ELEMENTARY TEACHERS IN RURAL SCHOOLS:

PERCEPTIONS AND USE OF TECHNOLOGY

IN THE CLASSROOM

by

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A DISSERTATION

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ABSTRACT

The purpose of this study was to discover rural elementary teachers’ perceptions of technology use in the classroom and to what extent elementary teachers use technology. The focus of the study was on the perceptions of rural elementary teachers in four different elementary schools, within the same school system. The independent variables utilized were AMSTI schools and Non-AMSTI schools, teacher age above and below 40, and teacher experience above and below 15 years. This mixed method study utilized a triangulation design to analyze qualitative and quantitative data. Quantitative data were collected using a 25-question 5-point Likert scale survey and qualitative data were collected via one-on-one interviews utilizing a 7 question interview script. Findings of the study indicate there is a difference in teachers’ perceptions between AMSTI schools and Non-AMSTI schools, teachers below 40 compared to teachers above 40, and teachers with less than 15 years of experience compared to teachers with over 15 years of experience. The findings of this study indicate a need for teacher centered technology training on how to use technology in the classroom.
DEDICATION

To my wife Debra and son Branton, your dedication, inspiration, and love made this dream possible.
# LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>ALSDE</td>
<td>Alabama State Department of Education</td>
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<td>AMSTI</td>
<td>Alabama Mathematics, Science, and Technology Initiative</td>
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<td>ARMT</td>
<td>Alabama Reading, Mathematics, and Technology</td>
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<td>ATIM</td>
<td>Alabama Technology in Motion</td>
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<td>Df</td>
<td>Degrees of freedom</td>
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<td>IRB</td>
<td>Institutional Review Board</td>
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ACKNOWLEDGEMENT

I extend my thanks to my dissertation committee, especially my committee chair, Dr. Margaret Rice for her guidance through the dissertation process.
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CHAPTER 1
INTRODUCTION

Introduction

Britt’s (1999) study found one-fifth of the teachers surveyed had no knowledge about email. The study discovered 47% of teachers could not use presentation software and 57% of classrooms had only one computer that was dedicated to student learning. Drill/practice software rated 93% and topped all other uses for the classroom computer while computer games rated second in importance with 83%. The study also found teachers rated their own technology knowledge higher in drill/practice software and computer games which paralleled the use of the computer instruction of their classroom. These findings serve as a baseline of what has been experienced in classrooms over the last 15 years, both by teachers and students.

Simpson (2013) found a significant difference among teachers in beliefs, comfort, and ability with technology. This study confirms what Britt found in 1999. Successful integration of technology into the curriculum requires a teacher with a positive attitude, who has the necessary training for a continued attitude of well-being and competence while using technology on a daily basis with students (Vannatta & Fordham, 2004). Dockstader (1999) states technology integration is difficult but necessary to improve student achievement. This also confirms Britt’s study, in that teachers must be comfortable and have a feeling of knowledgeable competence in order to use technology on a daily basis with students. The time span between Britt’s study and the Simpson study shows very little movement in teacher confidence, and perhaps points to technology still not being used, on a consistent basis, in Alabama public schools.
A national survey conducted by Becker (2001) revealed that only 27% of all teachers use computers in 20 or more lessons during the school year and the degree of integration occurring may differ across subject areas with social studies and math teachers using computers less frequently in the classroom. This is a major problem for students and teachers. Social studies and mathematics would necessarily be two of the content areas where computers, internet searches, calculations, charts, graphs, maps, and basic content research would be most enhanced. Continuation of this trend could cause students in the United States, and specifically Alabama, to be at a disadvantage when seeking employment in information and communication industries. A 2010 Alabama State Department of Education (ALSDE) report indicates use of technology for depth in instructional investigations and research seems to be very low in public schools and the use of technology for administrative purposes seems to be the highest use each day for most teachers. This finding could indicate that most teachers in Alabama public schools continue to use computers as a tool for more efficient book-keeping and recording of student grades.

Godzicki, Godzicki, Krofel, and Michaels (2013) discovered 57% of teachers spent over an hour each day using technology for administrative purposes. That is an amazing finding, since many teachers don’t report more use of technology than that in each day. It may mean that most of the technology used in the schools is for administration, and not for instruction in any way. In one national study, one-third of students felt the school related activities did not relate to their interest and the technology used did not motivate them to learn (Godzicki et al., 2013). In other words, the packaged drill software was no longer interesting to students, while it was the reported majority use by teachers when talking about technology-based instruction. Teachers do not seem to be keeping up with the development of technology at the pace students are, and teachers do not feel confident using new methods without a strongly scaffolded support system.
Another national survey found that 75% of teachers cited the value of technology to teach in the classroom but only 54% use technology for instruction daily (CDW-G, 2005).

In a study in 2006, Kuzmicic found 33% of teachers were plagued with one working classroom computer and the study also discovered 50% of teachers feel that there is inadequate time to use technology in the classroom curriculum. To complicate more the use of technology in the classroom, a Technology in Public Schools (2006) report found that 3,613 classrooms in the State of Alabama did not have at least one working computer. This problem is the problem of the “digital gap.” Many schools do not have the student/family means or the basic technological background amongst administrators and teachers to buy, set-up, and implement use of the newest technological devices. It is important to know exactly what is being used, and what is needed by teachers, in order to write a plan of action for rural and underserved schools. It is also important to know what type of specialists should be in place in Alabama’s public schools, to maximize the use of the technology available.

An Alabama Department of Education Technology comparison survey between 2007 and 2009 found only slight changes in student classroom computer use amongst and between the years surveyed. The survey comparison discovered 12% of teachers never use technology to enhance student academic achievement and 38% never assign an activity that utilizes technology. The survey also showed that 25.4% of students seldom or never use a computer for research, inquiry, exploration, communication, and collaboration (ALSDE, 2010, p. 22). If this trend remains in place, it could mean that Alabama’s schools are falling further and further behind in exactly the skills students will need in order to be successful after graduation.

Perceived student sophistication with technology hinges on three factors: perceived teacher attitudes toward technology, perceived preparation for using technology, and perceived
adequacy of technology (Howley et al., 2011). It is the perceptions of teachers that affect the perceptions of students, according to Howley et al.’s study; very much the Pygmalion effect, which is accepted in almost all areas of teaching and learning as a basic premise when considering factors affecting learning outcomes. Teachers struggle to keep up with technology, in its ever changing and conceptual movement beyond understanding, which occurs almost before one can learn the present set of rules and devices. For instance, the “Cloud” is a new method of saving information from one’s computer. It is outside the computer and outside the realm of the household or school. How it works can be very intimidating to an already overly busy teacher, and the fear of what it means and how to use it becomes overwhelming to many in the classroom. This causes a decision to “not use,” which may not be entirely conscious on the part of the teacher, but which is just as damaging to the chances of the students in the class to be working with the latest in technological advances. They may be doomed to drill activities, which the teacher has already been told are no longer effective, but they remain “safe” and so, are used as something to count in the “technology” box on the annual evaluation, by default. Technology confidence by the classroom teacher was discovered to be a major barrier in using technology (Marcum, 2010), so newer technologies are not even considered, and may be obsolete by the time they are considered, due to lack of teacher confidence.

The State of Alabama Department of Education recognized its teachers needed help and created a research-based program that incorporated best practices teaching for math and science. The Alabama Math, Science, and Technology Initiative (AMSTI) was designed by a committee of teachers, business leaders, and higher education representatives with the goal of improving teaching practices.
AMSTI offers three services to the teachers in Alabama: professional development, equipment and materials, and on-site support. Teachers must vote on becoming an AMSTI school and attend a two week summer course for two summers. Training is highly subject specific and is geared to each grade level. AMSTI has partnered with 16 of Alabama’s Institutes of Higher Education to provide services to 20,000 teachers and 400,000 students statewide (AMSTI, 2014). The AMSTI (2013) fact sheet states trained teachers have a greater understanding and knowledge of how to teach with technology.

Age can be a factor in the decision for a teacher to use technology. Kumar (2008) and Sang (2009) advocate that teacher age, motivation, and training influence technology use in the classroom. Jennings and Onwuegbuzie (2001) found younger teachers have a more positive attitude toward technology. Prensky (2001) discovered that use of technology at early life stages by teachers has a positive effect on their attitudes toward technology. Teachers under the age of 40 have grown up in the computer age and have been trained in technology since elementary school. These teachers benefited from the Telecommunications Act passed in 1996 which gave discounts to schools to buy computers and other technologies. Teachers who graduated before the advent of the technology revolution do not know the language of technology (Goldin & Katz, 2008).

Teachers with less than 15 years of experience have been trained by colleges of education on how to use classroom technology. This is because ISTE published its National Educational Technology Standards (NETS) in 2000 for teachers and soon after all colleges of education were training pre-service teachers on how to use technology in the classroom (Barron, Kemker, Harmes, & Kalaydjian, 2003). Howard (2011) discovered teachers with 11-30 years of experience were less likely to integrate technology. Becker (2001) stated that the teachers’
perceptions of classroom technology and the lack of expertise with computer technology could be the main inhibiting factors to technology integration. Gros (2013) discovered teachers’ perceptions of usefulness and perceived ease of use were the deciding factors for using technology in the classroom.

Statement of the Problem

Technology’s impact on educational environments in the past two decades has seen many changes, not necessarily always for the better when it comes to student engagement and productive use of available devices (ALSDE, 2006). Educational technology has become widely recognized as the key to preparing students for the future when integrated successfully in the school’s curriculum, yet teachers and administrators continue to be frustrated, reluctant, and reticent about using what is provided, and even more so when asked to consider looking for new devices and possibilities on their own (ALSDE, 2006). According to the Alabama State Department study, if teachers have not been specifically taught a particular lesson using a particular technology, they do not feel comfortable in stretching out to do innovation on their own, and continue to report that they have not been given enough training by those in charge.

One of the most pressing objectives of schooling in Alabama, according to the State Department of Education, is that curriculums must bridge the gap between how students learn and how students live (ALSDE, 2006). Students live with technology, it surrounds them entirely, yet, in school, they are not often engaged with technology. For instance, even in the poorest neighborhoods, community buildings and group gathering places usually contain high tech devices and materials. Thus, children come to school with some expertise in the use of these technologically sophisticated devices and are then not given a chance to use them in educationally sound and appropriate ways. They learn to use devices “in the streets” so to say,
and may not understand the true nature or the possibilities of the technology they come into contact with daily. Schools should bridge this gap, and bridge the gap of the “haves” and “have nots” when it comes to technology use. Asthana (2009) stated “the greatest impacts in education are those things which augment the existing curriculum, allowing both immediate enhancement and encouraging further curriculum development” (p. 6821). This statement outlines exactly what should be done in public schools; children should be given the opportunity to explore and learn the best uses of technology, devices, and materials, in a safe, controlled, and open environment. This cannot be done unless teachers and administrators are confident in their own use of technology and in feeling safe that mistakes can be made and forgiven. If schools are to be truly “21st Century” and operate honestly and with integrity, technology must be a major part of what is done each day.

The next generation of business professionals will spend a great deal of time multitasking and multifaceting in a technologically driven world. It is the job of today’s educators to equip the next generation for success in this technological world. Educators cannot measure success by student mastery of specific technology tools alone, but must use a wide range of assessments which evaluate valuable skills, attitudes, and dispositions (ALSDE, 2006). It is these 21st century skills, attitudes, and dispositions that are the heart of the Alabama State Technology Plan (ALSDE, 2006), but the translation of these into school curriculums has been reported to be less than acceptable. The digital natives that are in today’s Alabama classrooms expect more technology in the curriculum (Marcum, 2010). These digital natives have a right to expect more; it is the responsibility of the public schools to work with businesses and industry to produce workers for the next generation. This generation is being taught the use of technology;
it is up to the teachers and schools to teach them the best ways to use them, for the betterment of society and their work as adults.

The Alabama State Department of Education sanctioned Alabama State Technology Plan 2007-2012 was adopted by the State Board of Education on October 12, 2006. The IMPACT (Indicators for Measuring Progress in Advancing Classroom Technology) document was created in 2009. The purpose of the IMPACT document is to make recommendations for all stakeholders’ effective use and integration of technology in the classroom and to provide guidelines for the creation of a unified technological infrastructure that supports 21st century learning (ALSDE, 2006). Unfortunately, the billions of dollars spent have not translated to more technology usage in the classroom (Wells & Lewis, 2006). This is a major problem for the state, for industry, for businesses, and for the students who are being underserved. It was with this in mind that the Alabama State Board of Education created four primary goals designed to help students, teachers, and administrators usher in a new educational technology standard.

*The four goals for Alabama IMPACT are:*

**Goal 1:** All Alabama students, teachers, and administrators will effectively use technology as an integrated tool for teaching, leading, and learning to master local, state, and national standards.

**Goal 2:** All Alabama students, teachers, and administrators will benefit from a broad range of educational opportunities and resources through the use of technology.

**Goal 3:** All Alabama teachers and administrators benefit from high-quality, research-based professional development and supports necessary to achieve local, state, and national standards and courses of study.
Goal 4: All Alabama students, teachers, and administrators will have access to the appropriate technology resources and infrastructure necessary to support teaching, leading, and learning (ALSDE, 2006, pp. 9-20).

Alabama State Department of Education (2006)

The four IMPACT goals are an attempt to address the growing need for everyone in Alabama’s educational system to fulfill every student’s right to an education that will be useful and productive after graduation. The goals define students’, teachers’, and administrators’ responsibilities in the successful integration and use of technology in the school’s curriculum. Each goal addresses the promise to effectively integrate technology in the classroom, recognize the benefits of technology in the classroom, and supply access to technology in the classroom.

The Alabama Department of Education has added new long range goals in an effort to close student achievements gaps with PLAN 2020. The plan focuses on four main sections: learners, support systems, school systems, and professionals. Each of the four sections has its own objectives, strategies, and targets geared to achieve PLAN 2020’s one main overarching goal of producing students capable of contributing to the 21st century.

PLAN 2020 Objectives

1. All schools and systems will receive adequate funding to meet the individual and collective needs of their students.

2. All schools and systems will be resourced and supported based on identified need as determined from the state’s accountability plan and additional indicators at the local level.

3. Schools and Systems will be granted flexibility to innovate and create 21st century learning environments to meet the individual and collective needs of their students.
4. Schools and Systems are resourced to create a 21st century learning environment for their students including infrastructure, building renovation/improvements, and technology. (ALSDE, 2012, pp. 25-29)

Alabama State Department of Education (2012)

The word technology, as it is applied to education, is filled with hope for a brighter future and education must incorporate digital literacy in a connected world (ALSDE, 2010). Lawmakers, administrators, teachers, and parents all want their children to be prepared for the 21st century, but in many classrooms the very tools necessary to help move students to that 21st century goal are left to collect dust (Kuzmicic, 2006). In many cases educators do not take full advantage of all that technology can offer students in the learning process and shortchange the very ones they are trying to help (Smeets, 2005). In a 2010 Alabama IMPACT survey, teachers indicated only 32% of their students were routinely learning the necessary skills to participate effectively in the global community (ALSDE, 2010).

Integrating technology into an elementary classroom curriculum can be challenging for teachers, particularly when school funding is not prevalent (Kuzmicic, 2006), teacher professional development in using technology is not stressed (Becker, 2001), teacher prior experiences are not considered (Desai, 2012), equipment is not available (Britt, 1998), and there is insufficient time in the curriculum to incorporate technology (Kuzmicic, 2006). These factors continue to be problematic in rural schools in Alabama, and bridging the gap between those school systems with plenty of money and those without is one of the things that must be addressed in order for rural students to have a chance to catch up with their peers in more affluent systems.
Howard (2011) classified teachers into categories, those that were more likely to take the risk to use technology (MOR) and those that were less likely to take the risk to use technology (LER). The risk/benefit is measured on the Slovic, Finucane, Peters, and McGregor (2004) “goodness” and “badness” scale, where teachers look at every aspect of particular technologies before introducing them into their classrooms. Thus in education the perceived risk to using technology would be in relation to the teachers’ beliefs and values (Luhmann, 2005).

Unfortunately, when it comes to technology, the Gagne “Time on Task” theory supports the direct correlation between time devoted to learning and results (Gagne, 1984). According to this theory, “time on task” can be attributed to both teachers’ and students’ learning. The amount of time teachers spend using technological devices outside of class may correspond to the amount of time teachers use technological devices in classroom activities, and the same may be the case for students’ learning (Woods, 2000). Repetition and practice help both teachers and students learn faster. Considering this theory, teachers and students alike need to spend more time working with the technological devices, and should become more comfortable using them in class for teaching and learning.

The rapid growth of educational technology combined with the current State of Alabama Technology mandate for school advancements in educational technology has left many questions unanswered about technology in the classroom. One study done through classroom observers found that when students were allowed to work as individuals, using technology in student centered activities, the technology was rated essential to the lesson, while in classrooms that used whole-class technology led by the teacher, with few student centered activities, technology was rated as not essential to the lesson (Bielefeldt, 2012). This study points to the dire need for teachers to design instruction around individual and small group discovery/exploration lessons,
where the technology used is a tool for finding information and answers to the essential questions involved in the lesson. It is clear technology in the classroom will provide an efficient form of instruction when used to its full advantage, and not just used as a more modern overhead projector (Morrison, Ross, Kalman, & Kemp, 2011). Even with the pressing need to produce the next generation of technology capable workers, there are still those that advocate removal of technology from the classroom. Teachers who are comfortable with the status quo advocate for less technology (Kennedy, 2014).

Toyama (2011) points out that many school systems excel with very limited technology and computers cannot replace rigorous study. To put it simply, student test scores in math and reading remain flat even after adding massive amount of classroom technology and teachers still wait for a raise because of the expense of technology that is adding to a failing idea (Richtel, 2011). Technology is not the answer to all education ills, it is simply an enhancement tool. The Waldorf School in Silicon Valley matriculates children from some of the most prestigious technology known families, but refuses to allow technology in the classrooms. As a matter of policy all of the 160 Waldorf Schools across the country subscribe to a teaching philosophy that has a focus on physical activity and creative hands on tasks (Richtel, 2011). It is difficult to measure the success of the Waldorf teaching philosophy against that of other schools that use technology because it is a private school and does not have standardized testing. It does, however, reinforce the notion held by many that technology is not needed in schools simply because they have been turning out successful students for a hundred years and 97% of their graduates attend college (Richtel, 2011). Many would say the discussion on using technology is a moot point simply because it is here, it is a reality, it is part of the culture, and we need to figure out how to use it correctly (Rosen, 2011).
Statement of Purpose

Teacher perceptions about technology use in their classrooms and their attitudes toward technology are paramount to its success or failure. In a national survey conducted by the National Educational Association (2008), 76% of teachers used the computer for administrative tasks but only 32% used the classroom computers for instruction. The teachers’ struggles to keep up with technology and technology confidence by the classroom teacher were discovered to be barriers in using technology (Marcum, 2010). If teachers do not feel comfortable with using materials and devices, they will not use them. This has been well illustrated by the well documented success of the AMSTI (Alabama Mathematics, Science, and Technology Initiative) because each lesson and unit is taught particularly and specifically to each teacher before materials kits can be issued to the class. Then, a grade-level specialist is available to help each teacher with each lesson, in cases where teachers are not yet comfortable with all concepts. Other initiatives in the state have not been nearly as successful as AMSTI because this type of training and support was not available. The technology program has not had this type of system or support, other than through AMSTI. According to Howley et al. (2011 p. 2), “rural teachers reported technical difficulties, insufficient time, limited support, and the regimes of accountability testing as impediments to their integration of technology.” Further, Howley stated that teacher perceptions and attitudes not only determine whether they will use more technology in the classroom, but also affect the students’ attitudes about using technology in educational settings. Weinberg (2010) found students keep a positive attitude about technology even when it does not work up to expectations, as long as the teacher remains positive. It seems that this state of affairs in Alabama has produced the low technology involvement scores of the past. This study strove to determine if those conditions continue to exist and what can be done,
if they do. The purpose of this study is to discover rural elementary teachers’ perceptions of technology use in the classroom and to what extent elementary teachers use technology.

**Research Questions**

1. What are rural elementary teachers’ perceptions about technology professional development based on demographic variables?

2. What are rural elementary teachers’ perceptions of technology integration into the classroom based on demographic variables?

3. What are rural elementary teachers’ perceptions about their own technological knowledge based on demographic variables?

4. What are rural elementary teachers’ perceptions of obstacles to using technology based on demographic variables?

5. To what extent are rural elementary teachers using technology in the classroom based on demographic variables?

**Significance of the Study**

The technology revolution of the past several decades has transformed education and learning like no other change in history (Miranda & Russell, 2012). High speed internet service is in 97% of classrooms nationwide and hundreds of schools are experiencing 1:1 laptop programs (Bebell & Kay 2010). Technology in the classroom is needed in order to prepare tomorrow’s students for the global community, and the technology gap for underserved populations may be the one dynamic that causes success or failure of their life work.

Unfortunately, when a comparison was conducted between 2007 and 2009 there was little or no gain in technology utilized in the classrooms of the state, even with the technology push from the central state administration. The comparison discovered 12% of teachers never use
technology to enhance student academic achievement and 38% never assign an activity that utilizes technology. The study also found administrators and teachers believed they were not receiving training in the necessary digital literacy skills to prepare students to lead in the 21st century (ALSDE, 2010). Despite significant investment in infrastructure and a national call for teachers to integrate technology, schools appear to be making limited use of technologies (Howley, Wood, & Hough, 2011 p. 2). A lack of technological use in rural educational settings is especially troubling when considering 70% of the current growth in student population is in rural areas (Sundeen, 2013). The significance of the present study is to provide educators with insights into the use of technology in the classroom and teacher perceptions of technology. This may assist educators and administrators in developing ways to encourage teachers and change teacher perceptions of using technology in rural classrooms. The study will also contribute to the overall body of knowledge concerning the use of technology in schools.

**Definition of Terms**

*AMSTI*, Alabama Mathematics, Science, and Technology Initiative, is the Alabama Department of Education’s initiative to improve math and science teaching statewide through teaching with technology (ALSDE, 2007).

*Obstacles*, for the purpose of this dissertation, refers to anything that hinders the use of technology (Zhao & Frank, 2003).

*Perception*, for the purpose of this dissertation, refers to how a teacher sees, feels, or understands technology (Cherry, 2011).

*Professional development*, for the purpose of this dissertation, refers to training in technology and training on meaningful technology integration into the classroom (Tiene & Luft, 2001).
Teacher beliefs, for the purpose of this dissertation, refers to the foundation of beliefs on which teachers form their attitudes about schools, students, teaching, and learning (Pajares, 1992).

Technology, for the purpose of this dissertation, refers to classroom technology used to instruct or aid in instruction, computers, laptops, overhead projectors, recording devices, and other devices used to augment instruction (Simpson, 2013).

Technology integration, for the purpose of this dissertation, refers to the process of using technology to help augment curriculum (Dockstader, 1999).

Technology knowledge, for the purpose of this dissertation, refers one’s personal expertise and understanding of technology (Becker, 2001).

Assumptions

This study was conducted in rural schools in northwestern Alabama and it is assumed that other rural schools with similar demographics would have similar findings. It is also assumed that the participants were truthful in their responses.

Limitations

There were not any classroom observations of teachers actually using technology. All data gathered were focused on teachers’ perceptions and the study schools were small, limiting the sample size.

Theoretical Framework

As stated previously, according to Howley et al. (2011, p. 2), “rural teachers reported technical difficulties, insufficient time, limited support, and the regimes of accountability testing as impediments to their integration of technology.” It was also stated that these are extreme impediments if they continue to be reported as difficulties. Furthermore, an internal survey conducted by the Alabama Department of Education showed 25.4% of students seldom or never
use a computer for research, inquiry, exploration, communication, and collaboration (ALSDE, 2010). This is also a major impediment to achieving the objectives of schools and systems in preparing students for 21st century skills and employment after graduation. Teacher perceptions of technology have a great influence on the classroom curriculum (Massey, 2008). Students look to the teacher’s attitudes and skills, whether consciously or unconsciously, to develop their own perceptions and attitudes. Daily work with one person for over six or seven hours a day will cause some attitudes to be adopted by those in close proximity; negative attitudes and skills can be more than detrimental to students, they can mean the difference between employment and lack of employment later.

The teachers’ perceptions of classroom technology and the lack of expertise with computer technology could be the main inhibiting factors to technology integration (Becker, 2001). Teachers who suffer from technophobia tend to oppose technology and logically are less familiar with the advantages it offers (Schock, 2011). It is the advantages offered by student use of integrated technology that may or may not allow upward movement after graduation, and the rural areas are especially in need of upward movement in Alabama. The average annual family income of the counties in northwest Alabama is approximately twenty-eight thousand, five hundred dollars (United States Census Bureau, 2013), which for a family of five would put the family just above the federal poverty line of twenty-seven thousand, five hundred seventy dollars. Students’ lack of technology use daily will cause more of the same in the state; a populace with too little education, too late in life, to overcome the deficiencies caused by a school system that did not serve them well. The reluctance to use technology on the part of the teachers and schools has a much longer and deeper effect on students than can be attributed to other facets of school life. Compounding the general perception problem are teachers that have
been in the classroom for a long period of time. They face a dual challenge of acquiring technological knowledge and knowing how to integrate that knowledge in the classroom (Darling-Hammond, 2010). These teachers need special help and scaffolded training to gain the skills and attitudes to move into the digital age. If they are to continue to be successful teachers, they must also be served well, and our present system does not seem to be meeting their needs.

The purpose of this study is to discover rural elementary teachers’ perceptions of technology use in the classroom and to what extent elementary teachers use technology. This is a mixed methods study consisting of a survey and interviews about teacher perceptions on technology in the classrooms. With an ever increasing need for students to become members of a global community (ALSDE, 2010, p. 23), technology has become the vehicle that will transport students to the future, to employment, and to higher wages after graduation. Teachers in the State of Alabama overwhelmingly agreed students need technology integration into the curriculum but that knowledge is not manifesting itself into the classrooms (ALSDE, 2010). Technology in the classroom, particularly in rural schools, has a great impact on changing a culture which believes technology interferes with rural values and ways of life (Howley et al., 2011). A successful teacher is one who can draw from content, pedagogy and technology (Mishra & Koehler, 2006).

The theoretical framework for this study is Teacher Beliefs. Teacher beliefs are the most psychological construct of teacher education (Printrich, 1990). It is the foundation of beliefs on which teachers form their attitudes about schools, students, teaching, and learning (Pajares, 1992). According to Howley et al. (2011 p. 2), teacher perceptions and attitudes not only determine whether they will use more technology in the classroom, but also affect the students’ attitudes about using technology in educational settings.
Summary

Chapter 1 provides the topic, the relevant background, and need for this study. The reluctance to use technology on the part of the teachers and schools has a much longer and deeper effect on students than can be attributed to other facets of school life. A lack of technological use in rural educational settings is especially troubling when considering that 70% of the current growth in student population is in rural areas (Sundeen, 2013). With an ever increasing need for students to become members of a global community (ALSDE, 2010, p.23), technology has become the vehicle that will transport students to the future, to employment, and to higher wages after graduation. The purpose of this study is to discover rural elementary teachers’ perceptions of technology use in the classroom and to what extent elementary teachers use technology. It is the foundation of beliefs on which teachers form their attitudes about schools, students, teaching, and learning (Pajares, 1992). Chapter 2 provides a comprehensive review of the literature that relates to the study. Chapter 3 is an in-depth description of the methodology used in the study. Chapter 4 presents the results of the collected data. Chapter 5 contains the findings, conclusions, and recommendations.
CHAPTER 2
REVIEW OF LITERATURE

Classroom Technology

Technologies in the classroom have a direct influence on student achievement in a world community (ALSDE, 2010). This is a statement made by the Alabama State Department of Education, and yet, schools and school systems in Alabama are not reporting adequate use of technology across all systems, and the rural systems are reporting even less use of technology than those in urban and suburban areas. This means, that by definition, students in rural Alabama schools may be in danger of permanent levels of inadequate preparation for life after graduation. This also is in direct conflict with other objectives of Alabama leaders and schools. Continued lack of support and service to students will keep the status quo, but it will not achieve the objectives put forth by the State Department of Education and is not in the best interest of the state’s population. The need for deeper understanding and use of technology has caused teachers to feel under pressure, and there are many reasons for that feeling of pressure.

Teachers are under pressure to integrate new technology into the curriculum (National Educational Technology Plan, 2010), but they lack the confidence, knowledge and skills to achieve a new level of proficiency. Confidence in technologies by many teachers remains uncertain and the choice to use technology integrated instruction remains low (Howley et al., 2011). This confidence problem is one of lack of practice and training, according to the perceptions of studies done in the last fifteen years. In an ALSDE 2010 survey, 97% of teachers reported recognizing implementation of technology was extremely important, important, or
somewhat important for students to succeed. In that same survey, 61% of teachers indicated the school systems were preparing students for the 21st century (ALSDE, 2010). These numbers would suggest that teachers accept the importance of technology and use it daily in integrated activities that are student-based. Unfortunately, the rest of the survey resulted in surprising answers to the next few questions. There is a disconnect between teachers’ acceptance of the importance of technology and the fact that, in the same survey, teachers reported they do not use technology in the classroom and 25.4% of students seldom or never use a computer for research, inquiry, exploration, communication, and collaboration (ALSDE, 2010).

Technology in education can be a prevalent part of students’ lives and teachers have a very profound influence on the amount of technology that is integrated in the classroom (Massey, 2008), but if there is such a disconnect between belief systems and what is actually going on in schools and classrooms, the influence is not really there. According to Becker (2001), the teachers’ perceptions of classroom technology and the lack of expertise with computer technology could be the main inhibiting factors to technology integration. As stated previously, to compound the problem, teachers that have been in the classroom for some time face the dual challenge of acquiring technological knowledge and knowing how to integrate that knowledge in the classroom (Darling-Hammond, 2010). There are many teachers in schools, especially rural schools, who have fifteen or more years in the classroom. Howard (2011) found teachers with 11-30 years of classroom experience were less likely to integrate technology in a meaningful way because of the risk of failure. This risk of failure allows teachers to proclaim technology as important, but when the classroom door closes, fear causes teachers to forego using the technology as planned and go back to basics that they know work for them.
Becker (2001) reported that 24% of English teachers used the computer for instruction at least twenty times in a thirty week period. One out of six Science teachers, one out of eight Social Studies teachers, and one out of nine Math teachers used the computer for instruction in the same time period. Ten years later an ALSDE (2010) report showed 55% of teachers use technology in reading, writing, and math classes. Funding and high stakes testing have spelled the end of Social Studies (Massey, 2008) and it was not on the survey.

Drill and practice software was once considered the most important technology tool in the classroom by 93.7% of teachers (Britt, 1998). Britt’s study also discovered teacher perceptions of successful classroom technology were influenced by their own ability or inability to use the technology. When asked to rate their own ability, teachers rated drill and practice as their most knowledgeable area, which coincided with the technology used in the classroom. Unfortunately, this type of technology has been seen as non-responsive and of little importance in modern devices and uses of highly developed investigation-type assignments. It is important to note that positive teacher attitudes and teacher self-efficacy are keys to the successful integration of technology in the classroom (Delcourt & Kinzie, 1993). These attributes can even help students more when drill and practice is the major activity employed as technology each day. The magic combination is when teachers’ attitudes are positive toward the integration of technology into all areas of the curriculum, and they implement these beliefs daily, through individual student use of computers and other devices to enhance learning.

In an ALSDE (2011) survey, teachers were asked to compare their technological knowledge against their peers and the result showed 29% felt their skills were above average and 61% felt their skills were average. This is an interesting number, since most administrators think their teachers are not technologically ready for new ideas. Teachers tend to compare their
technological knowledge with their peers, but that can be a faulty premise. Holden and Rada (2011) found 90% of administrators felt that only 17% of their teachers were skilled enough to integrate technology into the classroom. This number is staggering, when taken into account that administrators and state department officials require the use of technology in the classroom and to a greater depth than using drill and practice all the time. Johnson (2009) found teachers tend to look at surface features rather than instructional content. There is another disconnect between what teachers see themselves as being able to do and what they know versus what the administrators believe they know and believe they can do in the classroom. Add to this disconnect the problems of the ever-changing nature of technology and there is little wonder that schools are not doing more. Technology is constantly changing and it is difficult for classroom teachers to keep up with all the changes (Massey, 2008), as well as all the other things a teacher must do during each day to remain in compliance with all the regulations and requirements of high stakes testing environments. Technology, although reported to be extremely important by administrators and teachers, falls far down the list in the reality of more pressing daily classroom demands.

Integrating technology into an elementary classroom curriculum can be challenging for teachers for other reasons. One must consider limited funding, lack of training, nonexistent equipment, as well as insufficient time in the curriculum to incorporate technology (Howley et al., 2011). Teachers ask for help, do not receive what they need, and put the materials from the workshop on the shelf, while going back to what they were already doing. School-based, content-area based, and teacher request based professional development has been proven to work best, but continues not to be used in most school systems. Teachers need professional development, especially in effectively integrating technology (Wohleb, 2011). Goedde (2014)
advocated the cost of professional development should exceed the cost of technology. Systematic professional development with technology is critical for teachers to keep pace with the ever changing educational technologies (Goedde, 2014). In an ALSDE comparison study, administrators and teachers believed they were not receiving the necessary digital literacy skills to prepare students to lead in the 21st century (ALSDE, 2010, p.109). It is another disconnect for the state, and one that is reported to be a problem nationally, not just for Alabama (Howley et al., 2011).

School firewalls and blocked sites were cited as the number one problem with integrating technology in classroom activities. Almost 40% of teachers felt the blocked sites were unnecessary (ALSDE, 2010). Teachers report that after carefully planning a lesson, checking to make sure all sites referenced were working, and then delivering the lessons, some sites would not work by the time students logged into them.

The second most cited obstacle to using technology was a lack of equipment and 25% of teachers in Alabama schools believe that their classroom suffers from equipment shortages (ALSDE, 2010). This is an alarming number and is only slightly up from the 2006 study by Kuzmicic (2006) which found 33% of teachers were plagued with one working classroom computer. So, beyond archaic use policies that don’t work, there are real problems with lack of equipment or working equipment. It is a plague of the technology world and schools know this all too well; hardware and software do not always “talk” and one almost has to be a technically certificated person to deal with all the “bugs” in systems. Rural elementary teachers especially believe they have inadequate access to equipment (Howley et al., 2011), and that the equipment they have is second rate or the cast off devices of other schools. These problems bring on another, more difficult problem. Without stable working equipment, teachers are not able to
follow state mandates (Massey, 2008). If state mandates are not followed, teachers and schools can lose their ratings of being good schools, funding, and finally, control of what is done there.

The Alabama Department of Education has added new long range goals in an effort to close student achievement gaps with PLAN 2020. The plan focuses on four main sections, learners, support systems, school systems, and professionals. Each of the four sections has its own objectives, strategies, and goals geared to achieve PLAN 2020’s one main overarching goal of producing students capable of contributing to the 21st century. This set of goals specifically addresses the need for schools and systems to invest in technology. PLAN 2020 addresses the need for training with technology in the classroom. One way this is being addressed is by having technology personnel from Alabama Technology in Motion (ATIM) assess each school’s training needs in technology and assist teachers on the school’s existing technology.

Teacher Beliefs

Teacher beliefs are the most complicating psychological construct of teacher education (Printrich, 1990). It is the foundation of beliefs on which teachers form their attitudes about schools, students, teaching, and learning (Pajares, 1992). Pajares (1992, p. 207), goes on to say, "beliefs cannot be directly observed or measured but must be inferred from what people say, intend, and do - fundamental prerequisites that educational researchers have seldom followed.” Unfortunately teacher beliefs on education vary widely and are difficult to define (Pajares, 1992). These beliefs are placed into two different types, extrinsic and intrinsic. Extrinsic teacher beliefs regarding technology are associated with lack of hardware, software, time, and support (Bai, 2006). This belief is the idea that success or failure will occur because of some uncontrollable outside event. It is especially important for rural teachers, who, it has already been shown, believe they have old or dated hardware and software, thus putting them in a place
of not being able to compete, before they begin (Howley et al., 2011). These teachers believe they are in a place of unfair challenge before they begin. Intrinsic teacher beliefs include how a teacher feels about teaching and learning. Intrinsic beliefs may be the most difficult to change or overcome simply because teachers are human and imitate their teachers (Bai, 2006). Teachers impose schemes of the familiar and create what is absent using world experiences (Shulman, 1986). Since world experiences are different, each teacher has his or her own set of beliefs about teaching and learning.

Teachers’ beliefs are closely related to how they teach and how they will integrate technology (Norton, McRobbins, & Cooper, 2000). Using the existing technology and what is available can help the teacher have more confidence that the technology used in the classroom can make integration on new materials easier to teach and offer better approaches to instruction, context of learning, and assessment (Lawless & Pellegrion, 2007). It is the belief that the technology is working for the students that causes teachers to repeat types of integration in other lessons (Cavanaugh, 2009).

**Teachers’ Perceptions**

*Technology Professional Development*

Professional development is the opportunity for teachers to keep abreast of the latest educational technology developments. Edwards (2008) found teachers who participate in professional development consider themselves better teachers and the knowledge is transferred to the classroom. Teachers need professional development in order to keep current on changes in their field. Vontz and Lemming (2006) deemed professional development a crucial part of a teacher’s development and success. Teachers need professional development especially in effectively integrating technology (Wohleb, 2011). True professional development is
worthwhile, request based, and is not run by those who have moved to administrative jobs because they were not successful in the classroom (Murkerson, 2008). Many have deemed professional development during the summer vacation as an ineffective way to prepare teachers for the classroom (Pansegrau, 1984). Summer vacation and three-hour workshops without follow-up are not an optimal delivery system, in fact, they are extremely ineffective and may be negatively effective. Kent and McNergney (1999) found that less than 15% of teachers received nine hours or more professional development in technology training a year. That could be one of the major problems associated with so little use of technology on a daily basis in the schools. Sawchuck (2010) discovered that teacher professional development in technology has only grown to 24%. Goedde (2014) advocates teachers’ professional development should be an ongoing process that keeps pace with technological advancements. The cost of professional development should exceed the cost of the technology that is being used (Goedde, 2014).

Poplin (2003) states there are four types of professional development training: coaching, face to face, train the trainer, and web based training. This is particularly important when it comes to technology because the pace at which technology is being developed far exceeds other educational developments. Jacobsen (2011) stated the best way to present new professional development was by targeting each teacher’s individual needs and onsite mentors. On site mentor relationships continue to build year after year because of the proximity of the individuals. Mentor training could alleviate teachers from feeling fearful of looking foolish when it comes to integrating technology in the classroom (Schrum, 1999). They do not wish to show how much they don’t know to their fellow teachers, or to students, so individual classes and attention are optimal. Tiene and Luft (2001) believe teachers who receive training using technology and access to meaningful technology will integrate more technology into the curriculum. This is
supported by Fowler (2007) who discovered teachers with 30 hours of professional development in technology rate themselves as highly skilled using technology. The freedom to fail in private is very important in using technology, but it is equally important for the teacher to know there is specialist help if needed. Fowler (2007) found the main obstacle to integration of technology was the knowledge of how to integrate technology into the curriculum, how to plan, how to manage the classroom, organize lessons and materials, and the teaching of how to use the technology as part of the lesson for the students. As long as teachers feel something is a valuable tool for use in their classroom, they will be most happy to participate in training, but if they see the tool or skill as just extra fluff, they will not be willing or interested in professional development in that area (Diana, 2005).

Teachers will participate willingly in professional development when they can clearly see a value to their classroom (Watson, 2006), but they must be able to identify and take personal ownership of that value. When the value is shown to them, teachers will immediately ask for more information and more training, in almost all cases. Since this is generally true of teachers across subject areas and grade levels, teaching practices are unlikely to change until teachers are exposed to teaching done differently (Ertmer, 2005) and with value added that can be easily identified. For technology particularly "[t]he idea is not only to teach them how to use the hardware and software, but how to integrate it seamlessly into the curriculum" (Willis & Raines, 2008, p. 2 citing Siegel, 1994). The time involved in technology cannot be seen by the teachers as something extra, it must be taught and learned as a tool that is as effective as a book, when used correctly and with skill (Stone, 2008). True professional development should bring change to instructional strategies (Holmes, 2008).
Technology Integration

As a resounding mantra, integrating technology into an elementary classroom curriculum can be challenging for teachers with limited funding, lack of training, nonexistent equipment, and insufficient time in the curriculum to incorporate technology (Howley et al., 2011). Throughout the literature concerning technology in classrooms and the use of it by teachers, these are the continuing roadblocks to effective use and integration. In a 2009 survey, 97% of teachers had access to computers and 96% of schools were wired for the internet but educational gains using technology had not progressed as would be expected in any other area, after initial introduction (Blackwell, Lauricella, Wartella, Robb, & Schomburg, 2013). Solomon (2000) argued the fundamental philosophy of teaching technology is understanding how to use technology. Teachers’ perceptions of technology integration are formed by professional development in technology, confidence using technology, and effective strategies for successfully integrating technology. If these requirements are not met, the teachers will not use technology on a daily basis.

Wohled (2011) found teachers perceive themselves as less than moderately competent with educational software but moderately competent with educational hardware. Norton, McRobbie and Cooper (2000) outlined the relationship between teacher attitudes and the integration of classroom technology. In their work, it is shown that teacher attitudes color all work with the integration of technology. If the teacher is uncomfortable, does not believe the technology is important, or is afraid of failure, the technology will not be used on a consistent basis. It will only be used as required by mandate, and not as effectively as it would with teacher buy-in and confidence. Technology in education can be a prevalent part of students’ lives and teachers have a very large influence on the amount of technology that is integrated in the
classroom (Massey, 2008), but poor training and poor delivery causes teachers to stop trying and revert to using the old methods of teaching that have been mastered and proven effective for their own classrooms. Teachers and students both can benefit from using the internet (Winter, 2013), but only if done with the knowledge and skill that are required for success. Frustration and an unwillingness to try again are the products of poor training and lack of skill in technological devices and use. Knowledge and effective strategies are needed to help teachers initiate and sustain effective technology integration practices (Ertmer, 1999).

**Technological Knowledge**

The teachers’ perceptions of classroom technology and the lack of expertise with computer technology could be the main inhibiting factors to technology integration (Becker, 2001). When schools have outdated equipment and the teacher is trained in emerging technologies, more frustration than training takes place. Training must be done on what is available to the teacher in the classroom, and it must be done for particular lessons and situations in the beginning. This scaffolding of training and development has not been the practice in most schools, thus teachers continue to be resistant and fearful of integrating any technology into most lessons. Pajares (1992) believes that experiences that are formed early last our entire life and are resistant to change. This is very much true of teachers; most are very resistant to change, and can only be changed if they believe there is value to making the change. Most teachers are concerned as to what the children in their classrooms retain and take on with them through life; the teachers too are concerned with the value and longevity of what they learn. All teachers, like most human beings, in today’s very rapid “through-put” (Toffler, 1980) of materials and ideas, or the problematic concept of buying/accepting something as valuable today that will be obsolete tomorrow, are susceptible to doubt and angst about the future. This doubt and angst causes
teachers to hold to what they already know and as they age in teaching, to become entrenched in what they do in the classroom. As stated before, to compound the problem, teachers that have been in the classroom for some time face the dual challenge of acquiring technological knowledge and knowing how to integrate that knowledge in the classroom (Darling-Hammond, 2010).

Although Fowler (2007) discovered that experienced teachers with 10 or more years used technology more than teachers with less than 10 years in the classroom, technology is constantly changing and it is difficult for any classroom teacher to keep up with all the changes (Massey, 2008). Teachers must be taught how to teach with technology in a meaningful way (Atkins & Vasu, 2000), and some component of how to accept the constant “through-put” of usefulness must be a part of the training. Actually, that training would not be wasted in any area of the curriculum, since knowledge itself is changing so rapidly on a daily basis. It is not just using technology that is going to engulf the teaching and learning cycle in the next fifteen years.

Laudan (1984) believed science and technology were forms of knowledge that were rational problem solving processes. If this is so, and mathematics also falls into that category, then all should be taught together. The grouping of curricular content areas with 21st century skills may become the norm rather than the exception during the close future. The cellular teaching of content areas for certain numbers of minutes each day, and moving to another class for another set of celled minutes may disappear; it may have to disappear (Lortie, 1975). As Lortie wrote in the last half of the 20th century, there is no room in effective education for the cellular approach to teaching and learning. He could not have had any idea at the time how right he was, and how much the world would change by 2014. Teachers cannot go into their rooms or what Lortie called cells, and do what they wish for their specified minutes, without regard to or
interest in all that is going on in the world and in the rest of the school. That is what teachers were doing when he did his sociological study of school teachers, and that is what continues to happen in many schools and classrooms. Agnew (2011) advocates teachers must provide 21st century instructional skills to enhance students’ utilization of technology. Unfortunately teachers have a limited knowledge of 21st century skills and do not integrate them into the curriculum (Louis, 2012).

Compared to scientific knowledge, technological knowledge is possible without being presented as certified content knowledge and it can be classified as a visual activity or skill. This classification as a skill is paramount to all teachers using and employing the many facets of technology available for every classroom. Parayil (1991) feels that technological knowledge is tacit and cannot easily be expressed formally but has to be learned working beside an experienced professional. This amounts to what has been traditionally called an apprenticeship. It is the idea of professionals in the field, and lay people in teaching, that one of the best ways for teachers to integrate technology is to have a specialist who teaches a lesson with them and then allows them to teach the lesson alone.

Obstacles to Using Technology: A Summary

Careful investigation of technology and its uses in schools continues to be an important quest. Teachers are under constant pressure to achieve state and local educational goals, which they may or may not philosophically accept as part of their pedagogical belief system. The acceptance of things outside their belief systems is very challenging, as it is for any human being, and the constant encroachment into what they do and how they do it has caused real morale problems for most schools and school systems over the last thirty years (Diana, 2005).
For teachers, the reality is limited funding, lack of training, nonexistent equipment, and insufficient time in the curriculum to incorporate technology (Howley et al., 2011). Sanchez (2011) echoed these findings but did not account for teacher perceptions. Fowler (2007) also includes teacher characteristics along with university type technology training as common barriers to using technology in the classroom. These realities, coupled with the fear of losing students due to failing test scores, may be causing the reluctance to speed up the use of technology. This is especially true for teachers who graduated before the advent of the technology revolution and who do not know the language of technology (Goldin & Katz, 2008). Gros (2013) discovered teachers’ perceptions of usefulness and perceived ease of use were the deciding factors for using technology in the classroom. The training, support, and mentoring of these teachers is most important for a school to add an effective technology integration program (Alabama Department of Education, 2013).

Schools and school systems must be willing to give teachers the tools and equipment with which to work effectively. The technological set-up must be correct for each school and system, in order for systems to meet PLAN 2020 guidelines (Alabama Department of Education, 2013).

Before any obstacle can be overcome there must be a culture shift within the teachers and the schools (Zhao & Frank, 2003). This culture change must be initiated by the administration and shared through the school, but cannot be done in a top-down fashion. It must be discussed thoroughly by each school, and the policies and rules governing the technology integration must come from each group. Buy-in to all that is technology integration is the most important aspect to developing a program that works. It is the perception of the learners that is a paramount concern in technology learning environments (Estrada, 2012). In this culture change teachers must be allowed to try new practices and experiment with technology (Smoekh, 2008), and not
fear retaliation or problems with student achievement while practicing. This is not to say that students should be allowed to fall behind in the name of technology, but there must be time to experiment and learn for teachers and students, and everyone must have a safe environment to do so (Goedde, 2014). These are ground-breaking activities, and should be treated as such. No one has the answers, and no school knows all there is to know about integrating technology.

According to the experts quoted in this chapter, decisions and practices must be on a local level, and must be determined by the practitioners themselves, in order for them to be effective.

**Summary**

The review of the literature for this study covered classroom technology, teacher beliefs, and teacher perceptions. The need to have well trained and viable workers for the 21st century is paramount to the future. Educating the next generation to flourish in the 21st century has become one of the most pressing issues teachers have to face (ALSDE, 2010). In an ALSDE 2010 survey, 97% of teachers reported recognizing implementation of technology was extremely important, important, or somewhat important for students to succeed. In that same survey 61% of teachers indicated the school systems were preparing students for the 21st century (ALSDE, 2010, p.109). The research indicates the Alabama State Department of Education realized the need to have technology in the classroom and has implemented steps to close the technology gap. PLAN 2020 addresses the need for training with technology in the classroom. Schools and school systems must be willing to gather equipment as well as provide training. The removal of obstacles that hinder the successful implementation of technology has to be a priority. Before any obstacle can be overcome there must be a culture shift within the teachers and the schools (Zhao & Frank, 2003).
CHAPTER 3

METHODOLOGY

Introduction

The purpose of the concurrent mixed methods design study was to discover rural elementary teachers’ perceptions of technology use in the classroom and to what extent rural elementary teachers use technology. The concurrent mixed method design was used in this study to ensure validity and explain contrary or complex survey results (Driscall, 2007). The study took place in a rural school system in a northwestern section of a southern state. The purpose of using mixed methods research was to harvest qualitative and quantitative data in an effort to answer the research questions (Creswell, 2011).

Setting

The county school system where the study was conducted is in the northwestern section of Alabama and covers approximately 630 square miles with 18 square miles of lakes. The population is 24,484 with a density of 39.9 persons per square mile and a per capita income of $19,000. The educational spending is $9,595 per student per year while the state average is $8,996 per student and the national average is $10,643 per student (U.S. Census, 2012). The school system is 99% white, 1% black, with an average of 51.2 % free or reduced lunch. The rate of high school graduates or higher, for persons 25 years or older is 69.9%, which is considerably lower than the state average of 82.6% (U.S. Census, 2012). The current graduation rate is 84.6% and exceeds the PLAN 2020 goal of 80% for all schools set by the Alabama State
Superintendent Dr. Thomas Bice (ALSDE, 2013). The county system has 2683 total students of which 1316 are elementary students (U.S Census, 2012). The elementary teachers in this study average 18 students in the classroom (Appendix A).

Technology includes over 200 approved educational resource internet sites for K-8 grade students and several specialized one to one programs for at risk students. Teachers have access to a computer as well as an iPad, Apple T.V., overhead projector, sound equipment, interactive devices, and hundreds of instructional program links on each school website. The system has an average of two computers and a document camera connected to the internet per classroom as well as a computer room with enough equipment to be used for whole class computer related activities. Mobile iPad carts complete with 40 iPads are available for checkout from each school’s library for teachers to use in their classrooms. Two technology personnel are responsible for maintaining the school system’s technology (ALSDE, 2012). Two of the elementary schools utilize AMSTI (Alabama Mathematics, Science, and Technology Initiative) and two do not utilize AMSTI.

AMSTI is the largest and most successful math and science program in the nation. It has been recognized by many national and international organizations. Microsoft recognized AMSTI for innovation and cost efficiency and Fortune 500 CEOs chose AMSTI as one of the official 35 programs that work. The annual budget for AMSTI is $28,000,000 and it provides $68,000,000 worth of equipment to teachers and students. More than one half of all the public schools in Alabama are AMSTI schools and many are on a waiting list due to funding. The teachers and administrators receive 120 hours of intense grade specific training over two years in summer classes. Students who receive AMSTI receive two and one half months worth of additional instruction over non-AMSTI schools after two years. Multiple years of outside evaluation on
every test given by the State Department of Education reveal AMSTI schools outperform non-
AMSTI schools (AMSTI, 2014).

**Participants**

The participants for this study consisted of 58 elementary teachers from the northwestern
Alabama school system’s four elementary schools. The school system was selected because of
its rural area, for which the US Census places the population at 39.9 persons per square mile.
Selection was also based on current ARMT scores and the investigator’s proximity to the
schools. Teachers were of varying ages, different number of years teaching, different genders,
and had varying technology skills.

**Instrumentation**

The current research involves elementary teachers’ perceptions of technology in the
classroom. Teachers were given an anonymous survey at a regularly scheduled
teachers/professional development meeting. The survey consisted of 25 questions that were
designed to help discover teachers’ perceptions of technology. The survey instrument (Appendix
A) in this study was inspired by a design created for elementary application by Ohio University
professors Howley, Wood, and Hough because they found existing instruments targeted middle
and high schools, and were not necessarily valid for elementary settings. Their instrument was
refined through feedback from the field, an online pilot test, and focus group interviews from
elementary teachers (Howley et al., 2011).

Elementary teachers from each of the schools representing their grade level in K-5
settings were the pool of interviewees. Two teachers per grade level per school or one teacher
per grade level for schools with only one corresponding K-5 grade level were interviewed at the
schools during teacher planning periods. Interviews were conducted using the overarching research question of what are rural elementary teachers’ perceptions of technology. The structured interview script (Appendix B) was designed with open ended questions which allowed the interviewees latitude to express their experiences with technology (Seidman, 1998). The structured interview allowed for easy comparison between participants, though it was generally structured so that it allowed flexibility for probing and exploring responses during the interview (Driscoll, 2007).

Qualitative research questions 1-4 help answer how rural elementary teachers perceive technology while quantitative research question 5 helps answer how rural elementary teachers actually use technology.

**Research Questions and Null Hypotheses**

1. What are rural elementary teachers’ perceptions about technology professional development based on demographic variables?
   
   a. There will be no difference between AMSTI and non-AMSTI schools in perceptions of technology professional development.
   
   b. There will be no difference between teachers age less than 40 and age over 40 in perceptions of technology professional development.
   
   c. There will be no difference between teachers experience less than 15 years and over 15 years in perceptions of technology professional development.

2. What are rural elementary teachers’ perceptions of technology integration into the classroom based on demographic variables?
a. There will be no difference between AMSTI and non-AMSTI schools in perceptions of technology integration into the classroom.

b. There will be no difference between teachers age less than 40 and age over 40 in perceptions of technology integration into the classroom.

c. There will be no difference between teachers with experience less than 15 years and over 15 years in perceptions of technology integration into the classroom.

3. What are rural elementary teachers’ perceptions about their own technological knowledge based on demographic variables?

   a. There will be no difference between AMSTI and non-AMSTI schools in perceptions of their own technological knowledge.

   b. There will be no difference between teachers age less than 40 and age over 40 in perceptions of their own technological knowledge.

   c. There will be no difference between teachers experience with less than 15 years and over 15 years in perceptions of their own technological knowledge.

4. What are rural elementary teachers’ perceptions of obstacles to using technology based on demographic variables?

   a. There will be no difference between AMSTI and non-AMSTI schools in perceptions of obstacle to using technology.

   b. There will be no difference between teachers age less than 40 and age over 40 in perceptions of obstacles to using technology.
c. There will be no difference between teachers experience with less than 15 years and over 15 years in perceptions of obstacle to using technology.

5. To what extent are rural elementary teachers using technology in the classroom based on demographic variables?

   a. There will be no difference between AMSTI and non-AMSTI schools in using technology in the classroom.
   
b. There will be no difference between teachers age less than 40 and age over 40 in using technology in the classroom.
   
c. There will be no difference between teachers experience with less than 15 years and over 15 years in using technology in the classroom.

**Data Collection**

In order to gain a complete understanding of the issues generated by the research questions, a mixed methodology design was utilized. Data collection was conducted in two concurrent steps at each school; quantitative data collection was first then the qualitative data were collected. The use of two different data collection methods strengthened the research design and added to the reliability of the data (Patton, 1990). The mixed method design can help offset the inherent weaknesses of one method with the strengths of the other (Miles & Huberman, 1994).

**Quantitative**

Quantitative methods offer insight into research utilizing closed end questions to obtain numerical data or observable behaviors (Gall, Borg & Gall, 1996). The use of the quantitative
method makes the correlation of data more manageable (Babbie, 1998). The quantitative method is instrumental in allowing for anonymity when collecting demographic data (Patton, 1990). In this study, a 25 question survey (Appendix A) was issued to each elementary teacher at a regularly scheduled faculty meeting. Survey data were collected, secured in a locked cabinet, and destroyed at the conclusion of the research. Survey participants’ anonymity was protected by utilizing the blind survey method.

**Qualitative**

Qualitative methods allow for the collection of data in a description that brings the reader into the context being described (Erlandson, Harris, Skipper, & Allen, 1993). Qualitative research weighs the content and setting for a deeper understanding of the participants (Best & Kahn, 1998). Qualitative methods are the open ended approach to viewing all the aspects of the participants (Glaser & Strauss 1967). In this study the interview participants were selected at random from each school’s grade level elementary teachers. Interview data were collected by a recording device, secured in a locked cabinet, and destroyed at the conclusion of the research. Interview participants were issued numbers to protect their anonymity.

**Data Analysis**

The data collected from the 25 question, five point Likert scale survey, were analyzed utilizing frequencies represented as percentages. A \( z \)-test was performed to look for significant differences between variables. The independent variables were AMSTI, Non-AMSTI, Age <40, Age >40, Experience <15 years and Experience >15 years. Interview data were analyzed by utilizing the Constant Comparative Method of Analysis. The Constant Comparative Method of Analysis was developed by Glaser and Strauss (Merriam, 1998). The Constant Comparative
Method of Analysis is usually associated with grounded theory because the constant comparative method is used for analyzing data in order to create a grounded theory (Glaser & Strauss, 1967). According to Glaser and Strauss (1967) the constant comparative method is an inductive data coding process for categorizing qualitative data for processing. Inductive analysis helps the investigator create a greater understanding of the phenomena under investigation. Constant comparative methodology consists of four stages: (a) codes, (b) concepts, (c) categories, and (d) theory (Glaser & Strauss, 1967). The codes stage identifies the key points of the data that are being studied, the concepts stage groups the data, the categories stage groups concepts to form a theory, and the theory stage is a collection of all the data and explains the research. Glaser (2001, p.145) advocated that “all is data” and all data no matter its source can be compared. Teacher Interview data were processed through three levels of coding: (a) open coding (b) focused coding, and (c) axial coding. Open coding is the selection of themes from large quantities of raw data, focused coding is the reexamination of open coding data with a focus on categories, and axial coding is the study of data to develop and refine themes (Hay, 2005). Interview data were coded using NVivo 10. NVivo 10 is a Windows compatible platform used to analyze unstructured qualitative data from audio, videos, surveys, and other social media. Qualitative and quantitative data were synthesized for variations using a triangulation design for validating quantitative data.

Table 1 is a representation of the data analysis of each research question. The measures are the survey questions, the dependent variables are the responses, and the independent variables are AMSTI, Non-AMSTI, Age <40, Age>40, Experience 1 to 15 years, and Experience over 15 years. The analysis for research questions 1-5 was frequencies represented by percentages.
### Table 1

*Survey Data Management Plan*

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Measure</th>
<th>Dependent Variable</th>
<th>Independent Variable</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Question 6</td>
<td>Responses</td>
<td>AMSTI, Non-AMSTI, Age, Experience</td>
<td>Percentages, z-test</td>
</tr>
<tr>
<td>2</td>
<td>Questions 1, 2, 3, 4, 5, 16, 17, 19</td>
<td>Responses</td>
<td>AMSTI, Non-AMSTI, Age, Experience</td>
<td>Percentages, z-test</td>
</tr>
<tr>
<td>3</td>
<td>Questions 7, 8</td>
<td>Responses</td>
<td>AMSTI, Non-AMSTI, Age, Experience</td>
<td>Percentages, z-test</td>
</tr>
<tr>
<td>4</td>
<td>Question 20</td>
<td>Responses</td>
<td>AMSTI, Non-AMSTI, Age, Experience</td>
<td>Percentages, z-test</td>
</tr>
<tr>
<td>5</td>
<td>Questions 16, 17, 19</td>
<td>Responses</td>
<td>AMSTI, Non-AMSTI, Age, Experience</td>
<td>Percentages, z-test</td>
</tr>
</tbody>
</table>

Table 2 represents the sub grouping of items on the survey. The subscale consists of perceptions of technology integration, perceptions of professional development, perceptions of self technology skills, actual technology use, perceptions of available technology, and perceptions of obstacles. Cronbach’s Alpha test was used to determine the reliability of the subscales. The reliability for each subscale is listed in Table 2 shown below. Reliability of the teacher perceptions of technology subscale was .828 and reliability of actual technology usage subscale was .740. Each subscale was higher than the minimum .700 as recommended by Johnson and Christensen (2004) for effectiveness. No test was required for perceptions of
obstacles, professional development, and perceptions of self technology skills as they are considered single items.

**Table 2**

*Survey Subscales*

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Item</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceptions of Available Technology</td>
<td>Questions 1, 2, 3, 4, 5, 16, 17, 19</td>
<td>Cronbach’s Alpha .828</td>
</tr>
<tr>
<td>Perceptions of Professional Development</td>
<td>Question 6</td>
<td>No test required</td>
</tr>
<tr>
<td>Perceptions of Self Technology Skills</td>
<td>Questions 7, 8</td>
<td>No test required</td>
</tr>
<tr>
<td>Perceptions of Obstacles</td>
<td>Question 20</td>
<td>No test required</td>
</tr>
<tr>
<td>Actual Technology Usage</td>
<td>Questions 16, 17, 19</td>
<td>Cronbach’s Alpha .740</td>
</tr>
</tbody>
</table>

**Summary**

This study was conducted using a concurrent mixed method design. The concurrent mixed method design was used in this study to ensure validity and explain contrary or complex survey results (Driscoll, 2007). The quantitative data were gathered using a 25 question survey designed to elicit teacher perceptions about technology. The qualitative data were gathered by interviewing a portion of the survey participants using scripted open ended questions immediately after the completion of the survey.
CHAPTER 4
RESULTS AND ANALYSIS OF DATA

Introduction

This concurrent mixed methods study evaluated rural elementary teachers’ perceptions of technology by utilizing comparative data, survey data, and interview data. Glaser (2001, p.145) advocated that “all is data” and all data no matter their source can be compared. Perceptions of technology were compared by age, teaching experience, and AMSTI use or Non-AMSTI use. The researcher had a unique opportunity to compare the effects of AMSTI on teachers’ perceptions when two of the four study schools were utilizing AMSTI and two of the study schools were not utilizing AMSTI.

Research Participants

The participants were rural elementary teachers at the four study schools. After obtaining permission from the school system’s superintendent and Institutional Review Board (IRB) approval through the University of Alabama, the researcher scheduled appointment times with the study schools’ principals. The principals gave permission for the researcher to address the faculty at their teachers’ meetings. The elementary teachers at each school’s teachers’ meeting were informed about the study and given the informed consent form to read and sign. The teachers were then given a 25 question survey to complete (Appendix A). Two teachers from each grade level that had at least two teachers were then interviewed in their classroom by the researcher using an interview script (Appendix B). If there were more than two teachers per grade level the participants for that grade level were selected at random using a blind draw
method. Interview participants were recorded and given a coded number to protect their identity. The population of elementary teachers was 58 participants out of 59 total teachers at the four study schools. One teacher was absent from school the days the researcher collected data.

AMSTI schools accounted for 35 of the 58 participants and non-AMSTI schools accounted for 23. There were 39 participants under the age of 40 and 19 over the age of 40. There were 33 participants with 1-15 years of experience and 25 participants with over 15 years of experience. The study schools had 20 participants with a Bachelor’s degree and 38 with a Master’s degree. There were 58 females in the study and all were Caucasian. The study schools’ participants have an average of 18 students in their classroom.

Survey

The survey used by the researcher was a 25 question Likert-type scale (Appendix A). The questions in the survey were designed to elicit responses to teachers’ perceptions about using technology in the classroom and how they were actually using technology in the classroom. Of the four study schools there was a 98% survey participation rate by the elementary classroom teachers. The survey demographics section included age, education, and experience. The entire elementary teacher population at the study schools was female and all were Caucasian.

Interviews

Interviews were conducted by the researcher using a script consisting of 7 open ended questions (Appendix B). Interview questions were open ended and were designed to gain insight into teachers’ perceptions of technology. Participants were recorded and given numbers to protect their anonymity. Interviews were conducted in the teacher’s classroom during teacher
planning periods while the students were not in the room. Of the four study schools 46 interviews were conducted.

**Results**

**Research Question 1**

Research Question 1 asked “What are rural elementary teachers’ perceptions about technology professional development based on demographic variables? “Participants were asked in the interviews about their attendance at professional development on technology and the time since their last technology training. Table 3 represents the comparison of time since attending technology professional development between the study schools, the state, and the nation. The study school data in Table 3 came from the responses to question 6 of the survey (Appendix A). State and national data in table 3 came from the Alabama IMPACT Report 2010, Alabama Department of Education Technology Report, and the U.S. Department of Education, National Center for Education Statistics.

**Comparative Data**

**Table 3**

*Time Since Last Technology Professional Development Attended*

<table>
<thead>
<tr>
<th>Group</th>
<th>Study Schools</th>
<th>State</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 3 mo.</td>
<td>3%</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
<tr>
<td>3-6 mo.</td>
<td>12%</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
<tr>
<td>6-12 mo.</td>
<td>63%</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
<tr>
<td>0-12 mo.</td>
<td>78%</td>
<td>37%</td>
<td>37%</td>
</tr>
<tr>
<td>Over 12 mo.</td>
<td>22%</td>
<td>63%</td>
<td>63%</td>
</tr>
</tbody>
</table>
When asked “What are rural elementary teachers’ perceptions about technology professional development” 47% of the rural elementary teachers in the study schools said they had been to a technology professional development class within the last six months. Another 31% had been to a technology professional development class within the last year and 22% indicated that it had been over a year since attending a technology professional development class.

*Survey Data*

Table 4 represents the amount of time since the last technology professional development training by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years.

**Table 4**

*Technology Professional Development Attended Comparison*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>&lt;3mo</th>
<th>3-6mo</th>
<th>6-12 mo</th>
<th>12+ mo</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>4%</td>
<td>3%</td>
<td>25%</td>
<td>24%</td>
<td>0%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>0%</td>
<td>6%</td>
<td>18%</td>
<td>13%</td>
<td>0%</td>
</tr>
<tr>
<td>Age &gt; 40</td>
<td>n=19</td>
<td>0%</td>
<td>3%</td>
<td>10%</td>
<td>17%</td>
<td>3%</td>
</tr>
<tr>
<td>Age &lt; 40</td>
<td>n=39</td>
<td>2%</td>
<td>7%</td>
<td>34%</td>
<td>22%</td>
<td>0%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>3%</td>
<td>5%</td>
<td>33%</td>
<td>25%</td>
<td>2%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=25</td>
<td>0%</td>
<td>5%</td>
<td>14%</td>
<td>14%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Perceptions of technology professional development showed teachers under 40 and teachers with less than 15 years of experience attend professional development classes more
often than teachers that are over 40 or teachers with over 15 years of experience. A z-test was performed and significant differences between variables were detected in the 6-12 month column Age >40 (n= 39, z=.10) and Age>40 (n=19, z=.34); \( p=0.0251 \)

**Interview Data**

Interview responses for question 5 (Appendix B) revealed two predominate themes, the value of professional development and the need for additional training. Table 5 indicates the two themes for question 5 (Appendix B). Themes were derived by utilizing NVivo-10 for word repetition and reoccurring topics from the recordings. These two themes reflect the participants’ feelings about professional development on technology. A cumulative list that includes the number of times the themes emerged is listed in Table 5.

**Table 5**

*Themes that Emerged from Interviews for Professional Development*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=46</th>
<th>Value of PD</th>
<th>Additional Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=28</td>
<td>5.2%</td>
<td>5.2%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=18</td>
<td>7.3%</td>
<td>7.2%</td>
</tr>
<tr>
<td>Age&lt;40</td>
<td>n=30</td>
<td>4.7%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Age&gt;40</td>
<td>n=16</td>
<td>6.1%</td>
<td>6.1%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=27</td>
<td>6.9%</td>
<td>8.2%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=19</td>
<td>6.8%</td>
<td>3.3%</td>
</tr>
</tbody>
</table>

**Theme 1: Value of Professional Development**

An analysis of the interviews quickly revealed that many of the participants felt technology professional development was valuable for teachers to help become technology savvy. A non-AMSTI school teacher stated,
I think professional development is great especially for people like me where technology doesn’t come naturally. I need these learning opportunities because I am totally lost when it comes to technology. I have attended workshops on iPads and other things and I caught on pretty fast but I can use more. I think professional development is good for non-Tech people like me.

A teacher from an AMSTI school stated about her experiences at a professional development class,

We have many opportunities for professional development. I recently had the opportunity to attend a class given by the state and it was wonderful. The interaction with the professor and other teachers gave me the opportunity to learn in the way I need. I did not complete the class but it was very good.

Theme 2: Additional Training

Interviews indicated participants felt there should be more opportunity for teachers to attend professional development on technology. A non-AMSTI teacher stated,

I feel teachers definitely need to be trained in technology. I would love to go for training but there is little opportunity for me at this time. The students need to be taught in a way they will be seeing in the real world. I personally feel technology training is a good thing.

A teacher at an AMSTI school had this to say,

As a teacher I recognize things change every day and I need more training to stay current especially because I am an older person. It is hard for me and I need more professional development to keep up with all the changes. Professional development is good for teachers and I need the training.
Research Question 2

Research Question 2 asked “What are rural elementary teachers’ perceptions of available technology based on demographic variables?” Participants were asked about their perceptions of the number of computers in their classroom. Perceived student sophistication with technology hinges on three factors: perceived teacher attitudes toward technology, perceived preparation for using technology, and perceived adequacy of technology (Howley et al., 2011). Survey question 12 revealed teachers at the study schools felt 60% of their students’ computer technology sophistication rated good to superior (Appendix A). Table 6 shows the comparison of teacher perceptions of the number of classroom computers between the study schools, the state, and the nation. The study school data in Table 6 come from the responses to question 1 of the survey (Appendix A). State and national data in Table 6 come from the Alabama IMPACT Report 2010, Alabama Department of Education Technology Report, and the U.S. Department of Education, National Center for Education Statistics.

Comparative Data

Table 6

Comparative Data Showing Teachers’ Perceptions of Number of Classroom Computers

<table>
<thead>
<tr>
<th></th>
<th>Study Schools</th>
<th>State</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior</td>
<td>44%</td>
<td>35%</td>
<td>33%</td>
</tr>
<tr>
<td>Good</td>
<td>34%</td>
<td>39%</td>
<td>37%</td>
</tr>
<tr>
<td>Adequate</td>
<td>10%</td>
<td>15%</td>
<td>16%</td>
</tr>
<tr>
<td>Poor</td>
<td>3%</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>None</td>
<td>7%</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>
The survey revealed 44% of rural elementary teachers in the study schools felt the number of classroom computers was superior while another 34% felt it was good. The survey also indicated 10% felt the number of classroom computers was only adequate and 3% felt it was poor. The comparative data did not show much difference between state and national.

**Survey Data**

Table 7 shows teacher perceptions of the number of classroom computers by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 7 come from question 1 of the survey instrument (Appendix A).

**Table 7**

*Teacher Perceptions of the Number of Classroom Computers*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Superior</th>
<th>Good</th>
<th>Adequate</th>
<th>Poor</th>
<th>Non-existent</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>15%</td>
<td>20%</td>
<td>24%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>3%</td>
<td>2%</td>
<td>15%</td>
<td>20%</td>
<td>0%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>n=39</td>
<td>12%</td>
<td>15%</td>
<td>25%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Age&gt;40</td>
<td>n=19</td>
<td>6%</td>
<td>5%</td>
<td>15%</td>
<td>15%</td>
<td>2%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>12%</td>
<td>12%</td>
<td>32%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=25</td>
<td>5%</td>
<td>8%</td>
<td>8%</td>
<td>10%</td>
<td>0%</td>
</tr>
</tbody>
</table>

The survey shows teachers at AMSTI schools, teachers under age 40, and teachers with less than 15 years of experience perceive the number of classroom computers is superior by 15%, 12%, and 12% respectively. The same groups indicated the number of classroom computers in the school was good by 20%, 15% and 12% respectively. A *z*-test was performed to look for
significant differences between variables and significant results were detected in the good column: AMSTI \((n=35, z=.20)\) and non-AMSTI \((n=23, z=.02); p=0.0452;\) Experience 1-15 \((n=33, z=.32)\) and Experience over 15 \((n=25, z=.08); p=0.028;\) and the poor column AMSTI \((n=35, z=.00)\) and non-AMSTI \((n=23, z=.20); p=0.0058.\)

Table 8 shows teacher perceptions of computer software available for students by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 8 come from question 2 of the survey instrument (Appendix A).

**Table 8**

*Teacher Perceptions of Software*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Superior</th>
<th>Good</th>
<th>Adequate</th>
<th>Poor</th>
<th>Non-existent</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>3%</td>
<td>30%</td>
<td>24%</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>2%</td>
<td>5%</td>
<td>17%</td>
<td>16%</td>
<td>2%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>n=39</td>
<td>2%</td>
<td>19%</td>
<td>22%</td>
<td>12%</td>
<td>0%</td>
</tr>
<tr>
<td>Age&gt;40</td>
<td>n=19</td>
<td>3%</td>
<td>13%</td>
<td>19%</td>
<td>7%</td>
<td>2%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>2%</td>
<td>25%</td>
<td>29%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=25</td>
<td>3%</td>
<td>8%</td>
<td>10%</td>
<td>8%</td>
<td>2%</td>
</tr>
</tbody>
</table>

Teachers at AMSTI schools, teachers under the age of 40, and teachers with less than 15 years of experience were more positive about the school’s software. A \(z\)-test was performed to look for significant differences between variables and significant results were detected in the good column: AMSTI \((n=35, z=.30)\) and non-AMSTI \((n=23, z=.05); p=0.0167.\)

Table 9 shows teacher perceptions of computer hardware available by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less
than 40, and teaching experience 1-15 years compared to teaching experience over 15 years.

Data for Table 9 come from question 3 of the survey instrument (Appendix A).

Table 9

*Teacher Perceptions of Computer Hardware*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Superior</th>
<th>Good</th>
<th>Adequate</th>
<th>Poor</th>
<th>Non-existent</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>7%</td>
<td>26%</td>
<td>16%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>2%</td>
<td>3%</td>
<td>16%</td>
<td>17%</td>
<td>2%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>n=39</td>
<td>5%</td>
<td>13%</td>
<td>15%</td>
<td>13%</td>
<td>4%</td>
</tr>
<tr>
<td>Age&gt;40</td>
<td>n=19</td>
<td>4%</td>
<td>10%</td>
<td>12%</td>
<td>19%</td>
<td>0%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>5%</td>
<td>17%</td>
<td>22%</td>
<td>17%</td>
<td>2%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=25</td>
<td>3%</td>
<td>10%</td>
<td>8%</td>
<td>8%</td>
<td>0%</td>
</tr>
</tbody>
</table>

The data show 26% of teachers at AMSTI schools rated the provided computer hardware as good in contrast to the 3% of teachers at Non-AMSTI schools. Data also revealed 22% of teachers with less than 15 years of experience rate the computer hardware as adequate in contrast to 8% of teachers with over 15 years of experience. A $z$-test was performed to look for significant differences between variables and significant results were detected in the good column: AMSTI ($n=35, z=.26$) and non-AMSTI ($n=23, z=.03$); $p=0.0222$.

Table 10 shows teacher perceptions of internet speed available for students by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 10 come from question 4 of the survey instrument (Appendix A).
The data revealed 31% of the teachers at AMSTI schools rated the school’s internet as good while 30% of the teachers at Non-AMSTI schools rated the internet connection poor. The data also show 22% of teachers under 40 rated the schools internet connection as good while 20% of the teachers over 40 rated the internet as poor. The data show 24% of teachers with 1-15 years experience rated the internet connection as good while 20% of teachers with over 15 years rated the internet connection as poor. A z-test was performed to look for significant differences between variables and significant results were detected in the good column: AMSTI (n=35, z=.31) and non-AMSTI (n=23, z=.00); p=0.0031.

Table 11 shows teacher perceptions of computer technology resources available for teaching preparation by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 11 come from question 5 of the survey instrument (Appendix A).
Table 11

*Teacher Perceptions of Computer Resources*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Superior</th>
<th>Good</th>
<th>Adequate</th>
<th>Poor</th>
<th>Non-existent</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>8%</td>
<td>27%</td>
<td>20%</td>
<td>17%</td>
<td>0%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>2%</td>
<td>7%</td>
<td>18%</td>
<td>13%</td>
<td>0%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>n=39</td>
<td>5%</td>
<td>25%</td>
<td>17%</td>
<td>7%</td>
<td>2%</td>
</tr>
<tr>
<td>Age&gt;40</td>
<td>n=19</td>
<td>4%</td>
<td>8%</td>
<td>2%</td>
<td>7%</td>
<td>0%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>5%</td>
<td>29%</td>
<td>24%</td>
<td>8%</td>
<td>2%</td>
</tr>
<tr>
<td>Exp 15 + yr</td>
<td>n=25</td>
<td>5%</td>
<td>7%</td>
<td>8%</td>
<td>4%</td>
<td>0%</td>
</tr>
</tbody>
</table>

The data show 27% of teachers at AMSTI schools rate the school’s provided technology resources as good while 7% of teachers at non-AMSTI schools rate the school’s provided technology as good. Data also revealed 25% of teachers under 40 rate the schools provided technology as good while 8% of teachers over 40 rate the provided technology as good. The data show 29% of teachers with 1-15 years of experience rate the schools provided technology as good while 7% of teachers with over 15 years rate the schools provided technology as good. A z-test was performed to look for significant differences between variables and significant results were detected in the good column: Experience 1-15 (n= 33, z=.29) and Experience over 15 (n=25, z=.07); p=0.0363.

Table 12 shows when students use technology for research by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 12 come from questions 16, 24, and 25 of the survey instrument (Appendix A).
Table 12

*Frequency Students Use Technology for Research*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Occasionally</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>2%</td>
<td>19%</td>
<td>13%</td>
<td>17%</td>
<td>8%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>2%</td>
<td>2%</td>
<td>12%</td>
<td>19%</td>
<td>3%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>n=39</td>
<td>7%</td>
<td>10%</td>
<td>19%</td>
<td>13%</td>
<td>13%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>n=19</td>
<td>0%</td>
<td>12%</td>
<td>12%</td>
<td>19%</td>
<td>2%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>2%</td>
<td>15%</td>
<td>19%</td>
<td>22%</td>
<td>7%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=25</td>
<td>2%</td>
<td>5%</td>
<td>6%</td>
<td>14%</td>
<td>5%</td>
</tr>
</tbody>
</table>

The data show that 19% of teachers from AMSTI schools use technology for research on a weekly basis while only 2% of Non-AMSTI teachers use it weekly. Eight percent of teachers at AMSTI schools report they never use technology for research while 3% of teachers at Non-AMSTI schools report never using it for research. Seven percent of teachers over 40 years of age report using technology for research on a daily basis while 0% of teachers under 40 years of age report using technology for research daily. Fifteen percent of teachers with 1-15 years experience report using technology for research on a weekly basis while only 5% of teachers with more than 15 years of experience use it weekly. A z-test was performed to look for significant differences between variables and there were not any significant differences detected.

Table 13 shows when students use technology for writing by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 13 come from questions 16, 24, and 25 of the survey instrument (Appendix A).
Table 13

Frequency Students Use Technology for Writing

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Occasionally</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>0%</td>
<td>4%</td>
<td>17%</td>
<td>14%</td>
<td>25%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>2%</td>
<td>2%</td>
<td>8%</td>
<td>7%</td>
<td>19%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>n=39</td>
<td>0%</td>
<td>5%</td>
<td>12%</td>
<td>12%</td>
<td>36%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>n=19</td>
<td>2%</td>
<td>2%</td>
<td>15%</td>
<td>7%</td>
<td>17%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>2%</td>
<td>2%</td>
<td>20%</td>
<td>10%</td>
<td>39%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=25</td>
<td>0%</td>
<td>3%</td>
<td>5%</td>
<td>5%</td>
<td>19%</td>
</tr>
</tbody>
</table>

The data revealed that 17% of AMSTI school teachers used technology for writing monthly while only 8% of Non-AMSTI school teachers used it monthly for writing. Thirty six percent of teachers over 40 years of age reported they never use technology for writing while 17% of teachers under 40 years of age reported they never use technology for writing. Twenty percent of teachers with 1-15 years experience reported they used technology for writing monthly while only 5% of teachers with over 15 years experience reported using technology for writing monthly. A z-test was performed to look for significant differences between variables and there were not any significant differences detected.

Table 14 shows when students use technology for reference by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 14 come from questions 16, 24, and 25 of the survey instrument (Appendix A).
Table 14

*Frequency Students Use Technology for Reference*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Occasionally</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>35</td>
<td>0%</td>
<td>2%</td>
<td>5%</td>
<td>7%</td>
<td>36%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>23</td>
<td>0%</td>
<td>4%</td>
<td>2%</td>
<td>5%</td>
<td>27%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>39</td>
<td>0%</td>
<td>2%</td>
<td>6%</td>
<td>12%</td>
<td>37%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>19</td>
<td>0%</td>
<td>6%</td>
<td>2%</td>
<td>8%</td>
<td>27%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>33</td>
<td>0%</td>
<td>2%</td>
<td>7%</td>
<td>14%</td>
<td>34%</td>
</tr>
<tr>
<td>Exp 15 + yr</td>
<td>25</td>
<td>0%</td>
<td>3%</td>
<td>0%</td>
<td>5%</td>
<td>22%</td>
</tr>
</tbody>
</table>

The data show that 36% of AMSTI teachers never use technology for reference while 27% of Non-AMSTI teachers never use technology for reference. Thirty-seven percent of teachers over 40 reported they never use technology for reference while only 27% of teachers under 40 reported that they never use technology for reference. Thirty-four percent of teachers with 1-15 years of experience reported that they never use technology for reference while 22% of teachers with over 15 years of experience reported that they never use technology for reference. A z-test was performed to look for significant differences between variables and there were not any significant differences detected.

Table 15 shows when students use technology for educational games by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 15 come from questions 16, 24, and 25 of the survey instrument (Appendix A).
### Table 15

*Frequency Students Use Technology for Educational Games*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Occasionally</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>35</td>
<td>17%</td>
<td>34%</td>
<td>2%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>23</td>
<td>14%</td>
<td>19%</td>
<td>2%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>39</td>
<td>13%</td>
<td>41%</td>
<td>6%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>19</td>
<td>8%</td>
<td>25%</td>
<td>2%</td>
<td>6%</td>
<td>2%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>33</td>
<td>14%</td>
<td>43%</td>
<td>3%</td>
<td>7%</td>
<td>0%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>25</td>
<td>13%</td>
<td>15%</td>
<td>0%</td>
<td>2%</td>
<td>0%</td>
</tr>
</tbody>
</table>

The data revealed that 17% of AMSTI teachers use instructional games daily while only 14% of non-AMSTI teachers use instructional games daily. Forty-one percent of teachers over 40 years of age reported using instructional games weekly while only 25% of teachers under 40 years of age reported using instructional games weekly. Forty-three percent of teachers with less than 15 years of experience report using instructional games weekly while only 15% of teachers with over 15 years of experience report using instructional technology games weekly. A z-test was performed to look for significant differences between variables and significant results were detected in the weekly column: Experience 1-15 ($n=33, z=.34$) and Experience over 15 ($n=25, z=.23$); $p=0.0223$.

Table 16 shows when students use technology for drawing by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 16 come from questions 16, 24, and 25 of the survey instrument (Appendix A).
Table 16

*Frequency Students Use Technology for Drawing*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Occasionally</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>3%</td>
<td>7%</td>
<td>2%</td>
<td>19%</td>
<td>31%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>0%</td>
<td>3%</td>
<td>2%</td>
<td>3%</td>
<td>22%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>n=39</td>
<td>2%</td>
<td>2%</td>
<td>0%</td>
<td>5%</td>
<td>48%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>n=19</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>14%</td>
<td>32%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>0%</td>
<td>5%</td>
<td>5%</td>
<td>19%</td>
<td>37%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=25</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
<td>2%</td>
<td>27%</td>
</tr>
</tbody>
</table>

The data show that 19% of AMSTI teachers occasionally use technology for drawing while only 3% of non-AMSTI teachers use technology for drawing. Forty-eight percent of teachers over 40 years of age reported that they never use technology for drawing while 32% of teachers under 40 years of age reported that they never use technology for drawing. Nineteen percent of teachers with 1-15 years of experience reported that they occasionally use technology for drawing while only 2% of teachers with over 15 years of experience reported that they occasionally use technology for drawing. A z-test was performed to look for differences in variables and significant results were detected in the occasionally column: Experience 1-15 \( (n=33, z=.19) \) and Experience over 15 \( (n=25, z=.02); p=0.0458. \)

Table 17 shows when students use technology for presentation by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 17 come from questions 16, 24, and 25 of the survey instrument (Appendix A).
Table 17

*Frequency Students Use Technology for Presentation*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Occasionally</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>6%</td>
<td>0%</td>
<td>10%</td>
<td>12%</td>
<td>22%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>0%</td>
<td>5%</td>
<td>5%</td>
<td>8%</td>
<td>18%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>n=39</td>
<td>5%</td>
<td>2%</td>
<td>5%</td>
<td>4%</td>
<td>41%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>n=19</td>
<td>0%</td>
<td>2%</td>
<td>8%</td>
<td>15%</td>
<td>17%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>2%</td>
<td>5%</td>
<td>8%</td>
<td>14%</td>
<td>33%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=25</td>
<td>5%</td>
<td>2%</td>
<td>0%</td>
<td>3%</td>
<td>22%</td>
</tr>
</tbody>
</table>

The data revealed that 22% of AMSTI teachers never use technology for presentation while only 18% of non-AMSTI teachers reported that they never use technology for presentation. Forty-one percent of teachers over 40 years of age reported that they never use technology for presentation while only 17% of teachers less than 40 years of age reported that they never use technology for presentation. Thirty-three percent of teachers with 1-15 years of experience reported that they never use technology for presentation while only 22% of teachers with over 15 years of experience reported that they never use technology for presentation. A z-test was performed to look for differences in variables and there were not any significant differences detected.

Table 18 shows when students use technology for acquiring the web by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 18 come from questions 16, 24, and 25 of the survey instrument (Appendix A).
Table 18

*Frequency Students Use Technology for Acquiring the Web*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Occasionally</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>15%</td>
<td>19%</td>
<td>8%</td>
<td>12%</td>
<td>5%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>5%</td>
<td>10%</td>
<td>3%</td>
<td>12%</td>
<td>5%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>n=39</td>
<td>13%</td>
<td>13%</td>
<td>8%</td>
<td>13%</td>
<td>13%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>n=19</td>
<td>5%</td>
<td>20%</td>
<td>5%</td>
<td>8%</td>
<td>0%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>12%</td>
<td>22%</td>
<td>7%</td>
<td>14%</td>
<td>10%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=25</td>
<td>8%</td>
<td>3%</td>
<td>5%</td>
<td>12%</td>
<td>0%</td>
</tr>
</tbody>
</table>

AMSTI, Age over 40, and Experience 1-15 years show a usage of 15%, 13%, and 12%, respectively, for daily use of acquiring the web. AMSTI, Age less than 40 and Experience 1-15 years show a weekly usage of 19%, 20%, and 22%, respectively. A z-test was performed to look for differences in variables and significant results were detected in the weekly column: Experience 1-15 (n= 33, z=.22) and Experience over 15 (n=25, z=.03); p=0.0378.

Table 19 shows the number of times per week the teacher uses technology to teach language arts by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 19 come from questions 17, 24, and 25 of the survey instrument (Appendix A).
Table 19

*Number of Times Per Week Teacher Uses Technology to Teach Language Arts*

<table>
<thead>
<tr>
<th>Group</th>
<th>n =58</th>
<th>5 times</th>
<th>4 times</th>
<th>3 times</th>
<th>2 times</th>
<th>1 time</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>19%</td>
<td>12%</td>
<td>16%</td>
<td>7%</td>
<td>3%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>5%</td>
<td>9%</td>
<td>10%</td>
<td>2%</td>
<td>7%</td>
</tr>
<tr>
<td>Age&lt;40</td>
<td>n=39</td>
<td>14%</td>
<td>10%</td>
<td>14%</td>
<td>5%</td>
<td>8%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>n=19</td>
<td>12%</td>
<td>12%</td>
<td>10%</td>
<td>7%</td>
<td>3%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>12%</td>
<td>12%</td>
<td>17%</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=25</td>
<td>14%</td>
<td>9%</td>
<td>9%</td>
<td>9%</td>
<td>8%</td>
</tr>
</tbody>
</table>

AMSTI school participants use technology to teach language arts more 5 times per week (19%), 3 times per week (16%), and 1 time per week (3%) in comparison to Non-AMSTI teachers who use it only 5% of the time 5 times per week, 10% of the time 3 times per week, and 7% of the time 1 time per week. A z-test was performed to look for differences in variables and there were not any significant differences detected.

Table 20 shows the number of times the teacher uses technology to teach math by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 20 come from questions 17, 24, and 25 of the survey instrument (Appendix A).
Table 20

How Many Times Per Week Teacher Uses Technology to Teach Math

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>5 times</th>
<th>4 times</th>
<th>3 times</th>
<th>2 times</th>
<th>1 time</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>16%</td>
<td>10%</td>
<td>16%</td>
<td>12%</td>
<td>3%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>10%</td>
<td>9%</td>
<td>3%</td>
<td>3%</td>
<td>7%</td>
</tr>
<tr>
<td>Age&lt;40</td>
<td>n=39</td>
<td>9%</td>
<td>7%</td>
<td>9%</td>
<td>7%</td>
<td>5%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>n=19</td>
<td>17%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>7%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>12%</td>
<td>12%</td>
<td>17%</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=25</td>
<td>10%</td>
<td>9%</td>
<td>7%</td>
<td>7%</td>
<td>9%</td>
</tr>
</tbody>
</table>

AMSTI school participants use technology to teach math more 5 times per week (16%), 3 times per week (16%), and 2 times per week (12%) in comparison to Non-AMSTI teachers who use it only 10% of the time 5 times per week, 3% of the time 3 times per week, and 3% of the time 2 times per week. Teachers over 40 years of age use technology to teach math more 5 times per week (17%) in comparison to teachers less than 40 years of age who use it only 9% of the time 5 times per week. A z-test was performed to look for differences in variables and there were not any significant differences detected.

Table 21 shows the number of times a teacher uses technology to teach social studies by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 21 come from questions 17, 24, and 25 of the survey instrument (Appendix A).
Table 21

*How Many Times Per Week Teacher Uses Technology to Teach Social Studies*

<table>
<thead>
<tr>
<th>Group</th>
<th>n = 58</th>
<th>5 times</th>
<th>4 times</th>
<th>3 times</th>
<th>2 times</th>
<th>1 time</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>35</td>
<td>5%</td>
<td>5%</td>
<td>7%</td>
<td>10%</td>
<td>21%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>23</td>
<td>0%</td>
<td>0%</td>
<td>9%</td>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>Age&lt;40</td>
<td>39</td>
<td>3%</td>
<td>7%</td>
<td>3%</td>
<td>12%</td>
<td>9%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>19</td>
<td>2%</td>
<td>0%</td>
<td>9%</td>
<td>10%</td>
<td>19%</td>
</tr>
<tr>
<td>Exp1-15 yr</td>
<td>33</td>
<td>0%</td>
<td>0%</td>
<td>9%</td>
<td>16%</td>
<td>19%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>25</td>
<td>5%</td>
<td>5%</td>
<td>2%</td>
<td>5%</td>
<td>9%</td>
</tr>
</tbody>
</table>

Five percent of AMSTI teachers report using technology to teach social studies 5 times per week and 5% of AMSTI teachers report using technology to teach social studies 4 times per week in comparison to non-AMSTI teachers who report never using technology to teach social studies 5 times per week and never using technology to teach social studies 4 times per week. Seven percent of teachers less than 40 years of age report using technology to teach social studies 4 times per week in comparison to teachers over 40 years of age who report never using technology to teach social studies 4 times per week. Five percent of teachers with over 15 years of experience report use technology to teach social studies 5 times per week in comparison to teachers with 1-15 years of experience who report never using technology to teach social studies 5 times per week. A z-test was performed to look for differences in variables and there were not any significant differences detected.

Table 22 shows how many times per week the teacher uses technology to teach science by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience...
over 15 years. Data for Table 22 come from questions 17, 24, and 25 of the survey instrument (Appendix A).

Table 22

*How Many Times Per Week Teacher Uses Technology to Teach Science*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>5 times</th>
<th>4 times</th>
<th>3 times</th>
<th>2 times</th>
<th>1 time</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>5%</td>
<td>5%</td>
<td>7%</td>
<td>10%</td>
<td>7%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>2%</td>
<td>0%</td>
<td>9%</td>
<td>7%</td>
<td>10%</td>
</tr>
<tr>
<td>Age&lt;40</td>
<td>n=39</td>
<td>3%</td>
<td>5%</td>
<td>5%</td>
<td>12%</td>
<td>9%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>n=19</td>
<td>2%</td>
<td>0%</td>
<td>7%</td>
<td>12%</td>
<td>17%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>3%</td>
<td>0%</td>
<td>7%</td>
<td>17%</td>
<td>19%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=25</td>
<td>5%</td>
<td>5%</td>
<td>3%</td>
<td>3%</td>
<td>9%</td>
</tr>
</tbody>
</table>

Seventeen percent of AMSTI teachers report using technology 1 time per week in comparison to 10% of Non-AMSTI teachers who report using it 1 time per week. A z-test was performed to look for differences in variables and there were not any significant differences detected.

Table 23 shows how many times per week the teacher uses technology to teach science by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 23 come from questions 19, 24, and 25 of the survey instrument (Appendix A).
Non-AMSTI teachers reported their students use technology more daily (19%) in comparison to 14% of AMSTI teachers. Teachers over 40 years of age reported their students use technology more daily (22%) in comparison to 10% of teachers less than 40 years of age. Teachers with 1-15 years of experience reported their students use technology more daily (21%) in comparison to 12% of teachers with over 15 years of experience. A z-test was performed to look for differences in variables and there were not any significant differences detected.

**Interview Data**

Interview responses for question 2 (Appendix B), “Tell as much as you can about the technology that the school system provides for you” revealed two predominant themes, availability of programs and computer access. Table 24 indicates the two themes for question 2 (Appendix B). Themes were derived by utilizing NVivo-10 for word repetition and reoccurring topics from the recordings. A cumulative list that includes the number of times the themes

### Table 23

*How Often Students Use Technology Per Week*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Daily</th>
<th>3-4 Days Per Week</th>
<th>2-3 Days Per Week</th>
<th>1-2 Days Per Week</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>14%</td>
<td>16%</td>
<td>16%</td>
<td>7%</td>
<td>0%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>19%</td>
<td>3%</td>
<td>14%</td>
<td>12%</td>
<td>2%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>n=39</td>
<td>10%</td>
<td>7%</td>
<td>19%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>n=19</td>
<td>22%</td>
<td>10%</td>
<td>7%</td>
<td>8%</td>
<td>2%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>21%</td>
<td>14%</td>
<td>22%</td>
<td>9%</td>
<td>2%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=25</td>
<td>12%</td>
<td>5%</td>
<td>5%</td>
<td>10%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Interview responses for question 2 (Appendix B), “Tell as much as you can about the technology that the school system provides for you” revealed two predominant themes, availability of programs and computer access. Table 24 indicates the two themes for question 2 (Appendix B). Themes were derived by utilizing NVivo-10 for word repetition and reoccurring topics from the recordings. A cumulative list that includes the number of times the themes
emerged is listed in Table 24. These two themes reflect the interview participants’ feelings about the technology that is provided by the school system.

**Table 24**

*Themes that Emerged from Interviews for Technology Provided by the School*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=46</th>
<th>Available Programs</th>
<th>Computer Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=28</td>
<td>3.6%</td>
<td>8.4%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=18</td>
<td>5.6%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Age&lt;40</td>
<td>n=30</td>
<td>5.2%</td>
<td>5.9%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>n=16</td>
<td>5.8%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Exp 1-15</td>
<td>n=27</td>
<td>4.2%</td>
<td>7.1%</td>
</tr>
<tr>
<td>Exp 15+</td>
<td>n=19</td>
<td>6.0%</td>
<td>5.6%</td>
</tr>
</tbody>
</table>

*Theme 1: Availability of Programs*

Interview responses revealed the participants were aware of the computer programs that were made available by the school system. Almost all participants mentioned the computer programs Riverdeep and Classworks in the interviews. As a kindergarten teacher stated,

> We have Classworks, which does math and language arts and we have Riverdeep which does math. I recently got the opportunity to observe a new program that will be introduced as part of ACCESS and it looks wonderful. We have many different programs in the library and the teachers have a pool of programs we share.

Another kindergarten teacher had this to say,

> We have our computer lab down by the library, in the library, we actually have two there. There was a larger computer lab and they broke it down and moved some of the computers to the first and second grade hall. They left some of the older computers there but they aren’t as good as the ones in the library so we use the library. They have some good programs in the library like Starfall, and Riverdeep that has math on it that we use a lot. There is a Starfall program that we use in the
classroom on our old computers but they have different games and programs in the library we can use.

**Theme 2: Computer Access**

There were some participants that felt the classroom computers were inadequate but most participants talked glowingly about the computer labs and the iPads that are available for the students.

A first grade teacher explained,

> We have a computer lab that our students go to twice a week, once a week for Riverdeep and once a week for Classworks. We also have a computer lab that is dedicated to the first and second grades. There are 20 to 25 computers in our computer lab and that gives every student his/her own computer. When we go into the dedicated computer lab to do whole class group work we take reading tests, play games, and we can also do Riverdeep and Classworks. We can go to the library and check out iPads for the whole class. There are 30 iPads that are made available for the students and they really love working with them.

As one teacher stated, “If I have a problem with my computers I get a student to come fix it for me. You know, these kids today know all about computers. It’s just a part of their life.”

**Research Question 3**

Research Question 3 asked “What are rural elementary teachers’ perceptions about their own technological knowledge based on demographic variables?” Participants were asked about their own technological skill. Table 25 shows the comparison of technological skill between the study schools, state, and national. The study school data in Table 24 come from the responses to question 7 of the survey, which asked “How skilled do you feel using technology?” (Appendix A). State and national data in Table 25 come from the Alabama IMPACT Report 2010, Alabama Department of Education Technology Report, and the U.S. Department of Education, National Center for Education Statistics.
**Comparative Data**

**Table 25**

*Comparative Data on Teacher Technological Skill*

<table>
<thead>
<tr>
<th></th>
<th>Study Schools</th>
<th>State</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced</td>
<td>48%</td>
<td>29%</td>
<td>33%</td>
</tr>
<tr>
<td>Average</td>
<td>37%</td>
<td>61%</td>
<td>57%</td>
</tr>
<tr>
<td>Beginner</td>
<td>13%</td>
<td>10%</td>
<td>10%</td>
</tr>
</tbody>
</table>

When asked to rate their own technological skill, the rural elementary teacher participants indicated that 48% felt they were advanced users, which is above the state rate of 29% and national rate of 33%. A rating of average user for the study schools was 37%, which is well below the state rate of 61% and lower than the national rate of 57%. The beginner rating for the study schools was slightly higher than both the state and national percentages.

**Survey Data**

Table 26 shows teachers’ perceptions of their own technological knowledge by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 26 come from questions 7, 24, and 25 of the survey instrument (Appendix A).
### Table 26

**Survey Data of Teacher Technological Skill**

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Superior</th>
<th>Good</th>
<th>Adequate</th>
<th>Slightly Adequate</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>7%</td>
<td>27%</td>
<td>19%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>0%</td>
<td>17%</td>
<td>15%</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>Age &gt; 40</td>
<td>n=39</td>
<td>5%</td>
<td>22%</td>
<td>18%</td>
<td>7%</td>
<td>2%</td>
</tr>
<tr>
<td>Age &lt; 40</td>
<td>n=19</td>
<td>3%</td>
<td>22%</td>
<td>18%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>5%</td>
<td>39%</td>
<td>17%</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=25</td>
<td>2%</td>
<td>8%</td>
<td>13%</td>
<td>8%</td>
<td>0%</td>
</tr>
</tbody>
</table>

A z-test was performed to look for differences in variables and significant results were detected in the good column: Experience 1-15 (n=33, z=.39) and Experience over 15 (n=25, z=.08); p=0.0074.

Table 27 shows teachers' perceptions of their own technological knowledge by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 27 come from questions 8, 24, and 25 of the survey instrument (Appendix A).
Table 27

*How Well Prepared Teachers Feel Using Computer Technologies for Teaching Related Needs*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Superior</th>
<th>Good</th>
<th>Adequate</th>
<th>Slightly Adequate</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>10%</td>
<td>26%</td>
<td>15%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>0%</td>
<td>14%</td>
<td>16%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>n=39</td>
<td>3%</td>
<td>24%</td>
<td>19%</td>
<td>12%</td>
<td>0%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>n=19</td>
<td>7%</td>
<td>14%</td>
<td>16%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>8%</td>
<td>24%</td>
<td>24%</td>
<td>8%</td>
<td>0%</td>
</tr>
<tr>
<td>Exp 15+ Yr</td>
<td>n=25</td>
<td>2%</td>
<td>14%</td>
<td>14%</td>
<td>7%</td>
<td>0%</td>
</tr>
</tbody>
</table>

A z-test was performed to look for differences in variables and there were not any significant differences detected.

*Interview Data*

Interview responses for question 6 (Appendix B) “Tell me how confident you feel when using technology” revealed one main theme, confidence with technology. Table 28 indicates the two themes for question 6 (Appendix B). The theme was derived by utilizing NVivo-10 for word repetition and reoccurring topics from the recordings. A cumulative list that includes the number of times the themes emerged is listed in Table 28. This theme reflects the interview participants’ feelings about their own confidence using technology.
Table 28

Theme that Emerged from Interviews for Confidence in Using Technology

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>28</td>
<td>32.0%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>18</td>
<td>33.4%</td>
</tr>
<tr>
<td>Age&lt;40</td>
<td>30</td>
<td>28.2%</td>
</tr>
<tr>
<td>Age&gt;40</td>
<td>16</td>
<td>36.8%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>27</td>
<td>31.6%</td>
</tr>
<tr>
<td>Exp15+ yr</td>
<td>19</td>
<td>33.2%</td>
</tr>
</tbody>
</table>

Theme: Confidence with Technology

An overwhelming number of participants stated they were confident using technology. Many admitted they could use more training but were confident with what they did know. One teacher stated,

I am pretty comfortable with what we have. I have a lot to learn with technology but I am confident with what I do know. I am usually the one the other teachers come to with technology problems. Overall, I am pretty confident.

A teacher at a non-AMSTI school had this to say,

For what I use I feel confident, that is the part that I use I feel confident with. I am sure there are things I could get that I would feel as confident. Like for my iPad there are a lot of Apps that I have downloaded that I use with the ELMO. I have had it several years so I feel very comfortable with that.
Another teacher went on to say,

I feel confident, I mean I know there is more I need to learn about technology but I feel confident.

Most of the participants expressed some reservations or desire to know more but all had a degree of confidence using technology. A teacher over 40 years of age had this to say, “I feel confident in what I have to do in technology. What I do with technology is limited but what I do, I do well.”

**Research Question 4**

Research question 4 asked “What are rural elementary teachers’ perceptions of obstacles to using technology based on demographic variables?” Participants were asked about their perceptions of obstacles to technology use. Table 29 shows the comparison of participants’ perceptions of obstacles to using technology between the study schools, the state, and the nation.

The study school data in Table 29 come from the responses to question 20 of the survey, which asked participants to select obstacles that prevent use of technologies in the classroom (Appendix A). State and national data come from the Alabama IMPACT Report 2010, Alabama Department of Education Technology Report, and the U.S. Department of Education, National Center for Education Statistics.
**Comparative Data**

**Table 29**

*Comparative Data of Teachers’ Perceptions of Obstacles to Using Technology*

<table>
<thead>
<tr>
<th></th>
<th>Study Schools</th>
<th>State</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of Equipment</td>
<td>44%</td>
<td>25%</td>
<td>31%</td>
</tr>
<tr>
<td>Training</td>
<td>8%</td>
<td>7%</td>
<td>9%</td>
</tr>
<tr>
<td>Administration</td>
<td>11%</td>
<td>13%</td>
<td>19%</td>
</tr>
<tr>
<td>Software</td>
<td>14%</td>
<td>9%</td>
<td>13%</td>
</tr>
<tr>
<td>Access</td>
<td>23%</td>
<td>23%</td>
<td>31%</td>
</tr>
</tbody>
</table>

Participants rated lack of equipment as the largest obstacle at 44% and it is well above the state and national ratings. Training, administration, software and access all rated very close to the state and national ratings.

**Survey Data**

Table 30 shows teachers’ perceptions of obstacles to using technology by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 30 come from question 20, 24, and 25 of the survey instrument (Appendix A).
Table 30

Survey Data of Teachers’ Perceptions of Obstacles to Using Technology

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Lack of Equipment</th>
<th>Software</th>
<th>Training</th>
<th>Administration</th>
<th>Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>25%</td>
<td>7%</td>
<td>5%</td>
<td>3%</td>
<td>22%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>16%</td>
<td>3%</td>
<td>6%</td>
<td>0%</td>
<td>10%</td>
</tr>
<tr>
<td>Age &gt; 40</td>
<td>n=39</td>
<td>44%</td>
<td>2%</td>
<td>8%</td>
<td>3%</td>
<td>5%</td>
</tr>
<tr>
<td>Age &lt; 40</td>
<td>n=19</td>
<td>16%</td>
<td>4%</td>
<td>5%</td>
<td>0%</td>
<td>14%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>43%</td>
<td>3%</td>
<td>7%</td>
<td>0%</td>
<td>14%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=25</td>
<td>21%</td>
<td>2%</td>
<td>7%</td>
<td>0%</td>
<td>3%</td>
</tr>
</tbody>
</table>

The data show lack of equipment was the primary obstacle in every group. AMSTI versus Non-AMSTI, age above and below 40 and experience over and under 15 years all show lack of equipment as a primary obstacle. A z-test was performed to look for differences in variables and significant results were detected in the Equipment column: Age >40 (n= 39, z=.44) and Age <40 (n=19, z=.16); p=0.0357.

Interview Data

Interview responses for question 4 (Appendix B) “What do you feel are the obstacles which keep you from using technology in the classroom” revealed two predominant themes, lack of equipment and funding for technology. Table 31 indicates the two themes for question 4 (Appendix B). Themes were derived by utilizing NVivo-10 for word repetition and reoccurring topics from the recordings. A cumulative list that includes the number of times the themes emerged is listed in Table 31. These themes reflect the interview participants’ feelings about obstacles to using technology.
Table 31

Themes that Emerged from Interviews for Obstacles to Using Technology

<table>
<thead>
<tr>
<th>Group</th>
<th>n=46</th>
<th>Lack of Equipment</th>
<th>Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=28</td>
<td>10.3%</td>
<td>4.4%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=18</td>
<td>11.3%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Age&lt;40</td>
<td>n=30</td>
<td>8.8%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Age&gt;40</td>
<td>n=16</td>
<td>12.8%</td>
<td>5.5%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=27</td>
<td>10.3%</td>
<td>5.4%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=19</td>
<td>11.8%</td>
<td>5.7%</td>
</tr>
</tbody>
</table>

Theme 1: Lack of Equipment

Responses from the participants reveal a wide array of obstacles but most mentioned the need for more up to date equipment. As one experienced teacher stated,

Lack of equipment in my classroom makes it hard to have whole group activities. I have computers and 20 students. I can only have whole group activities for short periods of time when we are in the computer lab.

A first year teacher proclaimed,

The books that we use want us to use interactive boards and computers to go along with the lesson but we don’t have interactive boards and few classroom computers.

Many teachers in every group interview had something to say about the need for more equipment and their desire to have more equipment.

Theme 2: Funding for technology

Funding for technology was a concern of many of the interview participants. As a fifth grade teacher proclaimed,
Funding! I would love to have more computers in my classroom. My computers are dinosaurs and from what I hear Microsoft will no longer support the operating system we are current using. We need funding to upgrade our computers and we need new computers. Yes, funding is the biggest obstacle I see.

A teacher from an AMSTI school went on to say,

I need computers. I have only one working computer in my room and it is old. The system needs to find some money to get more computers. We got iPads for all the teachers using a grant maybe we can look for a grant to get computers.

Research Question 5

In an ALSDE 2010 survey, 97% of teachers reported recognizing implementation of technology was extremely important, important, or somewhat important for students to succeed. In that same survey, 61% of teachers indicated the school systems were preparing students for the 21st Century (ALSDE, 2010). In the current study, school survey question 10 revealed 81% of the teachers at the study schools feel the computers’ contribution to their students’ education was good to superior and question 11 revealed 64% of the study schools feel they are preparing their students for the 21st century (Appendix A). These numbers would suggest that teachers accept the importance of technology and use it daily in integrated activities that are student-based.

Research Question 5 asked “To what extent are rural elementary teachers using technology in the classroom based on demographic variables?” Participants were asked to list the technologies students used in their classroom during the school year. Table 32 shows the comparison of technologies being used in the classroom by study schools, the state, and the nation. The study school data in Table 32 come from the responses to question 16 of the survey

**Comparative Data**

**Table 32**

*Comparative Data of Technology Used by Students in the Classroom*

<table>
<thead>
<tr>
<th></th>
<th>Study Schools</th>
<th>State</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Research</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Routinely</td>
<td>22%</td>
<td>29%</td>
<td>64%</td>
</tr>
<tr>
<td>Occasionally</td>
<td>29%</td>
<td>28%</td>
<td>23%</td>
</tr>
<tr>
<td>Never</td>
<td>48%</td>
<td>30%</td>
<td>13%</td>
</tr>
<tr>
<td><strong>Writing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Routinely</td>
<td>8%</td>
<td>24%</td>
<td>61%</td>
</tr>
<tr>
<td>Occasionally</td>
<td>24%</td>
<td>28%</td>
<td>29%</td>
</tr>
<tr>
<td>Never</td>
<td>67%</td>
<td>37%</td>
<td>11%</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Routinely</td>
<td>5%</td>
<td>39%</td>
<td>45%</td>
</tr>
<tr>
<td>Occasionally</td>
<td>8%</td>
<td>27%</td>
<td>21%</td>
</tr>
<tr>
<td>Never</td>
<td>86%</td>
<td>23%</td>
<td>34%</td>
</tr>
<tr>
<td><strong>Instructional Games</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Routinely</td>
<td>82%</td>
<td>48%</td>
<td>50%</td>
</tr>
<tr>
<td>Occasionally</td>
<td>7%</td>
<td>27%</td>
<td>23%</td>
</tr>
<tr>
<td>Never</td>
<td>10%</td>
<td>23%</td>
<td>27%</td>
</tr>
<tr>
<td><strong>Drawing/Graphics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Routinely</td>
<td>12%</td>
<td>8%</td>
<td>53%</td>
</tr>
<tr>
<td>Occasionally</td>
<td>3%</td>
<td>13%</td>
<td>22%</td>
</tr>
<tr>
<td>Never</td>
<td>84%</td>
<td>63%</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Presentation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Routinely</td>
<td>13%</td>
<td>36%</td>
<td>42%</td>
</tr>
<tr>
<td>Occasionally</td>
<td>13%</td>
<td>27%</td>
<td>25%</td>
</tr>
<tr>
<td>Never</td>
<td>71%</td>
<td>23%</td>
<td>33%</td>
</tr>
<tr>
<td><strong>Acquiring Web Info</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Routinely</td>
<td>48%</td>
<td>39%</td>
<td>94%</td>
</tr>
<tr>
<td>Occasionally</td>
<td>12%</td>
<td>27%</td>
<td>5%</td>
</tr>
<tr>
<td>Never</td>
<td>39%</td>
<td>23%</td>
<td>1%</td>
</tr>
</tbody>
</table>
In comparative data the use of instructional games by students was 21% higher than the state and national data. Writing, reference, graphics, and presentation were all very high in the never used category for the study schools. The high percentages in the never used columns are somewhat contrary to the 51% of the participants that answered survey question 14 who feel computers have a major contribution to their students’ education.

Survey Data

Table 33 shows how often students use technology for research by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 33 come from questions 16, 24, and 25 of the survey instrument (Appendix A).

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Occasionally</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>2%</td>
<td>19%</td>
<td>13%</td>
<td>17%</td>
<td>8%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>2%</td>
<td>2%</td>
<td>12%</td>
<td>19%</td>
<td>3%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>n=39</td>
<td>7%</td>
<td>10%</td>
<td>19%</td>
<td>13%</td>
<td>13%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>n=19</td>
<td>0%</td>
<td>12%</td>
<td>12%</td>
<td>19%</td>
<td>2%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>2%</td>
<td>15%</td>
<td>19%</td>
<td>22%</td>
<td>7%</td>
</tr>
<tr>
<td>Exp15+ yr</td>
<td>n=25</td>
<td>2%</td>
<td>5%</td>
<td>6%</td>
<td>14%</td>
<td>5%</td>
</tr>
</tbody>
</table>

The data show that 19% of teachers from AMSTI schools report using technology for research on a weekly basis while only 2% of Non-AMSTI teachers report using it weekly. Eight percent of teachers at AMSTI schools report they never use technology for research while 3% of
teachers at Non-AMSTI schools report never using it for research. Seven percent of teachers over 40 years of age report using technology for research on a daily basis while 0% of teachers under 40 years of age report using technology for research daily. Fifteen percent of teachers with 1-15 years experience report using technology for research on a weekly basis while only 5% of teachers with more than 15 years of experience use it weekly. A z-test was performed to look for differences in variables and there were not any significant differences detected.

Table 34 shows how often students use technology for writing by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 34 come from questions 16, 24, and 25 of the survey instrument (Appendix A).

Table 34

<table>
<thead>
<tr>
<th>How Often Students Use Technology for Writing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
</tr>
<tr>
<td>AMSTI</td>
</tr>
<tr>
<td>Non-AMSTI</td>
</tr>
<tr>
<td>Age &gt;40</td>
</tr>
<tr>
<td>Age &lt;40</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
</tr>
</tbody>
</table>

The data revealed that 17% of AMSTI school teachers used technology for writing monthly while only 8% of Non-AMSTI school teachers used it monthly for writing. Thirty six percent of teachers over 40 years of age reported they never use technology for writing in comparison to 17% of teachers under 40 years of age who reported they never use technology for
writing. Twenty percent of teachers with 1-15 years experience reported they used technology for writing monthly in comparison to only 5% of teachers with over 15 years experience who reported using technology for writing. A \( z \)-test was performed to look for differences in variables and there were not any significant differences detected.

Table 35 shows how often students use technology for reference by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 35 come from questions 16, 24, and 25 of the survey instrument (Appendix A).

Table 35

<table>
<thead>
<tr>
<th>How Often Students Use Technology for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
</tr>
<tr>
<td>AMSTI</td>
</tr>
<tr>
<td>Non-AMSTI</td>
</tr>
<tr>
<td>Age &gt;40</td>
</tr>
<tr>
<td>Age &lt;40</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
</tr>
</tbody>
</table>

The data show that 36% of AMSTI teachers never use technology for reference in comparison to 27% of Non-AMSTI teachers who never use technology for reference. Thirty-seven percent of teachers over 40 reported they never use technology for reference while only 27% of teachers under 40 reported that they never use technology for reference. Thirty-four percent of teachers with 1-15 years of experience reported that they never use technology for reference in comparison to 22% of teachers with over 15 years of experience who reported that
they never use technology for reference. A z-test was performed to look for differences in variables and there were not any significant differences detected.

Table 36 shows how often students use technology for educational games by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 36 come from questions 16, 24, and 25 of the survey instrument (Appendix A).

Table 36

<table>
<thead>
<tr>
<th>How Often Students Use Technology for Educational Games</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
</tr>
<tr>
<td>AMSTI</td>
</tr>
<tr>
<td>Non-AMSTI</td>
</tr>
<tr>
<td>Age &gt;40</td>
</tr>
<tr>
<td>Age &lt;40</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
</tr>
<tr>
<td>Exp 15 + yr</td>
</tr>
</tbody>
</table>

The data revealed that 17% of AMSTI teachers reported using instructional games daily while only 14% of non-AMSTI teachers reported using instructional games daily. Forty-one percent of teachers over 40 years of age reported using instructional games weekly while only 25% of teachers under 40 years of age reported using instructional games weekly. Forty-three percent of teachers with less than 15 years of experience reported using instructional games weekly while only 15% of teachers with over 15 years of experience reported using instructional games weekly. A z-test was performed to look for differences in variables and significant results.
were detected in the weekly column: Experience 1-15 \((n=33, z=.43)\) and Experience over 15 \((n=25, z=.15); p=0.0223\).

Table 37 shows how often students use technology for drawing by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 37 come from questions 16, 24, and 25 of the survey instrument (Appendix A).

**Table 37**

*How Often Students Use Technology for Drawing*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Occasionally</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>3%</td>
<td>7%</td>
<td>2%</td>
<td>19%</td>
<td>31%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>0%</td>
<td>3%</td>
<td>2%</td>
<td>3%</td>
<td>22%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>n=39</td>
<td>2%</td>
<td>2%</td>
<td>0%</td>
<td>5%</td>
<td>48%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>n=19</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>14%</td>
<td>32%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>0%</td>
<td>5%</td>
<td>5%</td>
<td>19%</td>
<td>37%</td>
</tr>
<tr>
<td>Exp over 15 yr</td>
<td>n=25</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
<td>2%</td>
<td>27%</td>
</tr>
</tbody>
</table>

The data show that 19% of AMSTI teachers occasionally use technology for drawing while only 3% of non-AMSTI teachers use technology for drawing. Forty-eight percent of teachers over 40 years of age reported that they never use technology for drawing while 32% of teachers under 40 years of age reported that they never use technology for drawing. Nineteen percent of teachers with 1-15 years of experience reported that they occasionally use technology for drawing while only 2% of teachers with over 15 years of experience reported that they occasionally use technology for drawing. A \(z\)-test was performed to look for differences in
variables and significant results were detected in the occasionally column: Experience 1-15 \( (n=33, z=.19) \) and Experience over 15 \( (n=25, z=.02); p=0.0458. \)

Table 38 shows how often students use technology for presentation by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 38 come from questions 16, 24, and 25 of the survey instrument (Appendix A).

**Table 38**

*How Often Students Use Technology for Presentation*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Occasionally</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>35</td>
<td>6%</td>
<td>0%</td>
<td>10%</td>
<td>12%</td>
<td>22%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>23</td>
<td>0%</td>
<td>5%</td>
<td>5%</td>
<td>8%</td>
<td>18%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>39</td>
<td>5%</td>
<td>2%</td>
<td>5%</td>
<td>4%</td>
<td>41%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>19</td>
<td>0%</td>
<td>2%</td>
<td>8%</td>
<td>15%</td>
<td>17%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>33</td>
<td>2%</td>
<td>5%</td>
<td>8%</td>
<td>14%</td>
<td>33%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>25</td>
<td>5%</td>
<td>2%</td>
<td>0%</td>
<td>3%</td>
<td>22%</td>
</tr>
</tbody>
</table>

The data revealed that 22% of AMSTI teachers never use technology for presentation while only 18% of non-AMSTI teachers reported that they never use technology for presentation. Forty-one percent of teachers over 40 years of age reported that they never use technology for presentation while only 17% of teachers less than 40 years of age reported that they never use technology for presentation. Thirty-three percent of teachers with 1-15 years of experience reported that they never use technology for presentation while only 22% of teachers with over 15 years of experience. A z-test was performed to look for differences in variables and there were not any significant differences detected.
Table 39 shows how often students use technology for acquiring the web by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years. Data for Table 39 come from questions 16, 24, and 25 of the survey instrument (Appendix A).

**Table 39**

*How Often Students Use Technology for Acquiring the Web*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=58</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Occasionally</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=35</td>
<td>15%</td>
<td>19%</td>
<td>8%</td>
<td>12%</td>
<td>5%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=23</td>
<td>5%</td>
<td>10%</td>
<td>3%</td>
<td>12%</td>
<td>5%</td>
</tr>
<tr>
<td>Age &gt;40</td>
<td>n=39</td>
<td>13%</td>
<td>13%</td>
<td>8%</td>
<td>13%</td>
<td>13%</td>
</tr>
<tr>
<td>Age &lt;40</td>
<td>n=19</td>
<td>5%</td>
<td>20%</td>
<td>5%</td>
<td>8%</td>
<td>0%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=33</td>
<td>12%</td>
<td>22%</td>
<td>7%</td>
<td>14%</td>
<td>10%</td>
</tr>
<tr>
<td>Exp 15+ yr</td>
<td>n=25</td>
<td>8%</td>
<td>3%</td>
<td>5%</td>
<td>12%</td>
<td>0%</td>
</tr>
</tbody>
</table>

AMSTI, Age over 40, and Experience 1-15 years show a usage of 15%, 13%, and 12%, respectively, for daily use of acquiring the web. AMSTI, Age less than 40 and Experience 1-15 years show a weekly usage of 19%, 20%, and 22%, respectively. A z-test was performed to look for differences in variables and significant results were detected in the weekly column:

Experience 1-15 ($n=33$, $z=.22$) and Experience over 15 ($n=25$, $z=.03$); $p=0.0378$.

Data for survey question 19 can be found in Table 23. Table 23 shows how often students use technology per week by AMSTI schools compared to non-AMSTI schools, teachers age greater than 40 compared to teachers age less than 40, and teaching experience 1-15 years compared to teaching experience over 15 years.
**Interview Data**

Interview responses for Interview Question 1 (Appendix B) “Could you tell me as much as possible how you use technology in the classroom revealed one predominant theme, various computer activities. Table 40 indicates the theme for Interview Question 1 (Appendix B). This theme was derived by utilizing NVivo-10 for word repetition and reoccurring topics from the recordings. A cumulative list that includes the number of times the theme emerged is listed in Table 40.

**Table 40**

*Theme that Emerged from Interviews for Technology Use in the Classroom*

<table>
<thead>
<tr>
<th>Group</th>
<th>n=46</th>
<th>Computer Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMSTI</td>
<td>n=28</td>
<td>11.6%</td>
</tr>
<tr>
<td>Non-AMSTI</td>
<td>n=18</td>
<td>12.3%</td>
</tr>
<tr>
<td>Age&lt;40</td>
<td>n=30</td>
<td>10.3%</td>
</tr>
<tr>
<td>Age&gt;40</td>
<td>n=16</td>
<td>13.6%</td>
</tr>
<tr>
<td>Exp 1-15 yr</td>
<td>n=27</td>
<td>12.3%</td>
</tr>
<tr>
<td>Exp15+ yr</td>
<td>n=19</td>
<td>11.6%</td>
</tr>
</tbody>
</table>

*Theme: Computer Activities*

Interview participants revealed that all were using technology in the classroom in some way but the use of testing was cited by a majority of the participants. A third grade teacher stated,

In the classroom I use the computers for Alabama Reading testing, Star testing, and the daily five. We also use the computer for research to help prepare for our weekly reading
test. The students are divided into groups for their research that way each group can use the limited number of classroom computers.

One second grade teacher commented,

We utilize a lot of computer programs at this school for math, remediation, and accelerated programs. We have multiple reading programs and we are able to utilize many websites such as Kahn Academy, Riverdeep, and Classworks.

A fifth grade teacher remarked,

I send my students to the computer room every week to use the math program and we have other programs we can get from the library. We have iPads in the library that we can get to use with the students and they have some really good programs on them. I also have the students use the classroom computers as much as possible to play educational games.
CHAPTER 5

DISCUSSION, IMPLICATIONS, CONCLUSION AND RECOMMENDATIONS

Introduction

The purpose of this study was to discover rural elementary teachers’ perceptions of technology use in the classroom and to what extent elementary teachers use technology. This was a mixed methods study that used survey and focus groups. Chapter 4 presented the results from the data collection phase of the study. This chapter will discuss those results as related to the research questions.

Discussion

Research Question 1

What are rural elementary teachers’ perceptions about technology professional development based on demographic variables?

Comparing the survey data on time since the last technology professional development attended (Table 3), 78% of the study schools’ teachers had attended technology professional development within the last 12 months in comparison to the state (37%) and national (37%). This was much higher than Sawchuck’s (2010) findings of 24% growth in technology professional development. Survey data (Table 4) show teachers under 40 and teachers with less than 15 years of experience attend professional development classes more often than teachers that are over 40 or teachers with over 15 years of experience. Kent and McNergney (1999) found that less than 15% of teachers received nine hours or more professional development in technology training a year.
Teachers with less than 15 years of experience generally have a technology background in school and in the colleges of education they attended. Teachers over 40 do not have the technology base that younger teachers possess and avoid technology. Prensky (2001) called these individuals digital immigrants because they were not familiarized with technology at an early age. These digital immigrants tend to oppose technology and are less familiar with the advantages it offers (Schock, 2011). Interview data revealed two themes, value of professional development, and additional training. Teachers understand the need for professional development and how it can affect their success. A non-AMSTI school teacher said,

I think professional development is great especially for people like me where technology doesn’t come naturally. I need these learning opportunities because I am totally lost when it comes to technology. I have attended workshops on iPads and other things and I caught on pretty fast but I can use more. I think professional development is good for non-Tech people like me.

Teachers need professional development especially in effectively integrating technology (Wohleb, 2011). Another teacher remarked,

I feel teachers definitely need to be trained in technology. I would love to go for training but there is little opportunity for me at this time. The students need to be taught in a way they will be seeing in the real world. I personally feel technology training is a good thing.

Interview data indicated a majority of every group felt that technology professional development is a valuable tool at their disposal and additional training is required in order to become proficient with technology. This is in line with Wohled’s (2011) findings that teachers need professional development especially in effectively integrating technology.
The combination of comparative data, survey data and interview data for Research Question 1 shows rural elementary teachers at AMSTI schools favor professional development more than non-AMSTI schools. This finding is consistent with AMSTI’s professional development and mentoring programs for teachers fact sheet and Kumar (2008) who found experience with technology has an effect on attitudes toward technology. Rural elementary teachers under 40 years of age favor professional development more than rural elementary teachers over 40 years old. This is in line with Jennings and Onwuegbuzie’s (2001) findings that younger teachers have a more positive attitude toward technology and Sang (2009) who discovered age has a significant effect on attitudes toward technology. Rural elementary teachers with less than 15 years of experience favor professional development in technology more than teachers with more than 15 years of experience. This is in agreement with Howard (2011) who found teachers with 11-30 years of classroom experience were less likely to use technology and Kumar (2008) who found prior experience with technology had an effect on teacher attitudes.

Research Question 2

What are rural elementary teachers’ perceptions of technology integration into the classroom based on demographic variables?

More teachers (44%) in the study schools indicated that computers in their schools are superior compared to the state (35%) and nation (33%). Teachers at AMSTI schools, teachers under age 40, and teachers with less than 15 years of experience perceive the number of computers was superior by 15%, 12%, and 12% respectively. The same groups indicated the number of computers in the school was good by 20%, 15% and 12% respectively. This could be due to AMSTI teachers, teachers under 40 years of age and teachers with 1-15 years of
experience having been trained to use computers. This is consistent with Britt’s (1998) study that discovered teacher perceptions of successful classroom technology were influenced by their own ability or inability to use the technology.

Teachers at AMSTI schools, teachers under the age of 40, and teachers with less than 15 years of experience were more positive than the other groups about the school’s software. Results showed that teachers at AMSTI schools (26%) rated the provided computer hardware as good in contrast to 3% of teachers at Non-AMSTI schools. Data also revealed 22% of teachers with less than 15 years of experience rated the computer hardware as adequate in contrast to 8% of teachers with over 15 years of experience. The data revealed that 31% of the teachers at AMSTI schools rated the school’s internet as good while 30% of the teachers at Non-AMSTI schools rated the internet connection poor. Data also show that 22% of teachers under 40 rated the school’s internet connection as good while 20% of the teachers over 40 rated the internet as poor. Data showed that 24% of teachers with 1-15 years experience rated the internet connection as good while 20% of teachers with over 15 years rated the internet connection as poor. This could be due to the training AMSTI teachers, teachers under 40 years of age and teachers with 1-15 years of experience have completed and the confidence that comes with understanding how to use technology. Howley (2011) found teacher perceptions have a great influence on their attitudes about teaching and technology.

Results show that more teachers at AMSTI schools rate the school’s provided technology resources as good than teachers at Non-AMSTI schools. Results also revealed more teachers under 40 rate the school’s provided technology as good than teachers over 40. It was found that more teachers with less than 15 years of experience rate the school’s provided technology as good than teachers with over 15 years of experience. This can be due to technology training,
AMSTI teachers attending summer technology training, that most teachers under 40 years of age were trained in technology since elementary school, and teachers with 1-15 years of experience having been trained at their colleges of education to use the different types of technology. Training on how to use technology builds confidence and changes perceptions about technology (Lawless & Pellegrion, 2007). Howley (2011) found teacher perceptions have a great influence on their attitudes about teaching and technology.

The results show that AMSTI teachers use technology for research more on a weekly basis than Non-AMSTI teachers. Participants over 40 used technology for research more on a daily basis than participants under 40. More participants with 1-15 years experience than participants with over 15 years experience used technology on a weekly and monthly basis. This can be due to AMSTI teachers, teachers under 40 years of age, and teachers with 1-15 years of experience having been trained to use the different types of technology. Training on how to use technology builds confidence and changes perceptions about technology (Lawless & Pellegrion, 2007).

The results revealed more AMSTI school teachers used technology for writing monthly than Non-AMSTI school teachers. Participants over age 40 never used technology for writing to a greater degree than participants under age 40. Participants with 1-15 years experience used technology for writing monthly more than participants with over 15 years experience. This could be due to the survey population including kindergarten, first and second grade teachers whose students are just learning how to write.

Results show more of the AMSTI teachers never use reference CD ROMs than Non-AMSTI teachers. More teachers over 40 years of age never use reference CD ROMs than teachers under 40 years of age. More teachers with 1-15 years of experience never use reference
CD ROMs than teachers with over 15 years of experience. This could be a result of streaming video from the internet which reduced the need for CD ROMs.

The results revealed both AMSTI and Non-AMSTI schools use instructional games daily, 17% and 14% respectively. Teachers over 40 years of age use instructional games more on a weekly basis than the teachers less than 40 years of age. Teachers with less than 15 years of experience use instructional games more weekly than those with over 15 years of service. This is could be due to the easy access of instructional programs which are provided by the schools. Britt (1998) found teachers use drill and practice software as the most important technology tool in the classroom.

The results show AMSTI teachers occasionally use drawing technology more than Non-AMSTI teachers. Teachers age less than 40 occasionally use drawing technology more than teachers of age greater than 40. Participants with 1-15 years experience occasionally use drawing technology more than participants with over 15 years of experience. This could be a result of lack of equipment in the schools. Teachers in the study schools have an average of 18 students and two computers in their classrooms. Rural elementary teachers especially believe they have inadequate access to equipment (Howley et al., 2011).

For each group surveyed the majority of teachers in each group never use technology for presentation with the next highest being occasionally. AMSTI teachers use technology for acquiring the web daily more than Non-AMSTI teachers. Teachers less than 40 years of age use technology for acquiring the web daily more than teachers over 40 years of age. Teachers with 1-15 years of experience use technology for acquiring the web daily more than teachers with over 15 years of experience. This could be due to AMSTI teachers, teachers under 40 years of age and teachers with 1-15 years of experience having been trained to use computers. This is
consistent with Britt’s (1998) study that discovered teacher perceptions of successful classroom technology were influenced by their own ability or inability to use the technology.

AMSTI school participants use technology to teach language arts more times per week than non-AMSTI school participants. Teachers with 1-15 years of experience use technology to teach language arts more times per week than teachers with over 15 years of experience. AMSTI school participants use technology to teach math more times per week than non-AMSTI school participants. Participants with 1-15 years of experience use technology to teach math more times per week than participants with over 15 years experience. This could be due to AMSTI teachers, teachers under 40 years of age and teachers with 1-15 years of experience having been trained to use computers. This is consistent with Britt’s (1998) study that discovered teacher perceptions of successful classroom technology were influenced by their own ability or inability to use the technology.

AMSTI school teachers use technology to teach social studies more times per week than non-AMSTI school teachers. Teachers less than 40 years of age use technology to teach social studies more per week than teachers over 40 years old. Teachers with 1-15 years of experience use technology to teach social studies more per week than teachers with over 15 years of experience. This could be due to AMSTI teachers, teachers under 40 years of age and teachers with 1-15 years of experience having been trained to use computers. This is consistent with Britt’s (1998) study that discovered teacher perceptions of successful classroom technology were influenced by their own ability or inability to use the technology.

Teachers at AMSTI schools use technology more times per week than teachers at non-AMSTI schools. Teachers over 40 years of age use technology to teach science more per week than teachers under 40 years of age. Teachers with 1-15 years experience use technology to teach
more per week than teachers with over 15 years of experience. This could be due to AMSTI teachers, teachers under 40 years of age and teachers with 1-15 years of experience having been trained to use computers. This is consistent with Britt’s (1998) study that discovered teacher perceptions of successful classroom technology were influenced by their own ability or inability to use the technology.

Interview data show two themes, available programs and computer access. Interview responses revealed the participants were aware of the computer programs that were made available by the school system. Almost all participants mentioned the computer programs Riverdeep and Classworks in the interviews. As a kindergarten teacher stated,

We have Classworks, which does math and language arts and we have Riverdeep which does math. I recently got the opportunity to observe a new program that will be introduced as part of ACCESS and it looks wonderful. We have many different programs in the library and the teachers have a pool of programs we share.

It is the belief that the technology is working for the students that causes teachers to repeat types of integration in other lessons (Cavanaugh, 2009).

Interview responses revealed the participants were aware of the school system’s numerous computer programs that were made available for teachers. Almost all participants mentioned the computer programs Riverdeep and Classworks in the interviews. Most of the participants felt the computer programs Riverdeep and Classworks were good for the students.

The combination of comparative data, survey data and interview data for research question 2 indicates rural elementary teachers at AMSTI schools, rural elementary teachers under 40 years of age, and rural elementary teachers with less than 15 years of experience perceive technology more favorably than rural elementary teachers at Non-AMSTI schools, rural
elementary teachers over 40 years of age, and rural elementary teachers with more than 15 years of experience. A majority of rural elementary teachers at AMSTI schools, rural elementary teachers under 40 years of age, and rural elementary teachers with less than 15 years of experience felt the provided technology for the students, software, hardware, internet connection, and provided technology for the teachers were adequate to superior. These findings are in agreement with Becker’s (2000) statement that teaching philosophy is the most difficult thing to overcome when integrating technology.

Research Question 3

What are rural elementary teachers’ perceptions about their own technological knowledge based on demographic variables?

Comparative data show that 48% of the study schools’ teachers considered themselves as “advanced” in their own technological knowledge. This was much higher than the state (29%) and national (33%) ratings. A rating of “average” user for the study schools was 37% which is well below the 61% state rate and lower than the national rate of 57%. The “beginner” rating for the study schools was slightly higher than both the state and national percentages. The survey shows teachers at AMSTI schools rate their own technological skills higher than teachers at Non-AMSTI schools. The survey revealed teachers with less than 15 years of experience rate their own technology skills higher than teachers with over 15 years of experience.

Interview data show one theme, confidence with technology. One teacher stated, “I am pretty comfortable with what we have. I have a lot to learn with technology but I am confident with what I do know. I am usually the one the other teachers come to with technology problems. Overall, I am pretty confident.”
The interview data revealed most of the participants expressed some reservations or desire to know more but all had a high degree of confidence using technology. A teacher over 40 years of age had this to say, “I feel confident in what I have to do in technology. What I do with technology is limited but what I do, I do well.” This is in line with Wohled’s (2011) findings that teachers perceive themselves as less than moderately competent with educational software but moderately competent with educational hardware.

The combination of comparative data, survey data and interview data for research question 3 revealed rural elementary teachers at AMSTI schools, rural elementary teachers under 40 years of age, and rural elementary teachers with 1-15 years of experience had a better perception of their own technology skills. These findings are consistent with AMSTI’s Fact Sheet (2013) which asserts that teachers who are AMSTI trained have a deeper understanding and knowledge. These findings are also supported by Jennings and Onwuegbuzie (2001) who found younger teachers have a more positive attitude toward technology and Prensky (2001) who discovered teachers’ use of technology at early life stages has a positive effect on their attitudes toward technology. The data also revealed the entire school system’s teachers have a better opinion of their own technology skills when compared to the state and nation. This is consistent with Purcell, Heaps, Buchanan, and Fredrich (2013) who found that teachers under 35 were very confident with digital technology.

**Research Question 4**

What are rural elementary teachers’ perceptions of obstacles to using technology based on demographic variables?

Comparative data show lack of equipment as the largest obstacle at 44% and that was well above the state (25%) and national (31%) ratings. Training, administration, software and
access all rated very close to the state and national ratings. The survey data show lack of equipment was the primary obstacle in every group. AMSTI versus Non-AMSTI, age above and below 40 and experience over and under 15 years all show lack of equipment as a primary obstacle.

Interview data revealed two themes, lack of equipment and funding for technology. Interview data from the participants reveal a wide array of obstacles but as one experienced teacher stated, “Lack of equipment in my classroom makes it hard to have whole group activities. I have two computers and 20 students. I can only have whole group computer activities for short periods of time when we are in the computer lab.”

The combination of comparative data, survey data and interview data for research question 4 shows lack of equipment is the largest obstacle that prevents rural elementary teachers from using technology. Lack of funding was the second highest obstacle and it was also selected group wide. These findings are consistent with Endfinger (2009) who found insufficient equipment was the main barrier to using technology by elementary teachers. Funding was the fourth obstacle behind professional development and time in the Endfinger (2009) study. Fowler (2007) listed lack of hardware and software as first order barriers that are tied closely to funding. Becker (2000) identified time, access, curriculum coverage and technological skill as barriers to using technology.

Many interview participants from every group expressed a need to get more equipment and most mentioned additional resources were needed. For teachers, the reality is limited funding, lack of training, nonexistent equipment, and insufficient time in the curriculum to incorporate technology (Howley et al., 2011). Sanchez (2011) echoed these findings but did not account for teacher perceptions.
Research Question 5

To what extent are rural elementary teachers using technology in the classroom based on demographic variables?

In comparative data, instructional games were routinely used 82% by the study schools’ teachers while the state data and national percentages were 48% and 50% respectively. Each group used technology for writing, drawing, and presentation much less than the state and nation.

The results show that AMSTI teachers reported using technology for research more weekly than Non-AMSTI teachers. Participants over 40 years of age reported using technology for research more daily than participants under 40 years of age. Teachers with 1-15 years experience reported using technology for research more weekly than participants with over 15 years experience. This can be due to AMSTI teachers, teachers under 40 years of age, and teachers with 1-15 years of experience having been trained to use the different types of technology. Training on how to use technology builds confidence and changes perceptions about technology (Lawless & Pellegrion, 2007).

The results revealed more AMSTI school teachers reported using technology for writing monthly than Non-AMSTI school teachers. Teachers with 1-15 years experience reported using technology for writing monthly more than teachers with over 15 years experience. This could be due to the survey population including kindergarten, first, and second grade teachers whose students cannot write or are just learning how to write.

Results show more of the AMSTI teachers reported never using reference CD ROMs than Non-AMSTI teachers. More teachers over 40 years of age reported never using reference CD ROMs than teachers under 40 years of age. More teachers with 1-15 years of experience
reported never using reference CD ROMs than teachers with over 15 years of experience. This could be a result of streaming video from the internet and how CD ROMs are easily damaged.

The results revealed both AMSTI and Non-AMSTI schools use instructional games daily, 17% and 14% respectively. Teachers over 40 years of age use instructional games more on a weekly basis than teachers less than 40 years of age. Teachers with less than 15 years of experience use instructional games more weekly than those with over 15 years of experience. This could be due to the easy access of instructional programs which are provided by the schools. Britt (1998) found teachers use drill and practice software as the most important technology tool in the classroom.

The results show AMSTI teachers occasionally use drawing technology more than Non-AMSTI teachers. Teachers of age less than 40 occasionally use drawing technology more than teachers of age greater than 40. Participants with 1-15 years experience occasionally use drawing technology more than participants with over 15 years of experience. This could be a result of lack of equipment in the schools. Teachers in the study schools have an average of 18 students and two computers in their classrooms. Rural elementary teachers especially believe they have inadequate access to equipment (Howley et al., 2011).

For each group surveyed the majority of teachers in each group never use technology for presentation with the next highest being occasionally. AMSTI teachers use technology for acquiring the web daily more than Non-AMSTI teachers. Teachers less than 40 years of age use technology for acquiring the web daily more than teacher over 40 years of age. Teachers with 1-15 years of experience use technology for acquiring the web daily more than teachers with over 15 years of experience. This could be due to AMSTI teachers, teachers under 40 years of age and teachers with 1-15 years of experience having been trained to use computers. This is
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Interview data revealed one theme for research question 5, computer activities. The participants had a variety of answers to research question 5 but most involved the use of the computer. As fifth grade teacher commented,

I send my students to the computer room every week to use the math program and we have other programs we can get from the library. We have iPads in the library that we can get to use with the students and they have some really good programs on them. I also have the students use the classroom computers as much as possible to play educational games.

Interview data revealed many teachers at the study schools view computers as a drill and practice instrument. As a teacher said, “We utilize a lot of computer programs at this school for math, remediation, and accelerated programs. We have multiple reading programs and we are able to utilize many websites such as Kahn Academy, Riverdeep, and Classworks.” These programs were mentioned in many of the interview responses and it only reinforces Britt’s (1999) findings that drill/practice software rated 93% and topped all other uses for the classroom computer.

The combination of comparative data, survey data and interview data for research question 5 indicates that technology is used for writing, reference, drawing, and presentation only occasionally or never by all groups. This abundance of never using technology can be
explained by Becker (2001) as lack of expertise with computer technology. This study found 77% of the teachers never or occasionally assign students research activities using technology. This is higher than the ALSDE (2011) survey that found 58% of teachers occasionally or never use research activities using technology. AMSTI school teachers assign research activities using technology more often weekly than Non-AMSTI teachers. Teachers under 40 years of age use research activities using technology more often daily than teacher over 40 years of age. Teachers with less than 15 years of experience use research activities using technology more often weekly than teachers with over 15 years of experience.

This study discovered 91% of teachers occasionally or never use writing technology. This is higher than the ALSDE (2011) survey that found 65% of teachers occasionally or never use writing technology. AMSTI schools teachers use writing technology more often weekly than Non-AMSTI teachers. Teachers less than 40 use writing technology more often weekly than teachers over 40 years of age. Teachers with fewer than 15 years of experience use writing technology more often weekly than teachers with more than 15 years of experience. This finding can be supported by Howard (2011) who discovered teachers with 11-30 years experience were less likely to integrate technology.

This study found 94% of teachers occasionally or never use reference CD ROMs. This is much higher than the ALSDE (2011) survey that found 50% of teachers occasionally or never assign reference CD ROMs.

Routinely assigning presentation with technology was less that the ALSDE (2011) survey. Daily, weekly, and monthly presentation with technology for AMSTI was more than non-AMSTI. Daily presentation with technology for teachers over 40 years of age was more than teachers under 40 years old. Weekly and monthly presentation with technology for teachers
with 1-15 years of experience was used more often than teachers with over 15 years of experience. Routinely acquiring the web was used more than the ALSDE (2011) survey. Daily, weekly, and monthly acquiring the web for AMSTI teachers was used more often than Non-AMSTI. Daily, weekly, and monthly acquiring the web for teachers over 40 and under 40 showed no difference. Daily, weekly, and monthly acquiring the web for teachers with 1-15 years of experience was used more often than teachers with over 15 years experience. This finding can be supported by Howard (2011) who discovered teachers with 11-30 years experience were less likely to integrate technology. Use of educational games 82% is much higher than the ALSDE (2011) 48% but this can be explained due to the required computer math games all students attend weekly and by Britt’s (1998) findings that 93.7 % of teachers use drill and practice software as the most important technology tool in the classroom.

Teacher beliefs are the most complicated psychological construct of teacher education (Prinrich, 1990). It is the foundation of beliefs on which teachers form their attitudes about schools, students, teaching, and learning (Pajares, 1992). Pajares ( p. 207), goes on to say, "beliefs cannot be directly observed or measured but must be inferred from what people say, intend, and do - fundamental prerequisites that educational researchers have seldom followed.” Unfortunately teacher beliefs on education vary widely and are difficult to define.

Teacher beliefs were used as the framework of this study because they are related to how teachers teach and how they will integrate technology (Norton, McRobbins & Cooper, 2000). Since world experiences are different each teacher has his or her own set of beliefs about teaching and learning. Some of the teacher beliefs focused on in this study occur from early experiences in their lives, through training, and others are formed through trial and error. In this study AMSTI teachers, teachers less than 40 years of age, and teachers with 1-15 years of
experience have technology training or early life experiences in using technology and their perceptions were more positive about technology.

**Implications**

The first implication of this study is that pre-service teachers should be given much more extensive training in technology integration. Although the study showed that teachers younger than 40 years of age and with less than fifteen years in the classroom used technology more, it was clear that the technologies used continued to be low level in too many cases. Students were not being engaged with meaningful and authentic uses of technology in doing their tasks each day. It is then recommended that pre-service teachers be taught technology use in every course of their teacher preparation. This technology should be threaded throughout every aspect of teacher training, so that the pre-service teachers have been treated with the same type model of technology that they should be using when teaching.

Another important implication of the results from this study show that if a rural student is in a Non-AMSTI school or with a teacher that has more than 15 years of experience or the teacher is over 40 years old, the student will likely have limited technology use in their classroom. This is a major problem for students who find themselves in these schools, since this study also shows that the technology gap is a widening problem for the same set of students. It is possible that the widening technology gap for children without access will cause an entire generation of students who are consistently behind in their chosen careers and throughout life.

With this in mind, the training of teachers to use technology has become imperative for the future of the 21st century worker. Educating the next generation to flourish in the 21st century has become one of the most pressing issues teachers have to face (ALSDE, 2010). The use of the AMSTI model in Alabama has been proven to be a very effective tool for training teachers in
the use of technology, yet there are many schools that do not elect to use the process. Bright (2010) discovered AMSTI teachers are trained to integrate technology into their instruction but not all schools are required to be an AMSTI school. One of the possible changes that could be made is for AMSTI to be required by all Alabama schools. The state could require every school to be an AMSTI school and provide funding for this professional development that is effective. Teachers need professional development especially in effectively integrating technology (Wohleb, 2011). Kelly (2007) states professional development must be from 3 to 5 days to be effective. The cost of professional development should exceed the cost of the technology that is being used (Goedde, 2014) and the provided equipment must be up to date. Without a change in the way technology is addressed by the school systems and the state there could be generations of workers unprepared for the 21st century.

At this writing, the teachers and administrators in each school must vote to adopt AMSTI and the vote must be at 80% or more. In other words, at least 80% of the staff of each school must be willing and dedicated to making it work, and to using it on a daily basis (ALSDE, 2014). This has been a key point of adoption and is most likely a key point of the success of AMSTI. A change in this decision by the staff to use the process (AMSTI specialists do not call it a program, for them it is a process) may affect the success of its use in a school. Caution should be used in changing this component of AMSTI. One possibility is bringing teachers to the schools that use AMSTI for day-long visits and one-on-one discussions and observations of the process; this might help teachers in the non-AMSTI schools better understand how well the other AMSTI schools are doing. This might be a possible means of increasing buy-in by staff members that have been reluctant to move toward the AMSTI model.
The implications of this study do rely heavily on what was learned in the study about the effectiveness of AMSTI schools versus Non-AMSTI schools. This was not planned, but was an outcome of the study. The training that AMSTI conducts for teachers to be certified in math and science teaching is covered in two week sessions during two summers (ALSDE-AMSTI, 2014). It is possible teachers do not vote to adopt because they do not wish to lose their summer hours away from school. Each AMSTI certified teacher receives 120 hours of grade specific training in teaching math and science, and using technology (AMSTI, 2014). Other than the problem of teachers and administrators in particular schools opting out of using AMSTI, there has also been a slow-down in adoption of the process because of a lack of State funding (AMSTI, 2014).

The training is not being offered at the present time to new schools, unless the school itself is willing to pay for the training and first kits (ALSDE-AMSTI, 2014). Each AMSTI site cannot afford to take on more schools until the legislature grants more money to the project, and now, according to the school budget, a very large fee is charged for a school to begin. This is due to a decrease in the tax base since 2008, and a flat budget for AMSTI (AMSTI, 2014). Schools that vote to adopt and cannot pay are being put on a waiting list, to be added when funds permit. These conditions could mean the State of Alabama is failing its children by not using tax funds wisely.

A related implication of the study is that teachers, administrators, and the state must be held responsible for educating their students to succeed in the 21st century, whether they use AMSTI or not. Teachers should be required to have technology professional development courses that are meaningful and immediately useful, in order to maintain their teaching certificate. This is another way the AMSTI process, or any other process that helps students use technology, could be encouraged for adoption by schools. The AMSTI option is being
encouraged by this study simply because it is an Alabama schools study and AMSTI is the adopted process for the State. It is my recommendation that technology always be present in every professional development plan of teachers in Alabama, and that individual support is always given to ensure methods learned are implemented successful in each classroom.

Another very important implication is that there must be a wholesale culture of change continuously occurring within each school and that the idea of technology use be foremost in the minds of school staff. This must be done before another generation of students steps out into the world unprepared to take their place in the 21st century. Teachers can no longer dismiss technology as unworthy of their classroom time when it is the students that will pay in loss of wages and advancement in careers. In this culture change teachers must be allowed to try new practices and experiment with technology (Smoekh, 2008). Teachers must be taught how to teach with technology in a meaningful way (Atkins & Vasu, 2000), and some component of how to accept the constant “through-put” of usefulness must be a part of the training. Administrators must oversee that real and meaningful technology training is being conducted for all teachers and the state must follow up on the administrators. Vontz and Lemming (2006) deemed professional development a crucial part of a teacher’s development and success, but as mentioned earlier, this professional development must be meaningful and have follow-up support in one-on-one sessions in the teacher’s classrooms.

Conclusions

The focus of this study is on technology and how it is perceived by rural elementary teachers. When compared to state and national findings the study schools often had higher ratings on technology integration, technology used, and frequency of use. The survey and interviews revealed AMSTI, age less than 40, and experience 1-15 year participants often rated
higher on technology integration, technology used, and frequency of use than Non-AMSTI, age over 40, and experience 15 plus years.

AMSTI requires teachers to become certified with grade level technology and conducts training sessions during the summer for teachers. The training in how to use the available technology adds confidence to AMSTI teachers. Harris (2007) was able to show teachers were exemplary after receiving the week long AMSTI professional development. The week long summer training sessions given by AMSTI fall within the area defined by Kelly (2007) as worthwhile and effective. Through training AMSTI has dispelled many of beliefs about technology and changed the perceptions of the participants. The AMSTI (2013) fact sheet states trained teachers have a greater understanding and knowledge. Gros (2013) discovered teachers’ perceptions of usefulness and perceived ease of use were the deciding factors for using technology in the classroom. The training, support, and mentoring of these teachers is most important for a school to add an effective technology integration program (Alabama Department of Education, 2013).

Teachers under the age of 40 have grown up in the computer age and have been trained in technology since elementary school. These teachers benefited from the Telecommunications Act passed in 1996 which gave discounts to schools to buy computers and other technologies (Endfinger, 2009). Integrating technology into the classroom is difficult and this is especially true for teachers who graduated before the advent of the technology revolution and do not know the language of technology (Goldin & Katz, 2008). Kumar (2008) and Sang (2009) advocate teacher age, motivation, and training influence technology use in the classroom. These findings are also supported by Jennings and Onwuegbuzie (2001) who found younger teachers have a more positive attitude toward technology and Prensky (2001) who discovered that use of
technology at early life stages by teachers has a positive effect on their attitudes toward technology.

Teachers with less than 15 years of experience have been trained by colleges of education on how to use classroom technology. ISTE published its National Educational Technology Standards (NETS) in 2000 for teachers and soon after all colleges of education were training pre-service teacher how to use technology in the classroom (Barron, Kemker, Harmes, & Kalaydjian, 2003). Howard (2011) discovered teachers with 11-30 years experience were less likely to integrate technology.

Solomon (2000) argued the fundamental philosophy of teaching technology is understanding how to use technology. The AMSTI (2013) fact sheet states AMSTI trained teachers have a greater understanding and knowledge, and Kumar (2008) and Sang (2009) advocate teacher age, motivation, and training influence technology use in the classroom. The more teachers are trained to use technology the better their confidence is in using technology. Marcum (2010) points out that confidence in using technology by the classroom teacher determines if the teacher will use technology. The teachers’ perceptions of classroom technology and the lack of expertise with computer technology could be the main inhibiting factors to technology integration (Becker, 2001).

**Future Research**

This study was conducted to discover the perceptions of technology by rural elementary teachers. The findings show that there is some difference in perception between rural elementary teachers at AMSTI schools compared to rural elementary teachers at Non-AMSTI schools, rural elementary teachers under age 40 compared to rural elementary teachers over age
40, and rural elementary teachers with 1-15 years of experience compared to rural elementary teachers with over 15 years of experience.

Recommendations for further research are as follows:

1. This study was conducted on rural elementary teachers’ perceptions about technology. Further research could include rural middle school teachers and rural high school teachers.

2. Students were not included in this study. Further studies could include students’ perceptions of technology compared to their teachers’ perceptions of technology.

3. Administrators were not included in this study. Further studies could include administrators’ perceptions of technology compared to teachers’ perceptions of technology.

4. Parents were not included in this study. Further studies could include the perceptions of parents on classroom technology.

5. Gender was not a part of this study. Further studies could include the perceptions of technology by gender.

6. Further studies could include teachers’ perceptions of technology before and after attending AMSTI professional development.

7. Further studies could look for a correlation in using technology in the classroom and teacher tenure.

8. Further studies could include teachers’ perceptions of technology compared to their actual use through classroom observations.

9. Further studies could include teachers’ perceptions of technology and the college of education where the teachers received their teaching certificate.
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Appendix A

Survey Questions

1. Including computers both within and outside of your classroom, how would you describe the overall number of computers that are available for your students while under your instruction?
   a. superior  b. good  c. adequate  d. poor  e. non-existent

2. How would you describe the computer software available for your students to use at your school?
   a. superior  b. good  c. adequate  d. poor  e. non-existent

3. How would you describe the computer hardware for your students to use at your school?
   a. superior  b. good  c. adequate  d. poor  e. non-existent

4. How would you describe the speed of the Internet connection that is available to students at your school?
   a. superior  b. good  c. adequate  d. poor  e. non-existent

5. How would you describe the computer technologies resources that your school makes available to you for purposes of teaching preparation?
   a. superior  b. good  c. adequate  d. poor  e. non-existent

6. How many months since the last technology professional development class you attended?
   a. less than 3 mo.  b. 3-6 mo.  c. 6-12 mo.  d. more than 12 mo.  e. never

7. How skilled do you feel using technology?
   a. superior  b. good  c. adequate  d. slightly adequate  e. poor

8. How well prepared do you feel you are to use computer technologies for teaching-related needs?
   a. superior  b. good  c. adequate  d. slightly adequate  e. poor

9. How would you describe the extent to which stakeholders in your school are supportive of students’ use of technologies at school?
   Students a. superior  b. good  c. adequate  d. slightly adequate  e. poor
   Parents   a. superior  b. good  c. adequate  d. slightly adequate  e. poor
   Teachers  a. superior  b. good  c. adequate  d. slightly adequate  e. poor
   Administrators a. superior  b. good  c. adequate  d. slightly adequate  e. poor

10. How important do you believe student use of computer technologies at school is to your students’ education?
    a. superior  b. good  c. adequate  d. slightly adequate  e. poor
11. What level do you feel your school is preparing students for the 21st Century?
   a. superior   b. good   c. adequate   d. slightly adequate   e. poor

12. Generally speaking, how would you describe the level of sophistication of your students’ activities with computer technology while under your instruction?
   a. superior   b. good   c. adequate   d. slightly adequate   e. poor

13. Again use your best estimate, how motivated would you say your students are when it comes to using technology?
   a. superior   b. good   c. adequate   d. slightly adequate   e. poor

14. On a scale of 1-5 (with 1 being ‘no contribution’ and 5 being a ‘major contribution’) in your opinion how much has your students’ use of computers at school this year contributed to their education? (Please circle answer)
   1……..2……….3………..4……….5

15. On a scale of 1-5 (with 1 being ‘no contribution’ and 5 being a ‘major contribution’) in your opinion how much has AMSTI contributed to your students education? (Please circle answer)
   1……..2……….3………..4……….5

16. Please indicate approximately how often your students have used technology for each of the following during this school year. (Circle the best answer)

   Research          Occasionally  Daily  Weekly  Monthly  Never
   Writing (essays, etc.)    Occasionally  Daily  Weekly  Monthly  Never
   Typing Practice/Keyboarding  Occasionally  Daily  Weekly  Monthly  Never
   Reference CD-ROMs          Occasionally  Daily  Weekly  Monthly  Never
   Instructional Games       Occasionally  Daily  Weekly  Monthly  Never
   Internet-based Learning Module  Occasionally  Daily  Weekly  Monthly  Never
   Acquire info from Internet/Web Occasionally  Daily  Weekly  Monthly  Never
   Remedial Work             Occasionally  Daily  Weekly  Monthly  Never
   Activities for Advanced Students Occasionally  Daily  Weekly  Monthly  Never
   Drawing/Graphics           Occasionally  Daily  Weekly  Monthly  Never
   Video Production          Occasionally  Daily  Weekly  Monthly  Never
   Presentation (e.g., PowerPoint) Occasionally  Daily  Weekly  Monthly  Never
   Other: ___________________
17. How many times per week do you use technology to teach?
   (Circle the best answer)
   Language Arts  1  2  3  4  More than 5
   Math  1  2  3  4  More than 5
   Social Studies  1  2  3  4  More than 5
   Science  1  2  3  4  More than 5
   Other: __________ 1  2  3  4  More than 5

18. What teaching technologies are available in your school?
   (Circle all that apply)
   Active Boards
   Overhead Projectors
   Video/Still Camera
   Laptop Computers
   Interactive Devices
   Sound Equipment
   Interactive Games
   Calculators
   Other: ____________

19. Over this past school year, which statement best describes how often your students have
used computer technology at school while under your instruction?
   (Circle the best answer)
   Never
   1- 2 Days a week
   2- 3 Days a week
   3-4 Days a week
   Every Day

20. What obstacles prevent the use of technologies in your classroom?
   (Circle the best answer)
   Lack of equipment
   Software
   Training
   Administration
   Funding
   Other: ______________

21. What is the average number of students
    in your classroom? ___________
22. How many computers are always available for students to use in your classroom?
   a. 1      b. 2      c. 3      d. 4      e. 5 or more

23. What is the highest degree you hold as a teacher?
   a. Bachelor   b. Masters   c. Education Specialist   d. Doctors

24. How many years have you been teaching?
   (Circle the best answer)
   1-5 Years
   6-10 Years
   11-15 Years
   16-20 Years
   Over 20 Years

25. Please indicate your age.
   a. 21-25   b. 26-30   c. 31-35   d. 36-40   e. over 40
Appendix B

Interview Script

1. Could you tell me as much as possible how you use technology in the classroom?

2. Tell as much as you can about the technology that the school system provides for you?

3. Can you tell me what technologies you use to prepare your students for the 21st century?

3. Tell me how your students react to using technology in the classroom?

4. What do you feel are the obstacles which keep you from using technology in the classroom?

5. How do you feel about professional development on technology?

6. Tell me how confident you feel when using technology?
Appendix C

Alton Wilson< alwilson3@crimson.ua.edu> Tue, Mar 27, 2012 at 4:51 PM
To: howley@ohio.edu

Dr. Howley,
I am a graduate student at the University of Alabama and I am currently working on a study to discover teacher perceptions of technology in rural elementary classrooms. I read your article Rural Elementary School Teachers’ Technology Integration in the Journal of Research in Rural Education, 2011, 26(9) and I was impressed with the findings. I would like permission to use all or part of your survey instrument in my study.
Thank you,
Alton Wilson

Howley, Aimee< howley@ohio.edu> Thu, Mar 29, 2012 at 7:36 AM
To: Alton Wilson <alwilson3@crimson.ua.edu>

Dear Alton,

I have consulted with my co-author, Larry Wood, and we both agree that you may use all or part of the instrument so long as you cite our work appropriately.

Best of luck with your research!

-Aimee

From: Alton Wilson [mailto:alwilson3@crimson.ua.edu]
Sent: Tuesday, March 27, 2012 5:51 PM
To: Howley, Aimee
Subject: Survey Instrument

[Quoted text hidden]
Appendix D

Winston County Schools

Post Office Box 9 • Double Springs, Alabama 35553 • (205) 489-5018 • Fax: (205) 489-3203

Sue Reed
Superintendent

Board Members
Larry Yancey, President
Greg Batchelor, Vice Pres
Joey Boteler
Joe Laster
Ralph Williams

April 10, 2012

To: Principals

From: Mrs. Sue Reed

Mr. Alton Wilson has permission to go into the Winston County Schools to talk to the teachers about his Doctorial Survey.

Thanking you in advance,
Sue Reed
May 16, 2014

Alton Wilson
ELPTS
College of Education
Box 870302

Re: IRB # 14-OR-179, “Elementary Teachers in Rural Schools: Perceptions and Use of Technology in the Classroom”

Dear Mr. Wilson:

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your application has been given expedited approval according to 45 CFR part 46. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your application will expire on March 15, 2015. If your research will continue beyond this date, please complete the relevant portions of the IRB Renewal Application. If you wish to modify the application, please complete the Modification of an Approved Protocol form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, please complete the Request for Study Closure form.

Please use reproductions of the IRB approved stamped consent forms to obtain consent from your participants.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sincerely,

[Signature]

[Stamp]

Carpanlito T. Myles, MSM, CI, CIP
Director & Research Compliance Officer
Office for Research Compliance
The University of Alabama