carried out using the advanced analytical tools found in SPSS.

A.4.9. **Will you collect or receive any of the following identifiers?** Does not apply to consent forms.

__ No _**X**_ Yes *If yes, check all that apply*:

a. __ Names
b. __ Telephone numbers
c. __ Any elements of dates (other than year) for dates directly related to an individual, including birth date, admission date, discharge date, date of death. For ages over 89: all elements of dates (including year) indicative of such age, except that such ages and elements may be aggregated into a single category of age 90 and older
d. _X_Any geographic subdivisions smaller than a State, including street address, city, county, precinct, zip code and their equivalent geocodes, except for the initial three digits of a zip code
e. __ Fax numbers
f. __ Electronic mail addresses
g. __ Social security numbers
h. __ Medical record numbers
i. __ Health plan beneficiary numbers
j. __ Account numbers
k. __ Certificate/license numbers
l. __ Vehicle identifiers and serial numbers (VIN), including license plate numbers
m. __ Device identifiers and serial numbers (e.g., implanted medical device)
n. __ Web universal resource locators (URLs)
o. __ Internet protocol (IP) address numbers
p. __ Biometric identifiers, including finger and voice prints
q. __ Full face photographic images and any comparable images
r. _X_Any other unique identifying number, characteristic or code, other than dummy identifiers that are not derived from actual identifiers and for which the re-identification key is maintained by the health care provider and not disclosed to the researcher

A.4.10. **Confidentiality of the data**. Describe procedures for maintaining confidentiality of the data you will collect or will receive. Describe how you will protect the data from access by those not authorized. How will data be transmitted among research personnel? Where relevant, discuss the potential for deductive disclosure (i.e., directly identifying subjects from a combination of indirect IDs).

The reports, along with all the necessary computer files, will be analyzed by the researcher. These data, along with the resultant electronic files generated from these data, will be burned to a Compact Disk and will be stored in a safe location both at the researcher's work office and home

offices for a period of five years. To ensure that there will be no technical difficulties both with the distribution of the survey instrument and electronically collecting the data, the participants will be asked to complete the survey within ten days. If a high return is not achieved, a follow-up second email will be sent to the distribution to solicit additional responses.

A.4.11. **Data sharing.** With whom will *identifiable* (contains any of the 18 identifiers listed in question A.4.9 above) data be shared outside the immediate research team? For each, explain confidentiality measures. Include data use agreements, if any.

__ No one
__ Coordinating Center**:**
_X_Statisticians**:**
__ Consultants**:**
__ Other researchers**:**
__ Registries**:**
__ Sponsors:
__ External labs for additional testing:
__ Journals:
__ Publicly available dataset:
__ Other:

The statisticians will maintain the same protocols for confidentiality as the researcher.

A.4.12. **Data security for storage and transmission**. Please check all that apply.

For electronic data:

_X_ Secure network __ Password access _X_ Encryption
_X_ Other (describe):
__ Portable storage (e.g., laptop computer, flash drive)
Describe how data will be protected for any portable device:

Survey Monkey will host the survey and resultant data and can only be retrieved with a secure network connection and an encrypted username and password. The resultant electronic files generated from these data, will be burned to a Compact Disk and will be stored in a safe location both at the researcher's work office and home offices for a period of five years

For hardcopy data (including human biological specimens, CDs, tapes, etc.):

_X_ Data de-identified by research team (stripped of the 18 identifiers listed in question 7 above)
_X_ Locked suite or office
_X_ Locked cabinet
_X_ Data coded by research team with a master list secured and kept separately
__ Other (describe):

A.4.13. **Post-study disposition of identifiable data or human biological materials**. Describe your plans for disposition of data or human biological specimens that are identifiable in any way (directly or via indirect codes) once the study has ended. Describe your plan to destroy identifiers, if you will do so.

After data is analyzed it will be deleted.

Part A.5. The Consent Process and Consent Documentation (including Waivers)

The standard consent process is for all subjects to sign a document containing all the elements of informed consent, as specified in the federal regulations. Some or all of the elements of consent, including signatures, may be altered or waived under certain circumstances.

- If you will obtain consent in any manner, complete **section A.5.1**.
- If you are obtaining consent, but requesting a waiver of the requirement for a signed consent document, complete **section A.5.2**.
- If you are requesting a waiver of any or all of the elements of consent, complete **section A.5.3**.

You may need to complete more than one section. For example, if you are conducting a phone survey with verbal consent, complete sections A.5.1, A.5.2, and possibly A.5.3.

A.5.1. **Describe the process of obtaining informed consent from subjects**. If children will be enrolled as subjects, describe the provisions for obtaining parental permission and assent of the child. If decisionally impaired adults are to be enrolled, describe the provision for obtaining surrogate consent from a legally authorized representative (LAR). If non-English speaking people will be enrolled, explain how consent in the native language will be obtained. Address both written translation of the consent and the availability of oral interpretation. *After you have completed this part A.5.1, if you are not requesting a waiver of any type, you are done with Part A.5.; proceed to Part B.*

Informed consent will be obtained through a letter (see attached) emailed to all possible participants (1200 certified teachers) in Burke County Public Schools. Actual participation in this survey implies consent to participate.

A.5.2. **Justification for a waiver of *written* (i.e., signed) consent**. *The default is for subjects to sign a written document that contains all the elements of informed consent.* Under limited circumstances, the requirement for a signed consent form may be waived by the IRB if either of the following is true:

a. The only record linking the subject and the research would be the consent document and the principal risk would be potential harm resulting from a breach of confidentiality (e.g., study involves sensitive data that could be damaging if disclosed). __ yes __ no

Explain.

b. The research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context (e.g., phone survey). _X_ yes __ no

Explain.

Through the introduction letter, explanation will be given regarding the anonymity of the survey participants. This survey poses nothing more than minimal risk and does not require a signature for consent. Actual participation in this survey implies consent to participate.

→ If you have justified a waiver of written (signed) consent (A.5.2), you should complete A.5.3 *only* if your consent process will not include all the other elements of consent.

A.5.3. **Justification for a full or partial waiver of consent.** *The default is for subjects to give informed consent.* A waiver might be requested for research involving only existing data or human biological specimens (see also Part C). More rarely, it might be requested when the research design requires withholding some study details at the outset (e.g., behavioral research involving deception). In limited circumstances, parental permission may be waived. This section should also be completed for a waiver of HIPAA authorization if research involves Protected Health Information (PHI) subject to HIPAA regulation, such as patient records.

__ Requesting **waiver of some elements** (specify; see SOP 28 on the IRB web site):
__ Requesting **waiver of consent entirely**
If you check either of the boxes above, answer items a-f.. To justify a full waiver of the requirement for informed consent, you must be able to answer "yes" (or "not applicable" for question c) to items a-f. **Insert brief explanations that support your answers.**

a. Will the research involve no greater than minimal risk to subjects or to their privacy? __ yes __ no
Explain.

b. Is it true that the waiver will *not* adversely affect the rights and welfare of subjects? *(Consider the right of privacy and possible risk of breach of confidentiality in light of the information you wish to gather.)* __ yes __ no
Explain.

c. When applicable to your study, do you have plans to provide subjects with pertinent information after their participation is over? *(e.g., Will you provide details withheld during consent, or tell subjects if you found information with direct clinical relevance? This may be an uncommon scenario.)* __ yes __ not applicable
Explain.

d. Would the research be impracticable without the waiver? *(If you checked "yes," explain how the requirement to obtain consent would make the research impracticable, e.g., are most of the subjects lost to follow-up or deceased?).* **Explain.** __ yes __ no

e. Is the risk to privacy reasonable in relation to benefits to be gained or the importance of the knowledge to be gained? __ yes __ no
Explain.

If you are accessing patient records for this research, you must also be able to answer "yes" to item f to justify a waiver of HIPAA authorization from the subjects.

f. Would the research be impracticable if you could not record (or use) Protected Health Information (PHI)? *(If you checked "yes," explain how* not *recording or using PHI would make the research impracticable).* __ yes __ no
Explain.

Part B. Questions for Studies that Involve Direct Interaction with Human Subjects

→ *If this does not apply to your study, do not submit this section.*

B.1. **Methods of recruiting.** Describe how and where subjects will be identified and recruited. Indicate who will do the recruiting, and tell how subjects will be contacted. Describe efforts to ensure equal access to participation among women and minorities. Describe how you will protect the privacy of potential subjects during recruitment. *For prospective subjects whose status (e.g., as patient or client), condition, or contact information is not publicly available (e.g., from a phone book or public web site), the initial contact should be made with legitimate knowledge of the subjects' circumstances. Ideally, the individual with such knowledge should seek prospective subjects' permission to release names to the PI for recruitment. Alternatively, the knowledgeable individual could provide information about the study, including contact information for the investigator, so that interested prospective subjects can contact the investigator.* Provide the IRB with a copy of any document or script that will be used to obtain the patients' permission for release of names or to introduce the study. Check with your IRB for further guidance.

Participants will be emailed the informed consent letter and invitation to participate in the survey in mid February 2007, with a follow-up and letter to administrators approximately a week to ten days later. All certified teachers will be invited to participate and this includes all women and minorities. Since this is emailed to a group of individuals, the researcher will have no idea which recipients respond and therefore anonymity is maintained. Since this questionnaire involves no more than minimal risk privacy for recruitment is not applicable. There is a small chance for persons to be identifiable based on the information requested but the researcher assures anonymity and confidentiality.

B.2. **Protected Health Information (PHI).** If you need to access Protected Health Information (PHI) to identify potential subjects who will then be contacted, you will need a *limited waiver of HIPAA authorization*. If this applies to your study, please provide the following information.

Not applicable

a. Will the information collected be limited only to that necessary to contact the subjects to ask if they are interested in participating in the study?

b. How will confidentiality/privacy be protected prior to ascertaining desire to participate?

c. When and how will you destroy the contact information if an individual declines participation?

B.3. **Duration of entire study and duration of an individual subject's participation, including follow-up evaluation if applicable.** Include the number of required contacts and approximate duration of each contact.

The survey will be available for no less than ten days and no more than one month. Respondents will be asked to spend approximately twenty to twenty-five minutes taking the one time survey and no follow-up evaluation is applicable.

B.4. **Where will the subjects be studied?** Describe locations where subjects will be studied, both on and off the UNC-CH campus.

The online survey will be conducted in Burke County Public Schools, a medium sized school district in the foothills of North Carolina, consisting of approximately 14,500 students and 1200 certified teachers.

B.5. **Privacy.** Describe procedures that will ensure privacy of the subjects in this study. Examples include the setting for interviews, phone conversations, or physical examinations; communication methods or mailed materials (e.g., mailings should not indicate disease status or focus of study on the envelope).

Participant's privacy will be ensured because this is an anonymous online survey.

B.6. **Inducements for participation.** Describe all inducements to participate, monetary or non-monetary. If monetary, specify the amount and schedule for payments and how this will be prorated if the subject withdraws (or is withdrawn) from the study prior to completing it. For compensation in foreign currency, provide a US$ equivalent. Provide evidence that the amount is not coercive (e.g., describe purchasing power for foreign countries). Include food or refreshments that may be provided.

There are not inducements for participation

B.7. **Costs to be borne by subjects.** Include child care, travel, parking, clinic fees, diagnostic and laboratory studies, drugs, devices, all professional fees, etc. If there are no costs to subjects other than their time to participate, indicate this.

There is no cost to participants other than approximately twenty to twenty-five minutes of time.

APPENDIX D

Informed Consent Letter

Technology Needs in Schools

Date

Dear Burke County Teachers:

For those of you who do not know me, my name is Scott Smith and I am the Chief Technology Officer for Burke County Public Schools and also a Doctoral candidate at the University of NC at Chapel Hill. I am quite concerned with the use of technology in schools and the needs that teachers and students have related to technology, thus I am conducting a research study.

I would like to personally invite you to participate in this research study. Your participation in this study is completely voluntary. To participate in the study you would complete the questionnaire online. This questionnaire is composed of questions addressing technology needs in schools. The survey should take no more than 20-25 minutes. You are free to answer or not answer any particular question and have no obligation to complete answering the questions once you begin.

Your participation is anonymous. You are asked not to put any identifying information on the questionnaire other than years of teaching experience, grade teaching and school you are assigned to. There is a small chance for persons to be identifiable based on the information requested but I assure anonymity and confidentiality. All data obtained in this study will be reported as group data. The only person who will have access to these data is me, the investigator.

Because I want to encourage the participation of as many teachers as possible, I will be sending you a reminder email approximately 4 days after you receive this email with another link for the survey.

There are neither risks anticipated should you participate in this study nor any anticipated benefits from being involved with it. However, there will be professional benefit from this study, as the information the researcher obtains will be communicated to the profession through publication in the literature and presentation at professional meetings. There is no cost to you or financial benefit for your participation.

You may contact me with any questions by email (smith23@email.unc.edu).

All research on human volunteers is reviewed by a committee that works to protect your rights and welfare. If you have questions or concerns about your rights as a research subject you may contact, anonymously if you wish, the Institutional Review Board at 919-966-3113 or by email to IRB_subjects@unc.edu. If you contact the IRB, please refer to study number 07-2006.

Thank you for considering participation in this study. I hope that I can share your views with the greater professional community and use your response to help shape recommendations for technology in the educational setting.

Participation in this survey implies your consent to participate. The survey can be found by visiting: http://www.xxx.xxx

Sincerely,

Scott S. Smith

APPENDIX E

Letter to Administrators

Date:

To: All Principals
From: Scott Smith

As you all know form a previous email, I am doing research related to technology needs in schools. To ensure the greatest amount of feedback possible, I am seeking your assistance, in your role as instructional leader, to encourage your teachers to participate in this research study.

This information will assist me by providing valuable information on the status and direction of technology within our schools as well as add to the professional knowledge related to technology in the educational setting.

Additional information about the survey will be sent to all certified employees asking them to participate. Your endorsement of this project would be greatly appreciated. Attached is the survey so you can see just what information is being requested of the certified teachers.

Thank you,

Scott Smith

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