TEACHERS' PERSPECTIVE OF TECHNOLOGY INTEGRATION WITH PEDAGOGICAL PRACTICES AND THEIR PERCEPTIONS OF THE CORRELATION WITH STUDENT SUCCESS

by

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ABSTRACT

Teachers' perspective of technology integration with pedagogical practices and their perceptions of the correlation with student success were examined in this study. One hundred and ninety-two southwestern elementary school teachers volunteered to be a part of the study. Quantitative and Qualitative research methods were conducted. Relationships between teachers' attitude toward computers and computer usage were considered. Regression analysis was employed to examine the results of the two part survey. Telephone interviews were conducted to augment the study. While most of the findings were not statistically significant, they provided insight into how teachers used computers at elementary schools.

The results suggest that effective instructional computer use at the elementary school level should implement effective teaching practices. Data were drawn from elementary school teachers completing surveys and interviews. Data includes information on computer usage in the classroom, access to computers in school, and the kinds of instructional uses of computers in the schools.

The results of this study find evidence that teachers were using computers regularly, and the ways in which they are used. There were differences in the frequency of computer use in elementary classrooms. The major barriers to curriculum integration by elementary teachers were time and lack of upgraded computers in classrooms. The findings also indicate that computers are not a panacea for problems facing the schools. When used adequately computers may serve to enhance the educational environment and improve student success.
Findings from this study offer practical implication for school districts and teacher education college programs working toward supporting and promoting change in teaching roles and practice that use new technologies.
CHAPTER 1

INTRODUCTION

In 1999, The National Commission on Excellence in Education published *A Nation at Risk*, which called attention to the educational crisis in America (McDonough, 2001). A part of this report called for the restructuring of the classroom environment and for schools to change the way of instruction. In the 1970s, computer use involved keypunching, and teachers continued to use traditional teaching practices, while not yet understanding how technology would change the classroom. Teachers did not know the impact of using computer automation in the classroom that could increase student success. The extent that teachers had used computers at the time was for word processing, creating worksheets for student use, and logging students' grades.

In 1977, the usage of Apple II computers was prevalent in public schools. During the next 20 years the development of Internet-ready multimedia-capable Pentium and PowerPC computers became more common in the classrooms (Office of Technology Assessment [OTA], 1998).

As the years passed, traditional teaching practice remained the main focus for student success, however, teachers began to incorporate new methods of instruction in the classroom using technology.
Background of the Study

This study investigates elementary school teachers’ perspectives of technology integration with pedagogical practices and their perceptions of the correlation with student success. According to Sandholtz, Raingstaff, and Dwyer (1997), throughout the 1980s, microcomputers in schools existed mostly in computer labs that were located sometimes down a long corridor, or even in portables away from classrooms. In the 1980s, classrooms around the country had limited amounts of technology. Teachers had a choice to teach with computers in the class or teach in a non computer-aided classroom. Elementary teachers usually shared computers with several other teachers.

Most classroom teachers were not aware of how computers could change traditional teaching practices in the classroom environment. Teachers were unfamiliar with how students were using the computers in the laboratory, and did not know how they could be used in classrooms. In today’s school curriculum, (e.g., science, social studies, etc.) computer assisted instruction can be utilized by teachers in elementary school environments to enhance classroom instruction.

As computer technology continues to expand and software applications become more efficient and intuitive, educators and students have become familiar with applying innovation to the educational process. National technology studies have led to technology support for programs such as, Getting America’s Students Ready for the 21st Century: Meeting the Technology Literacy Challenge (U.S. Department of Education, 1996). Such action appeared to set high goals for public education that incorporated technology. Former President Clinton affirmed, “We will educate our children with it,
improve our businesses with it, make our government more democratic with it, and build a brighter, freer, more prosperous future with it. That is the American way” (Clinton, 1995).

The Technology Purchasing Forecast, for the 2001-2002 school years, indicated U.S. public school districts spent $6.45 billion on technology and projects, while projecting $7.19 billion to be spent in the 2002-2003 school year. According to USA Today (2004), Internet Usage in Teaching reports that Internet access has become the rule in K-12 education. According to Teach-nology website (2005) the Internet has fast become the most extensive resource tool available to teachers and learners across the globe. The Quality of Education Data (QED) stated that 96% of teachers in public schools utilize technology as an additional teaching resource to assist students (QED, 2002, p. 5). Educators say the Internet is vital to help young people do homework, conduct research and compete in a global economy (USA Today, 2004, p. 6). Consequently, in school systems today, teachers can utilize the computer applications to integrate technology into the curriculum.

Statement of the Problem

One of our nation’s most pressing social problems is the prevalence of early school failure, especially in urban public schools. According to the National Assessment of Educational Progress, the reading proficiency score for 9-year-old students in disadvantaged urban areas lagged far behind other groups (U.S. Department of Education, 1995).
Jones and Gottfredson (1997) discussed the importance of increasing the use of technology at the elementary school level. Madden et al. (1992) also indicated that the use of computers in the classroom could have a major impact on children learning to read to level by the third grade.

In 1999, the United States Department of Education, National Center for Education Statistics (USDOE/NCES), reported only one in five teachers felt prepared to integrate computers into traditional teaching practices. Due to the rapid increase in technology, veteran teachers may be falling behind due to their unwillingness to integrate technology. Research findings suggest teachers are interested in utilizing technology in the classroom to help students achieve success (McDonough, 2001). Most schools have begun the rapid acquisition of computers, yet little has changed in the institutional structure of schools or in the instructional practices of teachers (Cuban, 1997). Many educational advocates have called specifically for education reform in regards to the integration of technology and the improvement of computer literacy of today’s students (Clinton, 1995, 1997; Mehlinger, 1996; Morton, 1999; Papert, 1993).

Using computer technology in the classroom is not guaranteed to miraculously enhance learning all by itself (McDonough, 2001). However, research points to a need for the development and practice supporting a change in pedagogy that can incorporate emerging computer-based cognitive tools in elementary schools (Fitzgerald & Werner, 1996). Teachers can consider computers as tools to help them achieve their instructional goals.
Significance of the Study

The purpose of this study was to identify elementary school teachers’ perspectives of technology integration with pedagogical practices. This study explored perceptions of teaching practices and the variables that impact pedagogy through technology. This study is identifying factors that can improve teaching practices, and will explore teachers’ assumptions about the effectiveness of the use of computer technology in the classroom. Sheingold states, “Teachers will have to confront indirectly the difficult problem of creating a school environment that is fundamentally different from the one they themselves experienced” (Robyler & Edwards, 2000, p. 329).

According to researchers, computing technology can have a positive impact on learning and teaching in the primary and secondary grades (Honey, 2001; Norris, Smolka, & Soloway, 2000); therefore access to computers and the use of computers could increase student success.

Research Questions

This study examined the practices of teachers and the process of the utilization of computer-assisted technology. The following research questions were examined in this study.

1. How do gender, race, tenure, educational level, familiarity with and access to technology impact teachers’ attitudes toward the use of technology in the classroom?
2. How do gender, race, tenure, educational level, familiarity and access to technology impact teachers’ use of technology in the classroom?

3. What teaching styles, strategies, and factors effect technology integration in the classroom?

Research Hypotheses

The following hypotheses were tested in this study:

Ho1. There are no statistically significant differences in attitudes of teachers toward use of technology in the classroom when controlling for gender race, tenure and teacher educational level.

Ho2. There are no statistically significant differences in the teachers’ use of technology in the classroom when controlling for gender, race, tenure and teachers educational level.

Assumptions of the Study

The following assumption relating to the study was made: Teachers will complete surveys honestly and accurately, producing results indicative of teachers’ educational beliefs, teaching practices, usage of technology, and integrating technology in the classroom.
Limitations of the Study

There can be many factors that affect teaching practices and the integration of technology. Therefore, specific limitations were inherent in the study. The following are limitations of the study:

1. Teachers in the study are employed by different public school districts. Factors unique to school districts can affect the results of the study. Teachers participating in the research use teaching methods in elementary school settings from identified school districts in the southwestern part of the United States. These teachers' assumptions may not be generalized to other regions in the nation.

2. Identified schools in the study do not have the same type of technology capabilities and/or infrastructure.

3. The study is limited only to the extent that reported data reflected honest and accurate statements by the respondents.

Definition of Terms

Beliefs. Individuals accept proposition as true; unlike knowledge, beliefs do not require a "true condition" agreed upon by a community. Beliefs are considered to drive actions, and shape both what and how an individual will learn (Richardson, 1996).

Computer Application. Software designed to "support tasks that are useful to a computer user" (Roblyer & Edwards, 2000, p. 329).

Computer Assisted Instruction (CAI). Instruction when instruction is based on a program learning approach "in which specific educational objectives are achieved
through step-by-step instruction” (White, 1990), where focus is on “learning from computers” (Jonassen, 2000); is a narrower term and most often refers to drill-and-practice, tutorial, or simulation activities offered either by themselves or as supplements to traditional, teacher directed instruction. Bangert-Drowns et al. (1985), and represent commonly accepted (though certainly not the only) definitions of these terms.

**Computer Based Instruction (CBI).** Refers to use of computer tools for teaching and learning in meaningful activities (Jonassen, 2000; Roblyer & Edwards, 2000).

**Computer-Enriched instruction (CEI).** Defined as learning activities in which computers (1) generate data at the students' request to illustrate relationships in models of social or physical reality, (2) execute programs developed by the students, or (3) provide general enrichment in relatively unstructured exercises designed to stimulate and motivate students. Bangert-Drowns et al. (1985), Batey (1987), Grimes (1977), Samson et al. (1986), and Stennett (1985), and represent commonly accepted (though certainly not the only) definitions of these terms.

**Computer-Based Education (CBE).** CBE and computer-based instruction (CBI) are the broadest terms and can refer to virtually any kind of computer use in educational settings, including drill and practice, tutorials, simulations, instructional management, supplementary exercises, programming, database development, writing using word processors, and other applications. These terms may refer either to stand-alone computer learning activities or to computer activities which reinforce material introduced and taught by teachers. Bangert-Drowns et al. (1985), Batey (1987), Grimes (1977), Samson
et al. (1986), and Stennett (1985) represent commonly accepted (though certainly not the only) definitions of these terms.

**Computer-Managed Instruction (CMI).** Can refer either to the use of computers by school staff to organize student data and make instructional decisions or to activities in which the computer evaluates students' test performance, guides them to appropriate instructional resources, and keeps records of their progress. Bangert-Drowns et al. (1985), Batey (1987), Grimes (1977), Samson et al. (1986), and Stennett (1985), and represent commonly accepted (though certainly not the only) definitions of these terms.

**Constructivism.** For the purpose of this study, constructivism is defined in terms of computer use. Philips (1995) interprets the "active participation by the learner" (p. 11) and by a teacher's use of computer technology to empower student-centered collaboration, evaluation, and reinvention in an educational environment where students use computer technology to create multimedia products which represent their learning, and where textbooks are clearly understood as one but not necessarily the best, source of information (p. 11).

**Culture.** For the purpose of this study culture is to understand a new environment before change or observation can be made. Culture implies structural stability and patterning and integration; accumulated shared learning from history, constantly enacted and created by our interactions with others. Culture is created, embedded, developed, managed, and changed. If an identified group is successful and the assumptions come to be taken for granted then a culture is created. Can be identical to the process of group formation in that the very essence of belief, feelings, and values
that result from shared experience and common learning, results in the pattern of shared assumptions (Schein, 1992).

Curricular Integration. Refers to instructional programs with appropriate integration of computer-based learning activities with teachers' instructional goals and with the ongoing curriculum, which changes and improves on the basis of feedback that indicates whether desired outcomes are achieved (Winkler, Shavelson, Stasz, Robyn, & Febel, 1985).

Effective Teacher. Has positive expectations for student success; is an extremely good classroom manager; knows how to design lessons for student mastery. Affects and touches lives (Wong, H., & Wong, R., 1998).

Instructivism. Within the context of this study it means teachers' use of computer technology to support traditional teacher-centered teaching, testing, and remediation in a classroom where the textbook is the heart of the curriculum.

Perspective. The aspect in which a subject or its parts are mentally viewed: a view of things (as objects or events) in their true relationship or relative importance (Woolf, 1973).


Self-Efficacy. A belief by the teacher that he/she has the capability to produce certain outcomes, the outcomes are valuable, that these outcomes will benefit the students (Poole & Okeafor, 1989). When ones behavior does not result in the achievement, one adopts new behaviors until the goal is obtained. These behavior
al changes occur simply because one believes in "self-proscribed" capabilities (Bandura, 1977).

**Student Centered.** Refers to inquire-based instruction, where five essential features of inquiry are directed by the student (NRC, 2000).

**Teaching.** A highly skilled craft that can be learned, every one of us is both a student and a teacher. We are at our best when we each teach ourselves what we need to learn (Wong & Wong, 1998).

**Technology Integration.** The practice of using technology that is both curriculum-based and future-oriented. It focuses on meeting content objectives within the “three Cs”: communication, collaboration and creative problem solving (Ertmer, 1999).

**Traditional Instruction.** Refers to teachers who primarily present information through either lecture or discussion, use laboratory activities to verify or provide a visual picture of concepts, and use assessment to hold students accountable for facts (Magnusson, Krajcik, & Borko, 1999).

**Transactional Leadership.** A barter, An exchange of wants between leader and follower, satisfies followers’ needs by entering into a relationship of mutual dependence. Encoding and decoding messages when talking face to face with another person, ongoing process between the leader and follower (Hersey, Blanchard, & Johnson, 2001).

**Transformational Leadership.** To bring about discontinuous change in a current state and functioning of an organization as a whole. The change is driven by a vision based on a set of beliefs and values that require members of an organization to perceive
and think differently and perform new actions and organizational roles. (Hersey, Blanchard, & Johnson, 2001).

Organization of the Study

The study is organized into six chapters. The first chapter contains the introduction, background of the study, statement of the problem, significance of the study, research questions, research hypotheses, assumptions of the study, limitations of the study, definitions of terms, and organization of the study.

Chapter 2 includes a review of literature that is related to educational research on the background of teaching methods, theoretical framework, and implementation of technology, factors affecting implementation of technology, mind tools, videoconferencing, and pedagogy of computer technology and provides the theoretical construct for the study.

Chapter 3 addresses the methodology of the study, specifically the research context, population and sample, research questions, research hypothesis, instrumentation, data collection and procedures, statistical analyses, and limitations of the study. An account of data collection and analysis of methodologies used in this quantitative and qualitative study are discussed.

Chapter 4 reports on the analysis of the data collected and presented along with the results of the study. The chapter reviews the quantitative results in both narrative and statistical analysis in relation to the research questions.
Chapter 5 reports on the analysis of the qualitative data collected and presented along with the results of the study. The chapter reviews the results in a narrative related to the research questions.

Chapter 6 summarizes the findings, conclusions, and implications for the educational field and recommendations for further study.
CHAPTER 2
REVIEW OF LITERATURE

Introduction

Computer Assisted Instruction (CAI) can be beneficial for students and a part of school reform. In the early 1990s, reformers identified this as a target for schools (Bauman, 1996) that required reorganization. Research found that teachers were unaware of how computer assisted instruction could give emphasis to the kinds of active learning that computers can support in the classroom (Chance, 2000). The use of CAI could increase student achievement. In the public school environment, cultural change cannot occur unless those leading the process communicate knowledge and skills necessary to adapt to integrating technology into the classroom. The use of technology is only one type of school reform. According to Becker (1983) and Sheingold, Kane, and Endreweit (1983), teachers believe that the greatest impact of computers in the classroom is that children tend to help each other more. In CAI environments, preschool children were more likely to help and share with each other than in non-computer environments (Muller & Perlmutter, 1984).

The impact of technology in the classroom calls for school restructuring that is predicated on the principle that schools are complex social institutions and that school restructuring requires a social system perspective (Chance, 2000; Murphy, 1992; Schein, 1996). School administrators and teachers can work in an interrelationship to impact educational reform to include computer-assisted instruction.
Teachers and students can be a part of the process of change. In Senge's study of change, he concludes that people change what they need to change, not what other individuals think they need to change (1990). A summit on the 21st Century Workforce reported culture needs to change from supporting educational systems to supporting the needs of children (Moore, 2003).

In modern industry, technology is used to improve the efficiency, quality, or quantity of certain products or services. Likewise, technology can be applied to improve the efficiency of the teaching environment. Teachers have the responsibility to educate all children, and can interject their technical skills into the classroom environment to increase student achievement. This relationship includes shared patterns of thought, beliefs, feelings, and values that result from shared experience and common learning (Schein, 1992, p. 251). McGrath (1999) discusses how the introduction of technology affected the ways teachers worked with students, identifying shifts in classroom dynamics. Roberts (1991) suggests that computers will help all students and will motivate students to read more and with greater understanding. Moore (2003) suggested technology tools can be utilized to provide various approaches for learning the content and learner input in determining appropriate learning outcomes (Moore, 2003). Hall and Hord (1987), Fullan (1991), and Sergiovanni (1991) have described problems of change within the school setting which can lead to setbacks in integrating technology.

Conceptually, change does not occur in education with the introduction of an innovation; change occurs when the innovation is actually implemented (Hall & Horde,
1987). These researchers discuss the implications of theoretical and conceptual constructs of change theory in education (Hall, 1992; Hall & Horde, 1987; Jorde, 1984).

Fullan (1991) observed that change affects the individual and the cultural group within the individual functions. He pointed out that it is “necessary to contend with both the what of change and the how of change,” emphasizing that both aspects must be taken into consideration (Henley, 2001).

In 1998, the House Commerce Committee and House Education and Workforce Committee held a joint hearing on Education Technology Initiatives. Congressman Bill Goodling, Chairman of the Education Committee, hoped that the hearing witnesses would provide federal, local and private sector perspectives on the issue and recommendations on how the federal government can assist teachers in improving student performance through the effective use of technology. Chairman Goodling’s primary concern was that education funding would lead to increased academic performance not just increasing the presence of new computers in the classroom or access to the Internet (Goodling, 1998). The National Center for Educational Statistics conducted a survey in 1999 and found 99% of full-time regular public school teachers had access to computers or the Internet somewhere in their schools.

A study conducted by Global Strategy Inc. (2003) reported 95% of educators out of 811 surveyed believed that greater access to educational technology is especially important for improving the achievement of traditionally low-performing or at-risk students. Yet, while educators in rural and the poorest schools believed that technology
is a part of school improvement, the poll found that students in those schools were least likely to have access to technology at school or at home.

Use of computer technology continues to increase in the school settings and can play a major role in the traditional classroom. Subsequently, facilitators of change need to understand that change will occur as a result of exposing educators to new programs or new teaching methods. The role that electronic learning resources play in children’s lives cannot be underestimated (McNicol, Nankiell, & Ghelani, 2002).

This literature review will cover teaching methods, integration of technology, and factors affecting computer usage, integration of hardware and software and videoconferencing.

Theoretical Framework of Teaching Methods

Elementary teachers integrating technology into traditional teaching practices can produce new methods of group interaction. Webb (1991) found that the oldest, the most experienced, and the highest ability students gave the most help to their group mates. Verbal interaction in groups appeared to affect learning of basic commands and syntax but not learning to comprehend and produce programs. Students can influence their peers to work as a team and request for teachers to work as team members while integrating technology.

Milojkovic (1983) reported that fifth graders in three computer groups expressed a significantly greater liking for school in general than those in non-computer groups. They also tended to take less responsibility for positive outcomes, but more responsibility for negative outcomes. Teacher and students working in pairs actually may produce more learning in less time (Cheney, 1977). Therefore, students working in small group settings can have an effect on student achievement (Nye & Hedges, 2002).

New pedagogy can be incorporated into activities and foster new activities with computers and teachers in the classroom environment (Jonassen, 2000). Teachers’ practices have been researched in numerous ways. Bauch (1994) investigated instructional beliefs of teachers and found to a large degree that teachers’ assumptions about instructional practices influenced their teaching behavior and their perceptions of students’ academic success. Piper suggested in his research that most teachers are well trained and experienced in specific teaching areas. However, teachers differ in how they deliver their subject content to the students (Piper, 1993). According to Ornstein and Behar (1995), there are different types of teaching practices. The skill of teaching requires the teacher to develop a creative environment that motivates the students to learn, whether that requires the students to work individually, collaboratively, or in a combination of learning environments. Researchers suggest that teaching practices should be created by teachers themselves and not by other educators (Ornstein & Behar, 1995).

Research findings have indicated various instructional techniques that are used in the classroom environment. Henley suggests that a major paradigm in teacher-
centered instruction is direct instruction. Direct instruction is focused on the behaviors of the learners (Henley, 2001). Based on a behaviorist point of view the teacher would provide prompts of cues to lead students closer to the objective of the subject area. The students' role would be passive, responding to cues provided by the teacher (Henley, 2001; Newby, 2000). Henley also explored the importance of direct instruction to help students organize new information in expanding existing schemes. Teachers would help students establish links between new information and their own knowledge. This method of teaching would reinforce the desired behaviors that help students to understand the objective of the lesson.

Moisey (2001) suggests that integrating technology with conventional instructional systems design forms the foundation of an integrated approach. Dick and Carey's (1990) model demonstrates a framework for nine steps for systematic design of instruction.

1. Identification of instructional goals
2. Instructional analysis
3. Identification of entry behaviors and learner characteristics
4. Development of performance objectives and test items
5. Determination of an instructional strategy
6. Development of materials
7. Formative evaluation (pilot testing)
8. Revision
9. Summative evaluation
According to Moisey (2001) applying this framework creates effective instruction for student success.

Computer technology can help students formulate information and increase higher order thinking. This type of teaching method in addition to teachers asking students questions, highlight or emphasize information, using analogies; assist students in developing and using study skill strategies such as mnemonic devices; and, use imagery to help students visualize the information (Newby, 2000) can be an effective delivery approach.

Mangan (1992) pointed out that teachers should be critical about computerized education and begin to insist on a more serious role in defining and directing the appropriate use of information processing and computer technology in their classroom instructions. Guha (1993) suggest that teachers need to experience various computing processes that enable them to offer more to children. Stasz (1985) pointed out that integration of computers with subject matter in the classroom is the least well-addressed issue. Some instructional approaches like direct instruction limit integration of technology. Henley and Newby described how direct instruction requires teachers to develop three major tasks: (1) assure prerequisite skills have been taught and mastered, (2) supply instructional conditions that support student learning, and (3) determine the type of learning (Henley, 2001). Direct instruction focuses on the individual, not allowing students to develop collaborative skills associated with technology integration seems to work best with cooperative learning activities (Robyler, 2000).
Jarolimek and Foster (1981) reported on four modes of teaching: expository, inquiry, demonstration, and activity, as teaching methods to utilize with technology. Reeds (1991) expanded on this to say:

The expository mode uses explanations, lectures, recitations, and discussions along with textbooks and other printed materials. The inquiry mode uses questions, investigations, explorations, and discovery learning along with books, pictures, field trips, and resource persons. The demonstration mode uses explanations and illustrations along with whatever materials are needed to conduct a demonstration. The activity mode uses problem solving through students' projects and activities along with a wide variety of assorted learning materials including such items as construction kits, electric motors, art supplies, and audiovisual materials. (p. 19)

Effective teachers can use diverse teaching methods and integrate technology to enhance practices.

Integration of Technology

In 1992, the Technology Teacher reported on the advancements in technology which have improved the teaching of many skills to mentally handicapped students. According to this report, parents were astounded by children in special educational classes who learned to spell simple words and their names using computers (p. 16). Computers are not only used for drill and repetition but also used to increase student achievement (Hadley, 1992).

It is questionable, whether teachers are aware of the impact of computer-assisted instruction in their school environment. According to (McDonough, 2001) a constructivist approach can be applied when integrating technology and instruction:
The Cognition and Technology Group at Vanderbilt (1996) describes the two major shifts as: (1) learning being viewed as actively constructed by individuals through interaction with their environment and through the reorganization of their own mental structures, and (2) a realization of the importance of social contexts for learning. (p. 2)

Research also indicates that it is not only the subject matter but “the type and level of instructional objectives, student characteristics, teacher characteristics and the instructional strategies” that are needed (McDonough, 2001, p. 18) to incorporate technology.

Hooper and Rieber (1995) suggested that most teachers will first use new technology to support traditional instructive teaching practices, and that some teachers who continue to use computers in their teaching will eventually adopt new constructivist pedagogy and may even develop the ability to use technology to support their construct of new pedagogy. Hooper and Rieber (1995) assert that the benefit of technology is not simply its potential to replicate existing educational practice, but its ability to combine idea and product technologies to encourage students to engage in deeper cognitive activity (p. 163). They also believe that eventually researchers will develop the knowledge and skills to use technology as a cognitive tool within a constructivist paradigm of teaching and learning.

Hannifin and Savenye (1993) emphasize that constructivist pedagogy is more compatible with the new role of the teacher using computer technology than traditional instructional practices. They found that the capacity of the computer for facilitating student-centered activities and exploration requires teachers to make a fundamental shift from instructivism to constructivism.
According to Vojtek & Vojtek (2001) a balanced and blended use of technology benefits students. Educators and parents need to realize and understand what students need to learn. "They must also assess the negatives and positives of utilizing technology in the classroom environment" (p. 68). Pardini (2002) believes certain teaching strategies can help produce long-term acceptance of technology. Many technology-using teachers find that technology can help them improve student learning and motivation, address students with different learning styles or special needs, expose students to a wider world of information and experts, and implement new teaching techniques (U.S. Congress Office of Technology Assessment, 1999).

According to Pardini, "Teachers use technology as a catalyst for significant changes in learning practices" (Pardini, 2002, p. 21). Students can follow the example of teachers because they use technology as a tool. Since technology and automation are identified as major influences on the economy of industrialized nations, it is becoming increasingly imperative that students will need to learn automation as the market continues to demand qualified individuals.

"New technology-based models of teaching and learning have the power to dramatically improve educational outcomes" (Dede, 1998, p. 199). In a study investigating teachers' perceptions of their levels of technology implementation, Middleton and Murray (1999) found that the level of technology used by the teachers did have a positive significant impact on math and reading academic achievement of fifth grade students attending middle schools in the South Carolina school district. The
study examined the relationship between levels of technology implementation in the classroom and standardized test scores.

Middleton and Murray suggested that teachers using the Levels of Technology Implementation Instrument (LOTI): A guide for measuring classroom technology usage (Moersch, 1994) determined their personal level of technology implementation in their classroom. The study determined that a significant difference existed in achievement between students from teachers in fourth and fifth grade classes who characterized themselves as low level users of technology in the classroom (Middleton & Murray, 1999). The researchers suggested that the need for teacher in-service and staff development programs on the implementation of technology in the classroom is as crucial as the actual purchase of technology. This study adds to the theory of technology in the classroom, which produces significant effects on student achievement (Middleton & Murray, 1999).

Wenglinsky (1998) conducted a national study analyzing the relationship between educational technology and student achievement in mathematics. His findings indicate that for eighth-graders,

> When computers are used to perform certain tasks, namely applying higher order concepts, and when teachers are proficient enough in computer use to direct students toward productive uses more generally, computers do seem to be associated with significant gains in mathematics achievement. (p. 32)

Wenglinsky’s study explored access to computers at home and in school, and professional development of mathematics for teachers using computers. His research also indicated the various kinds of instructional uses of computers in the schools that
affect student success. His research also found that the greatest inequities in computer use are not in how often they are used, but in ways in which they are used (1998, p. 33).

Inequities in the amount of computers and funding allocations continue to exist in poor and urban areas. Teachers in poor and urban areas continue to receive inadequate time for staff development in order to improve their computer knowledge to assist students with higher order thinking in computer utilization (Wenglinsky, 1998). According to Wenglinsky, there were few differences in the frequency of school computer use by black fourth graders and white fourth graders, despite the fact that black fourth graders were less likely to have computers in school. The study also found that having inadequate amount of computers in these schools could affect academic achievement. When computers are used properly however, technology can serve as an important tool for improving student proficiency in mathematics and the overall learning environment of the school. Silverman and Pritchard (1993, 1994) contend that most technology education classes are taught in a lab setting involving hands-on projects, where students move around the room sharing materials and equipment. On the other hand, Norris, Sullivan, Poirot, and Soloway’s (2003) research of 4,000 teachers across the country found that:

There has not been an impact of technology since students have not used the technology. The researchers believe non-use lies not at the feet of teachers, but rather in the lack of access to the technology, one computer in the classroom is not access nor will it lead to significant student use. (p. 1)
They contend that there can not be an impact from technology if children do not have the opportunity to access and use the technology (Norris, Sullivan, Poirot, & Soloway, 2003).

Computer-assisted technology can support the variety of ways learners construct their own knowledge. According to Southwest Educational Development Laboratory, students who gather information from the Internet can be self-directed and independent learners (SEDL, 2002). Teachers can be given curriculum frameworks, lesson designs, and effective models for integrating technology into the classroom as a tool for student learning (Healy, 1998). Teachers can affect how students acquire knowledge and process academic information through, for example, one-on-one teaching techniques or team efforts, and through effective teaching methods that utilize technology.

Constructivist pedagogy is more effective than traditional methods such as lectures (President's Committee of Advisors on Science and Technology, (PCAST) 1997; Reeves, 1997; Wilson, 1996). Robinson (1992) concurred, reporting that teachers' use of computer technologies may already be influencing a change in the way teaching is being conducted.

In 1997, PCAST indicated that the use of computer technologies by teachers actually facilitates their adoption of new and more appropriate pedagogy. According to this report the presence of computers in the classroom does not interfere with classroom's social group interaction. Social group interaction for example is one effective approach to use in technology. Swigger and Swigger (1984) reported that most children in groups approached the computer with their friends. Even though the
computer programs were designed for individuals, children are using the computers in groups. The National Survey of Science and Mathematics Education in 1993 reported that 41% of the teachers of students from grades 1-4 believed that students learned mathematics better if they were grouped with students with similar ability (Weiss, 1994). Students and teachers can work together and formulate relationships while computer assisted technology instruction evolves in the school environment. In 1998, Burrill pointed out that when teachers use cooperative groups students in small groups talk together through a problem, help them sort out their thinking and decide what to do next while the teacher keeps them on task.

Integration of Hardware and Software

Computer software was very limited at one time. This was also the case with access to technology training and guidelines for restructuring the curriculum. Teachers were unaware of how technology could be a part of active learning. Major issues of compatibility centered on Macintosh and IBM hardware computers. According to Kaiser (1999), there were at least 20 different systems and software that could not be used interchangeably.

Kaiser (1999) and Rusby (1993) indicated four styles of educational software: instructional, revelatory, conjectural, and emancipator. These styles reflect how computers are used from program control to user control. Rusby investigated these styles and how program control operates on a behaviorist attitude of drill and practice as the basis of learning. Kaiser (1999) and Rusby (1993) suggested that programs with a
behavioral basis include an direct instructional style as opposed to software programs and subject matter being learner focused. Software developed with user control emphasizes the cognitive processes underlying learning. Software programs with a cognitive basis include problem solving, thinking skills and information-handling skills as data analysis and synthesis. Revelatory, conjectural and emancipator styles focus on simulations, exploratory activities and the enhancement of creativity (1979).

Kaiser (1999) found that Rusby's (1993) classification offers a general framework; however, it overlooks other influences in the way software is used. Teachers, who are eager to use computer-assisted technology, utilize various types of teaching techniques that can interact with a particular type of software. Software used for reading or learning mathematics can be used to provide repetitive practice of fundamental concepts or can encourage group discussion and exploration around concepts (Sewell, 1993, p. 49). According to Kaiser (1999), teachers can create a comfortable environment to explore learning opportunities or give an option for alternatives to integrate technology in the learning process. In order for this type of learning process to take place teachers can investigate and analyze how software applications can increase student achievement.

Maurer and Davison (1998) address the importance of computers in schools as a tool for teachers. The variations of software applications are used by teachers in several ways to plan instruction (Maurer & Davidson, 1998; Taylor, 1980). These authors identified the following categories for software tools:

Software is divided into three categories: tutor, tool, tutee. In the tutor category, the computer acts as tutor. Included in this category are drill-and-practice and tutorial software. The tool category comprises tool software and simulations. The final category, tutee software, is unique. Software that the students use to
According to eSN Special Report (2003) students use a number of computer-based applications in their classes, like Microsoft office and publisher. Students also use web creation tools, such as, Macromedia’s DreamWeaver (“eSN Special Report”, 2003). Software utilization (Sewell, 1993) encourages globalization to enter into the classroom by technology-based methods to reach students across the nation.

Buss & McClurg (1999) reported that teachers integrating geographic information system (GIS) in their teaching and learning environment improve the learning process of students at different educational levels. Educators were able to explore the effect of using spatial data resources to enhance student achievement. This study was undertaken to investigate the results of teachers from Wyoming using these resources in classroom instruction and the need for new teaching methods along with the necessity to learn how to use GIS for classroom implementation. Their study also consisted of examining the level and type of usage by the teachers who participated (Buss & McClurg, 1999) in the study.

Consequently, computer-assisted technology can support the variety of ways learners construct their own knowledge. Software applications that assist teachers’ best practices can impact students’ success in the classroom by using different methods of instructional technology.
Mindtools

Jonassen, Carr, & Yueh (1998) suggested that instructional technology has been used as media for delivery of instruction as conveyors of information and tutors for students. Their research argues technology should not support learning by attempting to instruct the learners, but rather should be used as knowledge construction tools that students learn with, not from (1998). Jonassen believes learners function as designers and the computers function as Mindtools for interpreting and organizing personal knowledge (Jonassen, Carr, & Yueh, 1998). According to these researchers Mindtools are computer applications that, when used by learners to represent what they know, can engage learners in critical thinking about the content they are studying (Jonassen, 1996). Mindtools require both leader and student to think about areas in different ways (Jonassen, Carr, & Yueh, 1998).

Mindtools are computer-based tools used in learning environments, which have been adopted or developed to function as intellectual partners with the learner. The collaboration will engage and facilitate critical thinking and higher order learning that includes using databases, spreadsheets, and computer mediated communication. When Mindtools are integrated into teaching practices, they can promote high level thinking skills. Mindtools are computer applications that assist students to not only learn technology, but also use automation to increase student achievement (Jonassen, 2000). “Mindtools assess the effects of learning with computer technologies when learners enter into an intellectual partnership with the computer” (Salomon, Perkins, & Globerson, 1991, p. 4).
Students using the computer as a teaching tool increase their thinking and learning capacity utilizing automation to increase their own achievement. When using Mindtools to integrate technology in the classroom, “Teachers must relinquish some of their intellectual authority and learners must assume more responsibility for making their own meaning” (Jonassen, 2000, p. 269).

Jonassen assumed this type of learning would not be easy for today’s students who may be used to simply repeating what they are told. Vojtek and Vojtek (2001) suggested that in order to use computers and telecommunications effectively, learning activities must be student-centered and provide opportunities for students to construct their own knowledge. Students can ask the questions rather than answer those directed toward them by their instructors.

Technological Environments

Satchwell and Dugger (1996) believe technology influences our society and culture by changing our lives and our environment. In educational computing environments, students have the ability to use extensive computer equipped classrooms. Tiene and Luft (2001) conducted research at Kent State University, which is identified as an Ameritech Classroom of the Future.

It was developed to assess the interaction of students and teachers in an automated environment with state-of-the-art technology of students and teachers working in teams. Research suggested technology-rich environments can give students the opportunity to use technology, and teachers can facilitate the process of using
technology to complete assignments. Satchwell and Dugger (1996) suggest that technology can help students understand, use, and evaluate the effects of current and emerging technological devices and activities.

Braak (2001) investigated 236 teachers familiar with computer use in the classroom. He investigated whether teachers who use computers with students as a part of the teaching/learning process differ from teachers who are not familiar with technology in their classroom environment. He suggested that it is important to identify teachers' individual characteristics, that have a possible hindering or stimulating effects on the use of computers (Braak, 2001) in the classroom environment. Tiene and Luft (2001) indicated that teachers in technology-rich environments found their students to be more motivated and focused because of the stimulation of using computer technology to complete assignments. Computer-assisted classrooms are fertile environments to nurture skills in cooperative learning (p. 31).

McGrath (1998) discussed how the introduction of technology affected the ways teachers worked with students, identifying shifts in classroom dynamics which can lead to increased motivation and enhanced levels of cooperation (p. 58). In computer-assisted environments technology can help find raw bits of facts in order to enhance teaching practices. Teachers and students can hypothesize, connect ideas and problem solve using data and information (Maurer & Davidson, 1998, p. 221).

New technology-based models of teaching and learning have the power to dramatically improve educational outcomes (Dede, 1998). Teachers can help students increase their opportunity to prepare for the future. Focusing on the effects of
technology is indicative of other purposes such as, careers in computer technology. Furthermore, integrating computer technology into the learning environment can encourage cooperative learning and student collaboration (SEDL, 2002).

On the other hand, Hannifin, and Savenye (2001) suggested poorly designed software applications and lack of time to design their own software often cause teachers to give up using computers early in teaching practices. Knupfer’s (1988) study indicated that teachers were concerned that commercially available software did not match their curricular requirements for skill level and instructional content (Guba, 2001; Knupfer, 1988). Frase (1996) indicated that teachers were forced to use pre-installed software that was available through the network (Frase, 1996; Guba, 1993). Computer-assisted environments can cause school communities to adapt shared goals, values and beliefs in relation to teaching and learning to accommodate a new environment (Maurer & Davidson, 1998). Another tool that creates technological environments is distance education and videoconference.

Distance education requires a qualitatively new pedagogy built on a unique relationship between the instructor and the learners (Huang, 2002). Videoconferencing is an innovative teaching method to incorporate into teaching practices. Videoconferencing is the combination of cameras, microphones, computer software, and various other peripherals that use digital phone lines Integrated Services Digital Network, ISDN to transmit and receive information. Two or more people at different locations can see and hear each other at the same time through videoconferencing technology. Sharing computer applications for collaboration can increase student’s
knowledge in subject areas. Videoconferencing is used for a variety of purposes, including formal instruction (courses, lessons, and tutoring), connection with guest speakers and experts, multi-school project collaboration, professional activities, and community events. Students and teachers can learn pertinent information about people of other nations.

Students and teachers learn through a team approach, by placing a video camera and seeing another person in color and using a white board (TSM, 2003). According to Science Mathematics and Technology Inc. (2001), the benefits of an interactive communication medium using, two-way video can be observed in a number of ways. Teachers and students can feel like they are in the same place as the participant. The visual connection and interaction among participants can enhance understanding and help participants feel connected to each other, and support collaboration among traditionally isolated institutions. A videoconference can improve knowledge retention and appeal to a variety of learning styles by including diverse media such as video or audio clips, graphics, animations, and computer applications (TSM, 2003).

A pilot study was conducted in Arabia, Eid Obeid Khalfan, general manager of the east coast region of Etisalat, Arabia believed “...video conferencing is an important tool in distance education.” The video conference sessions were conducted at schools in Khorfakkan and Dubai, Emirates, Arabia. According to the Highbeam website, 10 students from each elementary school were able to participate in a themed play with cartoon characters designed to teach the basic elements of physics (www.highbeam.com/library/03/2003). Relevant video conferencing tools can increase
the awareness of globalization in classroom environments. Video conferencing can be another way to implement technology applications.

Conclusion

As technology continues to become widespread, and proliferate in public and private school settings, the relationship between teachers and electronic technology can be inclusive and not exclusive in education. This issue can continue to impact patterns of social interaction and student achievement in the classroom.

This review of literature provides an image of technology as a way to develop teaching practices and implement technology integration of hardware and software, Mindtools, technological environments and videoconferencing all with the intention to enhance teaching practices and students' success.
CHAPTER 3

METHODOLOGY

Introduction/Overview

The primary purpose of this research study was to investigate teachers’ perspectives on technology integration with pedagogical practices and their perceptions of the correlation with student success. The variables such as gender, race, educational level and tenure will be considered to determine relationships with technology innovation.

In this chapter the methodology that is used to guide the research is described including a description and explanation of how the sample was selected, information about the instrument used, a presentation of reliability and validity of the instrument, and a discussion of the data analysis. This chapter also includes justification for the use of both quantitative and qualitative analyses.

The focus of the study is the integration of technology in classroom environments. For this reason, comparative analysis procedures were applied to determine differences in how teachers’ perception of technology relate to students’ success. A correlation analysis was used to assess significant relationships that include the factors of computer anxiety, teachers’ beliefs, and usefulness of computers, confidence, attitude, and gender bias about integrating technology. Chapter 3 is organized into the following sections: introduction/overview, research design, research context, research questions, research hypotheses, population and sample, instrumentation and procedures (part one quantitative and part two qualitative) data
analyses (part one quantitative and part two qualitative) and summarization of methodology.

Research Design

This research design incorporated quantitative and qualitative research methods, which make this a mixed method study. The objective of utilizing two types of analyses, quantitative and qualitative, is to build methodological triangulation. Triangulation is the process of collecting data from different sources (Woolf, 1988). In this study, methodological triangulation is achieved by combining two dissimilar data sources (interviews and institutional quantitative data) to answer the research questions. Utilizing this method strengthens and gives more value to the research study.

The quantitative method used includes a Likert scale questionnaire. This Computer Attitude Scale (CAS) and Computer Usage Scale (CUS) also known as Level of Technology Instrument (LOTI) is a 67-item questionnaire survey distributed to teachers at elementary schools. The variables being considered were liking, bias, anxiety, and confidence. Qualitative data was collected by conducting structured interviews. These measures consisted of standardized questions for elementary volunteer teachers from 10 of the 16 schools. The researcher created and used the same open-ended questions that guided the telephone interviews for each interview. Emerging themes were identified and used to analyze the data.

A pilot study was conducted to explore teaching practices as well as the use and non-use of technology. The sample in the pilot study consisted of one school
administrator and 12 teachers. Their teaching tenure ranged from one through 28 years in public education. The participants in the pilot study had the opportunity to complete the 67-item questionnaire available on the Internet using the website designed by the researcher. The survey consisted of two parts: part one measured attitudes and part two computer usage. The collected data was in digitized form, thus reducing the probability of human error normally associated with tabulating data from forms filled out by hand. This also enabled participants to complete the survey at their convenience.

The participants were also interviewed by telephone. Thirteen questions were presented. This inquiry helped to determine which questions would be best to use for the research population of the formal research project.

The Research Context

This study analyzes technology integration and teachers' perceptions of its correlation with student success. The study took place in five public school districts in the Southwestern United States. All of the schools in the study were elementary schools. The number of elementary schools in the districts ranged from two and as many as eight schools.

From these elementary schools, purposeful sampling was used to identify 13 out of the 16 interview sites. The researcher met with principals and identified which teachers were to be interviewed. Principals identified teachers who have some access to computers and the researcher asked others to volunteer. Teachers who volunteered
were not ordered to participate. From the total sample population, information was gathered regarding classroom teachers’ different levels of computer usage.

Some sites had computers in classrooms or had access to computers in laboratory settings. The amount of technology in the form of connectivity varied from school to school, classroom to classroom. There were many disparities found between school sites and teachers regarding technology automation. Teachers had various types of educational software applications on computers in use, with and without multimedia conference configurations. Some had the technological capability to access email or to share large files from correspondents, and to review websites via the Internet. Some teachers could connect to the internet and conduct multimedia classroom instruction and other conference configuration.

Research Questions

The following research questions were examined in this research study.

1. How do gender, race, tenure, educational level, familiarity with and access to technology impact teachers’ attitudes toward the use of technology in the classroom?

2. How do gender, race, tenure, educational level, familiarity with and access to technology impact teachers’ use of technology in the classroom?

3. What teaching styles, strategies, and other factors affect technology integration in the classroom.
Research Hypotheses

The following hypotheses were tested in this study:

Ho1. There are no statistically significant differences in attitudes of teachers towards use of technology in the classroom when controlling for gender, race, tenure and teacher educational level, familiarity with and access to technology impact teachers’ attitudes toward the use of technology in the classroom?

Ho2. There are no statistically significant differences in the teachers’ use of technology in the classroom when controlling for gender, race, tenure and teacher educational level, familiarity with and access to technology impact teachers’ use of technology in the classroom?

Population and Sample

The sample population of this study was drawn from 15 elementary schools from five school districts located in the Southwestern U.S. Teachers instructing in PreK-8th grades were a part of the study. The participants’ teaching tenure ranged from 1 year through 21 years and over. There was a variation in ethnic groups of the teachers being surveyed, consisting of American Indian or Alaskan Native, Asian or Pacific Islander, Black (non-Hispanic), White (non-Hispanic) Hispanic, Mexican American, Puerto Rican, Cuban, and Spanish, with the opportunity for the person taking the survey to write in additional ethnicity. Some teachers also had obtained degrees from associates to doctorates and had instructed at primary or elementary schools.
Although the majority of the teachers were female, the population also included males as well as retired military personnel. Several schools in the study are considered border schools due to their location within three to five miles of the border of Mexico. These Title I schools had a similar percent of minority students.

According to the Department of Education the program provides financial assistance through state educational agencies (SEAS) to local educational poor children help ensure that all children meet challenging state academic content and student academic achievement standards. Title I findings are received with the highest percentages of children from low-income families. Schools must focus Title I services to children who are failing, or most at risk of failing, to meet state academic standards. School enrolling more than 40% of students from poor families are eligible to use Title I funds for school wide programs that serve all children in the school. Most of the students several (65%) are in grades 1 through 6 and 12% are in preschool and kindergarten programs. (http://www.ed.gov/lprint/programs/titleiparta/index.html)

Two schools in the study were located on a military installation and considered accommodation schools for dependents of military personnel. Schools in the study had a student population as few as 100 students and high as 800 students. Schools were selected that were similar in size and their location. In each of the 15 elementary schools, all PreK-8th grade teachers were asked to participate in the quantitative part of the research study. One teacher from each of the eight school sites was randomly selected and interviewed. Six teachers volunteered from three schools to be a part of the study.

Comprehensive demographics are beyond the purview of this study. The teachers’ ethnicity, gender, age, teaching length, and current teaching grades are highlighted in the study. Teachers have various credentials identified in the study. Teachers’ with Associates, Bachelors, Masters, and Doctoral Degrees are identified.
Instrumentation and Procedures

The researcher submitted a written request to each of the 15 school sites for permission to conduct research. The request included the nature and purpose of the study and the methodology to be used to receive consent for the study. Principals received a letter requesting access to teachers and a copy of the consent form. The researcher attended staff meetings and explained the research and administered the survey.

The investigator conducted informational meetings at eight school sites and eight schools opted to receive the surveys in the mail and return them to the researcher. The informational staff meetings explained the nature and purpose of the study and requested participant volunteers. The consent forms were distributed with the permission of the principal and given to teachers at the beginning of staff meetings. Participants were requested and given ample time to read and sign the consent form (see Appendix C). Teachers were informed verbally and in writing that participation in the study will be strictly voluntary and they will be free to withdraw at any time during the study, establishing voluntary participation. Participants were also informed that confidentiality will be adhered to throughout the study and their identities would not be disclosed.

Quantitative Methods

To measure teachers’ perspectives of technology integration with pedagogical practices and their perceptions of the correlation with student success, a three-part survey
instrument was developed consisting of a survey instrument that was devised to gather 
(1) demographic data, (2) usage of computers and (3) attitudes about technology 
integration.

The instrument used for this research was based on two national surveys of 
teachers' pedagogy and use of computers. The survey instrument included six 
demographic questions, and 37 statements of the Levels of Technology Implementation 
(LOTI) instrument that determined the subjects' personal level of technology 
implementation in their classroom (Middleton & Murray, 1999). The questionnaire 
included the Computer Attitude Scale (CAS) developed by Loyd and Gressard, which 
included a Likert-type questionnaire instrument consisting of 23 positively and 
negatively worded statements of attitudes toward the use of computers (Gressard & 
Loyd, 1985). The Likert scale ranges for each item in part One on the questionnaire are 
as follows: Strongly Disagree, Disagree, Undecided, Agree, and Strongly Agree.

Part Two of the testing instrument consisted of Likert scale ranges for each item 
as follows: not applicable, not true of me now, somewhat true of me now, and very true 
of me now.

The Level of Technology Implementation (LOTI): A Guide for Measuring 
Classroom Technology Use, revised by Christopher Moersch of Learning Quest, Inc. 
(1994) (see Appendix A) has also been known as a component of the computer usage 
scale (CUS) which is an instrument designed to determine the level of technology 
implementation by each teacher. The intercorrelation of the two surveys helped develop 
the computer attitude and usage scale (CAAUS) of 67 questions for this research.
Moersch’s research determined that teachers’ level of technology implementation and investigated the correlation of students’ standardized test scores and teachers’ use of computers. He found that there was a significant difference between academic achievement and the use of technology. The validity of the instrument established by Moersch used Cronbach Alpha reliability testing was at the .870 level (Moersch, 1994). The analysis of variance procedure (ANOVA) was utilized to ascertain the status and influence on the variables. These findings support the research of Johnson and Johnson (1996), who determined that successful implementation of technology depends on the classroom teacher.

Loyd and Gressard, (1984) developed the CAS instrument that was used in part One of this study. This instrument was used by teachers to respond to six factors, developed to measure resistance to thinking about computer technology, fear of computers, and hostile or aggressive thoughts about computers (Loyd & Gressard, 1984). The researcher contacted Loyd and affiliates and Moersch Inc. to obtain permission to use the original survey and used four (likeness, anxiety, confidence, bias) of the six factors. In addition to this instrument, the researcher devised a survey instrument to gather demographic data included in part one of the instruments.

The procedures used to implement this instrument consisted of survey distribution to 16 school sites. Surveys were sent through postal service or delivered by the researcher. A school administrator (principal, assistant principal, administrative assistant) was appointed as the contact person. The researcher was also invited to attend staff meetings and distribute the surveys.
Teachers received a white envelope with a letter of consent requesting voluntarily participation. Teachers’ were instructed by the researcher to complete the survey instrument and return it to the researchers’ secured box placed near the exit of the room. Participating teachers who selected to withdraw from the research were instructed to return the survey form, and a copy of the survey questionnaire. They were informed not to write their names on the survey or envelope to secure confidentiality.

They were requested to place the completed survey in the white envelope and tear off the raffle ticket from and sealed envelope. Teachers’ were informed to place the envelope in the designated box. After all envelopes were handed in, the raffle was conducted. As an incentive to participate in the survey, every teacher who completed a survey had the opportunity to receive a raffle ticket to win free Educational software. The software included banking software in English and Spanish, and academic software to use as a tool for Math, Reading, and Science. At each of the 15 schools, two to five software packages were awarded to teachers. One school administrator used this time as an opportunity for staff to win free educational books. The raffle took place after all the surveys were completed and placed in the designated box. After all the surveys were collected from 15 schools, the data was tabulated into an electronic database.

**Qualitative Methods**

The grounded theory method of qualitative research is an inductive approach that uses a systematic set of procedures to arrive at a theory about basic social processes. The aim of this approach is to discover underlying social forces that shape human behavior by
means of interviews with open-ended questions and through skilled observations (LoBiondo-Wood & Haber, 1994). The qualitative component of the research consisted of a naturalistic approach that posits reality as holistic and continually changing.

The naturalistic approach provides much needed insights into information seeking experiences in the school environment (Westbrook, 1994). Qualitative analysis addresses not only the teachers’ perspectives but also the attitude of teachers toward integrating computers in the classroom. The research design of the qualitative component consists of interviewing teachers that use computers as part of their teaching practices. The justification for interviewing teachers is that they provide their beliefs, attitudes and perspectives about technology innovation.

In the qualitative phase of the study, data was collected to gather teachers’ perceptions of technology innovation. The interviews focused on the demographics of the participants, and the beliefs of teachers regarding the use of technology. Interviewing teachers “permit[s] the respondent to move back and forth in time” (Glaser & Strauss, 1967, p. 273). In addition, careful inventories and transcripts of all personal interview sessions were recorded and logged.

The researcher interviewed each teacher by telephone and used an audiotape recording system to record the time, questions, prompts and comments to each question. The flexibility of the interviewing technique allowed the investigator to probe, to clarify, and to create new questions based on what has already been heard (Westbrook, 1964). Thirteen interviews were transcribed into an electronic spreadsheet as sources of data.
collection. This limited predetermined conclusions about how technology was incorporated into the classroom.

Questions were developed from the pilot study. Also some of the interview questions developed by the researcher included questions from the survey that clarified teachers’ perception of technology integration. These were the questions in the order they were presented.

1. How long have you been teaching?
2. Have you always instructed at the same grade level?
3. What kind of teaching practices do you use in the classroom?
4. What kind of technology do you use in the class?
5. How much time on a daily basis do your students spend on the computer?
6. What are your thoughts and feelings about computers in the classroom?
7. How do you integrate teaching practices?
8. Is the current student-to-computer ratio in your classroom(s) sufficient for you to use computers(s) during your instructional day? (how many)
9. How do you help multilingual students with computers in your class?
10. How do you utilize access to computers?
11. How would you rate the technology at your site? Why?
12. Have the curriculum demands at your school (such as implementing standards and increasing student test scores) diverted your attention away from using the computers in your classroom? Or not? Why?
13. Do you think that more access to resources and /or training is needed?
Data Analysis

Quantitative Analysis

This study addresses the perceptions of technology and teaching practices and the correlation with student success. The survey instrument (Appendix A) for this study contained modified questions from a national survey. The original scale developed by Loyd and Gressard (1984) was revised to 23 items representing three subscales: anxiety, likeness, and confidence.

The revised scale, which includes 29 Likert style items, was found to be in variant conditions in terms of a number of factors and intercorrelations among the factors, including computer confidence and enjoyment of computer work.

The Computer Attitude Scale (CAS) developed by Moersch of Learning Quest, which is a Likert scale instrument consisting of positively and negatively worded statements of attitudes toward computers and the use of computers, included factors from Loyd and Gressard. CAS uses subscales based on the following factors: computer anxiety, computer confidence, computer liking, and usefulness. The computer attitude scale survey was subjected to three validation studies and proven to be a reliable measure of teachers’ use of technology and perceptions of students’ success (1984). The survey instrument for this research used several components, the first part included demographic data questions, the second part included the Level of technology instrument known as LOTI which test for computer usage. The third part incorporated questions about teachers’ attitudes toward computer use.
The three-part questionnaire was administered to 305 elementary teachers who taught in Pre K-8 grades. One hundred and ninety three surveys were returned from 16 elementary schools. Interviews were analyzed and coded for teachers' perspective of technology integration with pedagogical practices and their perceptions of the correlation with student success. Surveys were collected, numbered and coded by schools. Each question was analyzed and every question was included an electronic file in order to transfer into database format to analyze using SPSS software. T-test, ANOVA, and Pearson correlation were used to analyze quantitative data.

Qualitative Analysis

At the end of staff meetings a request for voluntary interviews were made to instructors. All teachers who completed the form and mailed in results were given a letter of request to volunteer in the qualitative component of the study. Teachers were requested to hand in paper separately from survey with their name, phone number and a convenient time for the 15-minute phone interview.

The analysis technique of qualitative research (Westbrook, 1994) that is developed in this study makes "replicable and valid inferences from data to their contest". The research design of the qualitative component consisted of a scripted interview with follow-up questions from 13 participants who teach in elementary schools. Data for this component was collected through standardized interviewing of 13 elementary teachers in 10 schools. Three of the teachers instructed at the same school. The researcher interviewed and documented the 13 telephone interviews, which are a part of the mixed
method mentioned in chapters 3 and 4. With the teachers’ approval the 15-minute telephone semi-structured interview comments were tape-recorded. The data was transcribed, and analyzed for thematic approach. This analysis included open-ended interviews that are based on specific questions, (Patton, 1990). Words spoken by the participants reflected his or her perceptions about the usage of computer technology (Vygotsky, 1987). The transcript was only a partial representation of the interviewing process. In addition, the researcher transcribed and took notes throughout the telephone interview sessions. The data collected from the interviews were analyzed using content analysis (Tsang, 2002).

The data was analyzed using a thematic approach of 13 participants. The researcher described created an explanation developed theories and linked the stories to those of the other participants. Themes emerged from these stories through what is known as the thematic approach, and the researcher/interviewer categorized this data in order to search for patterns and interpret the data collected (Glesne, 1998). The main objective of content analysis was to generate themes from the responses and use them for further analysis (Woolf, 1988). The researcher transcribed the interviews, then listened to, read and reviewed the transcripts to identify categories of responses. The comments were examined for similarities and differences in responses, as well as the frequency that certain concepts, keywords, and phrases appear in the responses. This was classified and the thematic approach was analyzed. Boyatzis’ (1998) thematic analysis and code development was performed to make meaning of the data. Categories were used in order to code and tabulate all responses. Similarities were found within the teacher integrators
that required a cyclical approach in which the collection of data affected the analysis of
data that helps to form theory (Mellon, 1990; Westbrook, 1994). While all the teachers
taught in primary or elementary settings, instructional methods and integration were not
always the same.

Isaac and Michael (1997) define descriptive research as a way to describe
systematically the facts and characteristics of a given population or area of interest,
factly and accurately (p. 46). The research questions that were investigated in this
study and the methods for analyzing them follow.

*Research Question 1.* How do gender, race, tenure, educational level, familiarity
with and access to technology impact teachers' attitudes toward the use of technology in
the classroom?

The distribution of teachers from elementary schools was compared on age, ethnic
composition, educational background, current teaching grade, and teacher tenure using
mean differences of each variable was determined. A significant positive Pearson
product-moment correlation was predicted between teachers' characteristics and the four
attitude strands of anxiety, confidence, bias (gender or racial), and liking.

A set of T tests were performed to examine CAS and the four subscale mean
score differences among male and female participants, ethnic groups and educational
background groups correlation coefficients was used in this analysis (Glass & Hopkins,
1984).
Descriptive statistics for each of the four subscales and the total CAS scale scores presents results of the Tukey (T) tests and analysis of variance (ANOVA) used to assess significant mean scores the different groups.

Research Question 2. How do gender, race, tenure, educational level, familiarity with and access to technology impact teachers' use of technology in the classroom?

Descriptive statistics for the computer usage scale was computed to identify the results of the Tukey tests (t-tests) and one-way ANOVA used to assess differences in computer usage or use of technology across various groups of gender, race, age, teacher tenure, and teacher educational level.

Teachers from 16 schools were compared by data from their gender, tenure, educational level, access to technology, and the use of technology using an omnibus ANOVA. The data detected $F = 4.044$ with ($P < .05$) (using an alpha level of .05). A follow up pair-wise comparison using the Bonferroni procedure was performed to identify the pairs of grades that differed significantly.

The Pearson Product Correlation was computed to examine the correlations. The six teachers' age groups were collapsed into three and the mean computer usage scores of the three age groups results of a one-way ANOVA.

A hierarchical regression analysis was used for Computer attitude scores and the correlation of Computer usage scores that would result in a significant increment to the multiple correlation coefficient (R) values.
Research Question 3. What teaching styles and strategies effectively incorporate technology in the classroom?

Thirteen teachers were interviewed for qualitative research. Weber (1990) characterized it as “a research method that uses a set of procedures to make valid inferences for text. This is based on the premise that many words from the interviews were categorized to share the same connotation (Weber, 1990). Telephone interviews were tape recorded and transcribed.

The investigator engaged in data analysis from 13 interviews. The data was coded for patterns and recognized emergent themes. Six themes were identified as coding categories for the data analysis. The constant comparative method, created by Glaser and Strauss (1967), was administered by transcribing data of incidents into categories of the teachers’ perspective of technology integration and their perceptions of student success.

Summary of the Methodology

This chapter explained the methods used in this quantitative and qualitative research study of teachers’ perspectives of technology integration with pedagogical practices and the correlation with student success.

Chapter 4 will present the results of the quantitative methodology. Chapter 5 will present the results of the qualitative methodology.
CHAPTER 4
QUANTITATIVE ANALYSIS

This chapter presents the results of the study and is presented in three major sections. The first section reports the achieved sample and the sample demographics. The second section reports the results of quantitative analysis of the data associated with research question 1. The third section reports the results of the analysis of the data associated with research question 2.

The core component of the survey instrument (Appendix B) is a web-based survey tool designed with an integrated database, developed by the research investigator. The database is used to accumulate data entered by both the research investigator and survey participants. Hard copies of the surveys were distributed at meetings and sent through the United States Postal Service. The 10 teachers who did not attend the meetings were able to participate in the survey by accessing the online website. A total of 192 surveys were accumulated by the researcher from online and mail-in surveys. The researcher was able to access the database online from all the surveys and export the raw data to SPSS version 11.0 for statistical analysis. This procedure of electronic surveying helped to ensure reliability and decrease a margin of error usually associated with the manual transcription from hard copies of the completed survey forms into the database. The achieved sample is reported in Table 1.
Sample of Population

A total of 306 surveys were sent teachers in elementary public schools in southeastern Arizona. A total of 192 surveys were returned (63% response rate). See Table 1.

Table 1

Survey Completions

<table>
<thead>
<tr>
<th>School ID</th>
<th>Number of Surveys Distributed</th>
<th>Percent of Total Distributed</th>
<th>Number of Surveys Completed</th>
<th>Return Rate (Percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A</td>
<td>25</td>
<td>8.17</td>
<td>2</td>
<td>8.0</td>
</tr>
<tr>
<td>2. B</td>
<td>22</td>
<td>7.19</td>
<td>16</td>
<td>73.0</td>
</tr>
<tr>
<td>3. C</td>
<td>16</td>
<td>5.23</td>
<td>6</td>
<td>37.5</td>
</tr>
<tr>
<td>4. D</td>
<td>26</td>
<td>8.49</td>
<td>13</td>
<td>50.0</td>
</tr>
<tr>
<td>5. E</td>
<td>24</td>
<td>7.84</td>
<td>24</td>
<td>100.0</td>
</tr>
<tr>
<td>6. F</td>
<td>16</td>
<td>5.23</td>
<td>10</td>
<td>62.5</td>
</tr>
<tr>
<td>7. G</td>
<td>14</td>
<td>4.57</td>
<td>11</td>
<td>78.5</td>
</tr>
<tr>
<td>8. H</td>
<td>15</td>
<td>4.90</td>
<td>11</td>
<td>73.0</td>
</tr>
<tr>
<td>9. I</td>
<td>11</td>
<td>3.59</td>
<td>9</td>
<td>82.0</td>
</tr>
<tr>
<td>10. J</td>
<td>20</td>
<td>6.53</td>
<td>13</td>
<td>70.0</td>
</tr>
<tr>
<td>11. K</td>
<td>19</td>
<td>6.21</td>
<td>7</td>
<td>37.0</td>
</tr>
<tr>
<td>12. L</td>
<td>21</td>
<td>6.86</td>
<td>10</td>
<td>48.0</td>
</tr>
<tr>
<td>13. M</td>
<td>30</td>
<td>9.80</td>
<td>27</td>
<td>90.0</td>
</tr>
<tr>
<td>14. N</td>
<td>24</td>
<td>7.84</td>
<td>23</td>
<td>96.0</td>
</tr>
<tr>
<td>15. O</td>
<td>23</td>
<td>7.52</td>
<td>13</td>
<td>56.5</td>
</tr>
<tr>
<td>Total</td>
<td>306</td>
<td>100</td>
<td>192</td>
<td>63.0</td>
</tr>
</tbody>
</table>
Survey participants were mostly female (84% female, 16% male) with ethnicity of 1.0% American Indian, 1.0% Asian, 1.6% Black, 71.4% White, Hispanic 22.9% and Other 2.1% (see Table 2).

Table 2

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indian</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Asian</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Black</td>
<td>3</td>
<td>1.6</td>
</tr>
<tr>
<td>White</td>
<td>137</td>
<td>71.4</td>
</tr>
<tr>
<td>Hispanic</td>
<td>44</td>
<td>22.9</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>2.1</td>
</tr>
<tr>
<td>Total</td>
<td>192</td>
<td>100.0</td>
</tr>
</tbody>
</table>

More than 50% of the teachers who participated in this study were age 46 and above, 32% were between 31 and 45 years of age and 12% were between 23 and 30 years of age. These categories are presented in Table 3.

The distribution of participating teachers’ educational background is shown in Table 4. More than half (57%) of the teachers who participated in this study had Bachelor’s degrees, while 39% had Masters level degrees. Relatively small proportions had associate degrees (1.6%) and 2% had Doctoral degrees.
Table 3

*Teacher’s Age*

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 or less</td>
<td>4</td>
<td>2.1</td>
</tr>
<tr>
<td>24 to 26</td>
<td>4</td>
<td>2.1</td>
</tr>
<tr>
<td>27 to 30</td>
<td>15</td>
<td>7.8</td>
</tr>
<tr>
<td>31 to 35</td>
<td>16</td>
<td>8.3</td>
</tr>
<tr>
<td>36 to 39</td>
<td>20</td>
<td>10.4</td>
</tr>
<tr>
<td>40 to 45</td>
<td>26</td>
<td>13.5</td>
</tr>
<tr>
<td>46 to 49</td>
<td>29</td>
<td>15.1</td>
</tr>
<tr>
<td>50 to 54</td>
<td>45</td>
<td>23.4</td>
</tr>
<tr>
<td>55 and older</td>
<td>31</td>
<td>16.1</td>
</tr>
<tr>
<td>No response</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>192</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4

*Teachers’ Educational Background*

<table>
<thead>
<tr>
<th>Qualifications</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associates</td>
<td>3</td>
<td>1.6</td>
</tr>
<tr>
<td>Bachelors</td>
<td>109</td>
<td>56.8</td>
</tr>
<tr>
<td>Masters</td>
<td>75</td>
<td>39.1</td>
</tr>
<tr>
<td>Doctoral</td>
<td>4</td>
<td>2.1</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
<td>.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>192</td>
<td>100.0</td>
</tr>
</tbody>
</table>
The distribution of grades represented across the various grade levels in the school systems are presented. Grades K–6 appear evenly distributed. A total of 27 teachers reported teaching in more than one grade (multigrade) which represents 4–5, 5–6, 7–8 grade combinations (see Table 5).

Table 5
Grades Taught

<table>
<thead>
<tr>
<th>Grades Taught</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>PreK – K</td>
<td>5</td>
<td>2.6</td>
</tr>
<tr>
<td>K</td>
<td>22</td>
<td>11.5</td>
</tr>
<tr>
<td>1</td>
<td>25</td>
<td>13.0</td>
</tr>
<tr>
<td>2</td>
<td>24</td>
<td>12.5</td>
</tr>
<tr>
<td>3</td>
<td>34</td>
<td>17.7</td>
</tr>
<tr>
<td>4</td>
<td>22</td>
<td>11.5</td>
</tr>
<tr>
<td>5 – 6</td>
<td>20</td>
<td>10.4</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>.5</td>
</tr>
<tr>
<td>Multigrade</td>
<td>27</td>
<td>5.2</td>
</tr>
<tr>
<td>Title I</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>LD</td>
<td>9</td>
<td>4.7</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
<td>.5</td>
</tr>
<tr>
<td>Total</td>
<td>192</td>
<td>100.0</td>
</tr>
</tbody>
</table>
The distribution of the sample across the various levels of teaching tenure is presented (see Table 6). The sample is a comparatively wide coverage of various levels of tenure with higher representation of longer teaching experience. Teachers who have taught for 6-10 years were 22.9% of the sample, while those with 11-20 years of teaching experience were about 29.7% of the sample with the highest teaching tenure. Teachers, who taught 21 years and over, were about 24.0% of the sample.

Table 6
Teacher Tenure

<table>
<thead>
<tr>
<th>Number of Years Instructing</th>
<th>Frequency</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-1</td>
<td>13</td>
<td>6.8</td>
</tr>
<tr>
<td>2-5</td>
<td>31</td>
<td>16.1</td>
</tr>
<tr>
<td>6-10</td>
<td>44</td>
<td>22.9</td>
</tr>
<tr>
<td>11-20</td>
<td>57</td>
<td>29.7</td>
</tr>
<tr>
<td>21 over</td>
<td>46</td>
<td>24.0</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Total</td>
<td>192</td>
<td>100.0</td>
</tr>
</tbody>
</table>
The Results of the Computer Attitude Scale

Research Question 1

How do gender, race, tenure, educational level, familiarity and access to technology impact teachers’ attitudes toward the use of technology in the classroom?

The Computer Attitude Scale is multidimensional with four attitude strands as follows: anxiety; confidence; bias (gender or racial); and liking. A total computer attitude score (CAS) and separate sub-scores or part scores for anxiety, confidence, bias and liking were computed.

Research Hypothesis 1

H01 There are no statistically significant differences in attitudes of teachers’ towards use of technology in the classroom when controlling for gender, race, tenure, educational level, familiarity with and access to technology.

H01 was rejected due to significant differences in teachers’ attitudes towards the usage of technology in the classroom measured by an independent T-test. Pearson product moment correlations were computed to examine the correlations among the groups. The statistical significance (alpha < .05) and impact of the correlation were examined. One-way ANOVA were computed to identify which of the groups had a statistically significant difference.
Table 7 shows the Pearson correlation coefficients among the scores. As indicated in Table 7 a high confidence in computer technology has a strong positive relationship with liking computers. Teachers who reported a high confidence in computers also had high liking scores with a correlation coefficient of .81. The bias score has no relationship with liking and confidence scores and a very weak positive relationship with anxiety.

Table 7

Pearson Correlations of Total Attitude Score and Subscales

<table>
<thead>
<tr>
<th></th>
<th>Computer Attitude</th>
<th>Anxiety</th>
<th>Confidence</th>
<th>Bias</th>
<th>Like</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Computer Attitude</td>
<td>1.000</td>
<td>-.297**</td>
<td>.390**</td>
<td>.047</td>
<td>.374**</td>
</tr>
<tr>
<td>2. Anxiety</td>
<td>-.297</td>
<td>1.000</td>
<td>-.336**</td>
<td>.237**</td>
<td>-.364**</td>
</tr>
<tr>
<td>3. Confidence</td>
<td>.390</td>
<td>-.336</td>
<td>1.000</td>
<td>.012</td>
<td>.807**</td>
</tr>
<tr>
<td>4. Bias</td>
<td>.047</td>
<td>.237</td>
<td>.012</td>
<td>1.000</td>
<td>.009</td>
</tr>
<tr>
<td>5. Like</td>
<td>.374</td>
<td>-.364</td>
<td>.807</td>
<td>.009</td>
<td>1.000</td>
</tr>
</tbody>
</table>

p = <.05*  <.01**
The anxiety scores show a negative and low strength correlation with confidence and liking. These results may suggest that teachers who are confident about computers and like using computers would naturally be less anxious about using a computer in the classroom. The total CAS score is moderately correlated with the subscales. This is understandable since the subscales are components of the total score (see Table 8).

**Descriptive Findings**

The descriptive statistics for each of the four subscales and the total CAS scale scores are presented in this section. The results of the T tests and ANOVAs used to assess if there were statistically significant means scores among the different groups (i.e. male versus female, ethnic groups, age groups etc.) are also included.

Participating teachers reflected relatively low anxiety scores, indicating low levels of anxiety about computer technology in the classroom. They have fairly high levels of confidence and, very low bias scores, indicating low levels of race and gender bias among the teachers in the sample. Teachers also generally like using computer technology in their classrooms. Overall, teachers seem to show a moderately positive attitude towards computer technology in the classroom (see Table 9).
### Table 8

Regression Analysis results for Computer Attitude Scores

**Models Summary of Subscales**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R Square Change</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F Change</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>df1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>df2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sig. F Change</td>
</tr>
<tr>
<td>1</td>
<td>.443(a)</td>
<td>.196</td>
<td>.179</td>
<td>35.015</td>
<td>.196</td>
</tr>
</tbody>
</table>

*Predictors: (Constant), LIKE score, BIAS score, Anxiety score, Confidence score*
Table 9

Descriptive Statistics for Computer Attitude Scale and Subscales

<table>
<thead>
<tr>
<th>Scales</th>
<th>n</th>
<th>Total Score</th>
<th>Mean</th>
<th>S.E</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>193</td>
<td>29</td>
<td>13.38</td>
<td>.278</td>
<td>3.860</td>
</tr>
<tr>
<td>Confidence</td>
<td>193</td>
<td>35</td>
<td>26.15</td>
<td>.422</td>
<td>5.863</td>
</tr>
<tr>
<td>Bias</td>
<td>193</td>
<td>20</td>
<td>5.01</td>
<td>.149</td>
<td>2.073</td>
</tr>
<tr>
<td>Liking</td>
<td>193</td>
<td>30</td>
<td>20.32</td>
<td>.408</td>
<td>5.670</td>
</tr>
<tr>
<td>Computer Attitude Scale</td>
<td>193</td>
<td>114</td>
<td>64.85</td>
<td>.762</td>
<td>10.584</td>
</tr>
</tbody>
</table>

Computer attitude by gender. A set of t-tests were performed to examine CAS and the four subscale means score differences among male and female participants, ethnic groups, and educational background groups. Table 10 presents mean scores by gender group. In the attitude scores for males and females, the small differences may be due to the relatively higher number of female teachers in the sample.

In Table 10 the mean Anxiety score for females indicate 13.48, where as the mean score for females’ confidence level is 26.22. Bias mean scores for females is 5.01. The mean liking score for females’ is 20.50. The total Computer Attitude scale (CAS) mean score for females is 65.21 and the total CAS mean score for males is 63.52. This indicates shows no significant differences among male and female mean scores.

T-tests were used to compare male and female means in the CAS and the four subscales. The t-test results for male and female means comparisons are reported in Table 10. The t-test results indicate that there are no significant differences among the male and female teachers’ mean scores for all four computer attitude subscales, as well as for the total CAS means scores.
Table 10

*Anxiety, Confidence, Bias, Liking Subscales, and Computer Attitude Scale*

*Mean Scores by Gender*

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>159</td>
<td>13.48</td>
<td>3.876</td>
<td>.81</td>
<td>.377</td>
</tr>
<tr>
<td>Male</td>
<td>31</td>
<td>12.81</td>
<td>3.798</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confidence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>159</td>
<td>26.22</td>
<td>5.654</td>
<td>.30</td>
<td>.761</td>
</tr>
<tr>
<td>Male</td>
<td>31</td>
<td>25.87</td>
<td>6.766</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bias</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>159</td>
<td>5.01</td>
<td>2.094</td>
<td>.46</td>
<td>.646</td>
</tr>
<tr>
<td>Male</td>
<td>31</td>
<td>5.19</td>
<td>1.939</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Like</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>159</td>
<td>20.50</td>
<td>5.565</td>
<td>.78</td>
<td>.438</td>
</tr>
<tr>
<td>Male</td>
<td>31</td>
<td>19.65</td>
<td>5.897</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Attitude</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>159</td>
<td>65.21</td>
<td>9.940</td>
<td>.82</td>
<td>.415</td>
</tr>
<tr>
<td>Male</td>
<td>31</td>
<td>63.52</td>
<td>13.276</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Computer attitude by ethnicity.* Another t-test was performed to determine the impact of the teachers' ethnicity on their Anxiety, Confidence, Bias and Liking subscale scores and on the total Computer Attitude Scale (CAS) scores. The group statistics for ethnicity and t-test results are reported in Table 11. The Ethnic groups have been
collapsed into two groups; 'White' and non-'White' for purposes of this analysis. Both White and Non-White teachers had the lowest mean value for the bias score subscale.

Conversely, the White and Non-White teachers both had the highest mean value for the CAS subscale. However, the difference between mean values for both groups appeared to be minimal across all five subscales.

There are no statistically significant differences between White and non-White teacher’s attitude towards computers in the classroom. This is an indication that ethnicity may have no impact on the teachers’ attitude towards use of computers in the classroom (see Table 11).

Table 11

<table>
<thead>
<tr>
<th>Scales</th>
<th>Ethnicity</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>Non-White</td>
<td>52</td>
<td>13.56</td>
<td>3.680</td>
<td>.40</td>
<td>.69</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>137</td>
<td>13.31</td>
<td>3.977</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confidence</td>
<td>Non-White</td>
<td>52</td>
<td>26.96</td>
<td>4.686</td>
<td>1.14</td>
<td>.258</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>137</td>
<td>25.87</td>
<td>6.310</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bias</td>
<td>Non-White</td>
<td>52</td>
<td>5.27</td>
<td>2.224</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>137</td>
<td>4.94</td>
<td>2.014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Like</td>
<td>Non-White</td>
<td>52</td>
<td>20.58</td>
<td>5.127</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>137</td>
<td>20.31</td>
<td>5.887</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Attitude</td>
<td>Non-White</td>
<td>52</td>
<td>66.37</td>
<td>6.454</td>
<td>1.12</td>
<td>.265</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>137</td>
<td>64.43</td>
<td>11.808</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Ethnic groups were collapsed into two categories: white and non-white
Computer attitude by educational background. Mean computer attitude scores by the teacher’s educational background are reported in Table 12. Teachers’ with Associates and Bachelors degrees score at the same level as teachers with Masters and Doctoral degrees in the total attitude scale as well as in the four subscales. The differences in the means for these two groups appear minimal.

A set of t-tests was applied to the CAS scores and the four subscale scores to determine whether the teachers’ educational background had any impact on their attitude towards the use of computer technology in the classroom. The t-tests results are reported in Table 12.

The t-test results reflected in this table show that there were no significant differences detected between the means for teachers with Associate and Bachelors degrees and those with Masters and Doctoral degrees, indicating that teachers’ educational background is not influencing their attitude towards the use of computer technology in the classroom.
Table 12

*Computer Attitude Scale and Subscales by Educational Background*

<table>
<thead>
<tr>
<th>Scale</th>
<th>Educational Background</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>A.A and B.A., B.S.</td>
<td>112</td>
<td>13.23</td>
<td>3.727</td>
<td>.68</td>
<td>.496</td>
</tr>
<tr>
<td></td>
<td>M.A. and Doctorate</td>
<td>79</td>
<td>13.62</td>
<td>4.068</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confidence</td>
<td>A.A and B.A., B.S</td>
<td>112</td>
<td>26.63</td>
<td>5.073</td>
<td>1.48</td>
<td>.140</td>
</tr>
<tr>
<td></td>
<td>M.A. and Doctorate</td>
<td>79</td>
<td>25.35</td>
<td>6.784</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bias</td>
<td>A.A and B.A., B.S</td>
<td>112</td>
<td>5.02</td>
<td>1.968</td>
<td>.18</td>
<td>.855</td>
</tr>
<tr>
<td></td>
<td>M.A. and Doctorate</td>
<td>79</td>
<td>4.96</td>
<td>2.221</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Like</td>
<td>A.A and B.A., B.S</td>
<td>112</td>
<td>20.84</td>
<td>5.025</td>
<td>1.69</td>
<td>.093</td>
</tr>
<tr>
<td></td>
<td>M.A. and Doctorate</td>
<td>79</td>
<td>19.44</td>
<td>6.401</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer</td>
<td>A.A and B.A., B.S</td>
<td>112</td>
<td>65.71</td>
<td>6.700</td>
<td>1.51</td>
<td>.134</td>
</tr>
<tr>
<td>Attitude</td>
<td>M.A. and Doctorate</td>
<td>79</td>
<td>63.38</td>
<td>14.355</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Results of the Computer Usage Scale

*Research Question 2*

How do gender, race, tenure, educational level, familiarity and access to technology impact teachers' usage of technology in the classroom?
This section reports both the descriptive statistics for the Computer Usage Scale (CUS) scores and further presents results of the t-tests and ANOVAs used to assess differences in computer usage or use of technology in the classroom across various groups such as, gender, race, age, teacher tenure, and teacher educational level.

**Research Hypothesis**

The following hypothesis was tested in this study:

Ho2 There are no statistically significant differences in teachers' usage of computers in the classroom when controlling for gender, race, tenure, educational level, familiarity with and access to technology.

Ho2 was rejected due to significant differences among teachers' computer usage scores of ethnic groups measured by an independent T-test. Pearson Product moment correlations were computed to examine the correlations among the groups. The statistical significance (alpha p < .05) and impact of the correlation were examined. All Pearson-Product moment correlations among the groups were positive and statistically significant.

**Group Statistics**

**Computer usage by gender.** An independent t-test was used to compare the computer usage mean scores for male and female teachers in the sample; the results are reported in Table 13. The results of the t-test show that the difference between a mean score of 100.82 for female teachers and a mean of 111.74 for male teachers is not
This result indicates that in the sample of 192 teachers, gender makes no noticeable difference in the use of computers in the classroom by teachers.

Table 13

*Independent T-Test Comparing Computer Usage Mean Scores by Gender*

<table>
<thead>
<tr>
<th>Computer Usage</th>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>159</td>
<td>100.82</td>
<td>39.951</td>
<td>1.44</td>
<td>.152</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>31</td>
<td>111.74</td>
<td>31.524</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 14 indicates the independent samples t-test for equality. An independent sample t-test was used to compare the male and females computer usage. The t-test shows the mean scores difference of -10.924.

*Computer usage by ethnic group.* The ethnic groups have been collapsed into two groups; White and Non-White for purposes of this analysis. The re-grouping of the teachers by the two groups yielded 51 Non-White and 137 White teachers as shown in Table 15. The CUS mean score for White teachers was 108.5 with a standard error of the mean of 3.18 and 84.6 with a standard error of the mean of 4.86 for the Non-White teachers.
Table 14

Independent Samples Test for Equality of Male and Female Computer Usage Mean Scores

<table>
<thead>
<tr>
<th>Computer Usage Score</th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>Equal variances</td>
<td>1.192</td>
<td>.276</td>
<td>-1.437</td>
</tr>
<tr>
<td>not assumed</td>
<td>-1.684</td>
<td>50.785</td>
<td>.098</td>
</tr>
</tbody>
</table>
An independent t-test was used to determine if the observable CUS mean score differences were statistically significant. According to the results of the t-test results shown in Table 16, t = -3.978 is statistically significant p < .05. This is an indication that a mean difference of 23.87 between the White teachers and Non-White teachers’ Computer Usage mean score is statistically significant. Since the White teachers have the higher mean, it can be concluded that computer usage in classrooms across the sample population is more prevalent across classrooms taught by White teachers and less prevalent in classrooms taught by Non-White teachers.

Table 15

*Computer Usage Mean Scores by Ethnic Group*

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>S.E. Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Usage</td>
<td>Non-White</td>
<td>51</td>
<td>84.59</td>
<td>34.729</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>137</td>
<td>108.46</td>
<td>37.245</td>
</tr>
</tbody>
</table>

An independent t-test was used to determine if the observable CUS mean score differences were statistically significant. According to the results of the t-test results shown in Table 16, t = -3.978 is statistically significant p < .05. This is an indication that a mean difference of 23.87 between the White teachers and Non-White teachers’ Computer Usage mean score is statistically significant. Since the White teachers have the higher mean, it can be concluded that computer usage in classrooms across the sample population is more prevalent across classrooms taught by White teachers and less prevalent in classrooms taught by Non-White teachers.
Table 16

Comparison of Computer Usage Mean Scores for White and Non-White Teachers

<table>
<thead>
<tr>
<th></th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>Computer Usage Score</td>
<td>Equal variances assumed</td>
<td>.931</td>
<td>.336</td>
</tr>
<tr>
<td></td>
<td>Equal variances not assumed</td>
<td>-4.108</td>
<td>95.541</td>
</tr>
</tbody>
</table>

**Note:** The table shows the results of the Levene's Test for Equality of Variances and the t-test for Equality of Means. The 95% Confidence Interval of the Difference is also provided.
Computer usage by teachers’ educational background. The four categories of teachers’ educational background; Associate, Bachelors, Masters, and Doctoral degrees were collapsed into two groups to increase the sample sizes and increase the power of the test to detect significant differences in the computer scores of teachers with different educational backgrounds. The descriptive statistics for the new groupings are reported in Table 17. The mean computer usage score for teachers with Associate and Bachelor degrees is slightly higher than that of teachers with Masters and Doctoral degrees.

Table 17

Computer Usage Score by the Teacher’s Educational Background

<table>
<thead>
<tr>
<th>Educational Background</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>S.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Usage Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate and Bachelors Degree</td>
<td>112</td>
<td>104.37</td>
<td>39.660</td>
<td>3.747</td>
</tr>
<tr>
<td>Masters and Doctoral Degree</td>
<td>79</td>
<td>99.16</td>
<td>36.897</td>
<td>4.151</td>
</tr>
</tbody>
</table>

An independent t-test was performed to determine whether this slight difference is statistically significant. Table 18 shows that a mean difference of 5.20 between the two groups of teachers is not statistically significant. The results lead the researcher to
conclude that teachers’ educational background does not seem to impact their usage of computers in the classroom.

In a related study (Christensen, 1998), attitudes of teachers with higher levels of education became more positive and they were confident in their use of technology, and their classroom utilization increased. In another related study (Norris, Sullivan, Poirot, & Solway, 2003) use of technology in the curriculum were examined. According to this research, 14% of United States K-12 teachers make no use of computers for instructional purposes, and nearly half (45%) use it with their students less than 15 minutes per week. The inverse of this would be 18% of respondents report using computers for instructional purposes more than 45 minutes per week (p. 1).

Computer usage score by the grade taught by the teachers. Table 19 shows the computer usage mean scores by grade taught. Grade four’s mean computer usage score of 127.68 is statistically different than grade pre K - K mean of 83.11 (p. < .05) and grade two’s mean of 91.96 (p < .05). The computer usage means scores among the remaining grades were not statistically significant.
Table 18

Comparison of Computer Usage Mean Scores for Bachelors and Associate Degree Holders with Masters and Doctoral Degree Holders

<table>
<thead>
<tr>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>Computer Usage, Equal variances assumed</td>
<td>.499</td>
<td>.481</td>
</tr>
<tr>
<td>Computer Usage, Equal variances not assumed</td>
<td>.930</td>
<td>175.180</td>
</tr>
</tbody>
</table>
Table 19

Computer Usage Mean Scores by Grade Taught by the Teacher

<table>
<thead>
<tr>
<th>Grades teaching</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>Std. Error</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PreK - K</td>
<td>27</td>
<td>83.11</td>
<td>34.058</td>
<td>6.554</td>
<td>69.64</td>
<td>96.58</td>
<td>4</td>
<td>153</td>
</tr>
<tr>
<td>1-2</td>
<td>49</td>
<td>91.96</td>
<td>37.482</td>
<td>5.355</td>
<td>81.19</td>
<td>102.73</td>
<td>3</td>
<td>204</td>
</tr>
<tr>
<td>3</td>
<td>34</td>
<td>106.32</td>
<td>34.773</td>
<td>5.964</td>
<td>94.19</td>
<td>118.46</td>
<td>30</td>
<td>181</td>
</tr>
<tr>
<td>4</td>
<td>22</td>
<td>124.68</td>
<td>37.315</td>
<td>7.956</td>
<td>108.14</td>
<td>141.23</td>
<td>67</td>
<td>224</td>
</tr>
<tr>
<td>5 &amp; 6</td>
<td>20</td>
<td>116.00</td>
<td>31.563</td>
<td>7.058</td>
<td>101.23</td>
<td>130.77</td>
<td>56</td>
<td>162</td>
</tr>
<tr>
<td>Multi, gifted,</td>
<td>28</td>
<td>109.36</td>
<td>39.536</td>
<td>7.472</td>
<td>94.03</td>
<td>124.69</td>
<td>44</td>
<td>171</td>
</tr>
<tr>
<td>K-8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spec. Ed,</td>
<td>11</td>
<td>107.82</td>
<td>39.832</td>
<td>12.010</td>
<td>81.06</td>
<td>134.58</td>
<td>43</td>
<td>174</td>
</tr>
<tr>
<td>LD, Title I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>191</td>
<td>103.02</td>
<td>38.105</td>
<td>2.757</td>
<td>97.58</td>
<td>108.45</td>
<td>3</td>
<td>224</td>
</tr>
</tbody>
</table>
An Omnibus ANOVA was performed on the data to determine whether there were any statistically significant differences in the computer usage scores of teachers teaching different grades. Table 20 shows that there are differences in computer usage among the different grades. \( F=4.044 \) with \( P<.05 \). A follow up Pair-wise comparison using the Bonferroni procedure was performed to identify the pairs of grades that actually differed significantly. The Pair-wise comparisons are reported in Table 21.

Table 20

*ANOVA Results for Computer Usage Scores Across the Grades Taught by the Teacher*

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>32138.089</td>
<td>6</td>
<td>5356.348</td>
<td>4.044</td>
<td>.001</td>
</tr>
<tr>
<td>Within Groups</td>
<td>243736.864</td>
<td>184</td>
<td>1324.657</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>275874.953</td>
<td>190</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 21 shows the multiple comparisons of the Computer Usage mean scores across the seven grade categories. Grade one Pre K-K mean of 41.571 has a statistically significant difference from Grade K mean of 32.723 (\( p < .05 \)) and the Grade one mean of 18.358 (\( p < .05 \)). The other comparisons of the computer usage mean scores among grades were not statistically significant.
Table 21

*Multiple Comparisons of CUS Across the Grades — Dependent Variable: Computer Usage Score (CUS Score)*

<table>
<thead>
<tr>
<th>Bonferroni</th>
<th>(I) Recoded Grade</th>
<th>(J) Recoded Grade Names and Codes</th>
<th>Mean Difference</th>
<th>S.E</th>
<th>Sig.</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1 Pre-K</td>
<td>41.571(*)</td>
<td>10.453</td>
<td>.002</td>
<td>9.37</td>
<td>73.78</td>
</tr>
<tr>
<td>2</td>
<td>K</td>
<td>32.723(*)</td>
<td>9.341</td>
<td>.012</td>
<td>3.95</td>
<td>61.50</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>18.358</td>
<td>9.959</td>
<td>1.000</td>
<td>-12.32</td>
<td>49.04</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>8.682</td>
<td>11.245</td>
<td>1.000</td>
<td>-25.96</td>
<td>43.33</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>15.325</td>
<td>10.369</td>
<td>1.000</td>
<td>-16.62</td>
<td>47.27</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>16.864</td>
<td>13.440</td>
<td>1.000</td>
<td>-24.54</td>
<td>58.27</td>
</tr>
</tbody>
</table>

(*) The mean difference is significant at the .05 level.

Figure 1 shows the means of the six grades graphically. Teachers who instruct second grade use computers more than teachers instructing in first grade.

*Computer usage by teachers’ age.* The impact of the teachers’ age on their use of computers in the classroom was also examined. The teachers’ six age groups were collapsed into three and the mean computer usage scores of the three age groups were compared using an ANOVA. The descriptive statistics for the three age groups are reported in Table 22.
Figure 1. Computer usage mean scores by grade taught by the teacher.

### Table 22

Computer Usage Mean Scores by Teacher's Age

<table>
<thead>
<tr>
<th>Age</th>
<th>N</th>
<th>Mean</th>
<th>S.D</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Min. score</th>
<th>Max. score</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 to 30 Years</td>
<td>23</td>
<td>98.74</td>
<td>48.674</td>
<td>10.149</td>
<td>Lower Bound: 77.69</td>
<td>Upper Bound: 119.79</td>
<td>3</td>
</tr>
<tr>
<td>31 to 45 Years</td>
<td>62</td>
<td>107.56</td>
<td>37.911</td>
<td>4.815</td>
<td>Lower Bound: 97.94</td>
<td>Upper Bound: 117.19</td>
<td>5</td>
</tr>
<tr>
<td>46 Years and above</td>
<td>105</td>
<td>100.62</td>
<td>37.043</td>
<td>3.615</td>
<td>Lower Bound: 93.45</td>
<td>Upper Bound: 107.79</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>190</td>
<td>102.66</td>
<td>38.817</td>
<td>2.816</td>
<td>Lower Bound: 97.10</td>
<td>Upper Bound: 108.21</td>
<td>3</td>
</tr>
</tbody>
</table>
The ANOVA results shown in Table 23 indicate no statistically significant differences among the computer usage mean scores across the three age groups. This result indicates that the age of the teachers makes no significant impact on the amount of computer usage in their classrooms.

Table 23

**Analysis of Variance to Demonstrate Computer Usage Scores Among Age Groups**

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>2,282.325</td>
<td>2</td>
<td>1,141.162</td>
<td>.755</td>
<td>.471</td>
</tr>
<tr>
<td>Within Groups</td>
<td>282,498.439</td>
<td>187</td>
<td>1,510.687</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>284,780.763</td>
<td>189</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Correlations of Computer Attitude and Computer Usage Scores

Pearson Correlations was performed using the Computer Usage Scale (CUS) scores as the dependent variable and teachers' educational background, teacher's age, ethnicity, teaching grade, and gender as independent variables. The correlations between the CUS scores and CAS scores, ethnicity and teaching grade were statistically significant at P< .05, as reflected in Table 24.

The partial correlations between CUS scores and teaching grade and teachers' ethnicity were .251 and .260 respectively. The correlation between CAS scores, computer usage, teaching grade, and ethnicity were .328, .151, and -.069 respectively.
Table 24  
*Pearson Correlations Between the CUS Scores, CAS Scores and the Teachers’ Background Variables*

<table>
<thead>
<tr>
<th></th>
<th>CUS</th>
<th>CAS</th>
<th>Educational Background</th>
<th>Grade</th>
<th>Teacher’s Age</th>
<th>Ethnicity</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Computer Usage</td>
<td>1.000</td>
<td>.328**</td>
<td>-.041</td>
<td>.251**</td>
<td>.016</td>
<td>.260**</td>
<td>.120</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>p=.000</td>
<td>p=.290</td>
<td>p=.000</td>
<td>p=.414</td>
<td>p=.000</td>
</tr>
<tr>
<td>2. Computer Attitude</td>
<td></td>
<td></td>
<td>1.000</td>
<td>-.097</td>
<td>.151*</td>
<td>-.014</td>
<td>-.069</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>p=.096</td>
<td>p=.021</td>
<td>p=.423</td>
<td>p=.177</td>
</tr>
<tr>
<td>3. Educational Background</td>
<td></td>
<td></td>
<td>1.000</td>
<td>.040</td>
<td>.165*</td>
<td>.199**</td>
<td>-.037</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>p=.293</td>
<td>p=.013</td>
<td>p=.003</td>
<td>p=.310</td>
</tr>
<tr>
<td>4. Grade</td>
<td></td>
<td></td>
<td></td>
<td>1.000</td>
<td>.057</td>
<td>.022</td>
<td>.217**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>p=.222</td>
<td>p=.381</td>
<td>p=.002</td>
</tr>
<tr>
<td>5. Teacher’s Age</td>
<td></td>
<td></td>
<td></td>
<td>1.000</td>
<td>.306**</td>
<td>.062</td>
<td>.082</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>p=.000</td>
<td>p=.200</td>
<td></td>
</tr>
<tr>
<td>6. Teacher’s Ethnicity (White/non-White)</td>
<td></td>
<td></td>
<td></td>
<td>1.000</td>
<td>.033</td>
<td>.032</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>p=.329</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Gender</td>
<td></td>
<td></td>
<td></td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

p < .01**  
p < .05*
A step-wise regression analysis was used to determine the unique contributions made by each of the three independent variables to the variance of the CUS scores. Table 25 shows that when CAS scores are entered first as a predictor of CUS, R was .328, when teacher ethnicity is added to the regression model with CAS scores and teachers' ethnicity as the two predictors, multiple R was .433, and when teaching grade is added as a third predictor variable, multiple R increased to .475. The combined predictive power of the three variables is 23%. The teachers' attitude toward the use of computers in the classroom (CAS scores), teachers' ethnicity, and teaching grade, together, account for 23% of the variance of the CUS scores.

The impact of each predictor variable was assessed through the amount of change observed in the percentage variance explained by the model after the addition of the predictor variable. The R-square change reported in Table 25 shows that initially the CAS scores explain 11% of the variance of the CUS scores. When teachers' ethnicity is added to the model, there is an additional 8% explained variance added and teaching grade adds about 4% of additional variance explained by the model.
Table 25

Regression Analysis Results for Computer Usage Scores

Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>S.E. of the Estimate</th>
<th>RSquare Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.328(a)</td>
<td>.107</td>
<td>.102</td>
<td>35.519</td>
<td>.107</td>
<td>21.888</td>
<td>1</td>
<td>182</td>
<td>.000</td>
</tr>
<tr>
<td>2</td>
<td>.433(b)</td>
<td>.187</td>
<td>.178</td>
<td>33.983</td>
<td>.080</td>
<td>17.827</td>
<td>1</td>
<td>181</td>
<td>.000</td>
</tr>
<tr>
<td>3</td>
<td>.475(c)</td>
<td>.225</td>
<td>.212</td>
<td>33.275</td>
<td>.038</td>
<td>8.790</td>
<td>1</td>
<td>180</td>
<td>.003</td>
</tr>
</tbody>
</table>

a Predictors: (Constant), CASSCORE
b Predictors: (Constant), CASSCORE, Teacher's Ethnicity
c Predictors: (Constant), CASSCORE, Teacher's Ethnicity, Recoded grade
A second regression analysis examined the extent to which the Computer Attitude scale scores could be predicted from the teachers' background variables and how much impact each would have on the predictive power of the group of the independent variables. All other variables (educational background, teacher's age, ethnicity and gender) were not significantly correlated with the CAS scores. Significant correlations were found between CAS and the teachers' background variables (Table 26); therefore, a regression analysis was conducted. The adjusted $R^2$ for the significant correlation indicates that 1.7% of the variance of the CAS score can be attributed to the teachers' background variable.

Table 27 shows that the Teaching Grade variable had a very minimal but significant correlation of .151 with the CAS scores. This indicates that teachers' grade explains .023 percent of the variance in the CAS scores. The other background variables (educational background, teacher's age, ethnicity and gender) did not have a statistically strong linear relationship with the CAS scores.
Table 26

Pearson Correlations Between CAS Scores and the Teachers’ Background Variables

<table>
<thead>
<tr>
<th></th>
<th>CAS</th>
<th>Ed. Backgrd. *</th>
<th>Grade</th>
<th>Age</th>
<th>Ethnicity</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Computer Attitude</td>
<td>1.000</td>
<td>-0.097</td>
<td>0.151*</td>
<td>-0.014</td>
<td>-0.069</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Educational Background</td>
<td></td>
<td>1.000</td>
<td>0.040</td>
<td>0.165</td>
<td>0.199</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Teaching Grade</td>
<td></td>
<td>1.000</td>
<td>0.057</td>
<td>0.217</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Teacher's Age</td>
<td></td>
<td>1.000</td>
<td>0.306</td>
<td>0.062</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Teacher's Ethnicity (White/Non-White)</td>
<td></td>
<td>1.000</td>
<td>0.033</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Gender</td>
<td></td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Educational Background

* p = < .05
Table 27

Regression Analysis Results: Model Summary of Teaching Grade Variables of Computer Attitude Score

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>S.E. of the Estimate</th>
<th>Change Statistics</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R Square Change</td>
<td>F Change</td>
</tr>
<tr>
<td>1</td>
<td>.151(a)</td>
<td>.023</td>
<td>.017</td>
<td>10.581</td>
<td>.023</td>
<td>4.226</td>
</tr>
</tbody>
</table>

a Predictors: (Constant), NEWGRADE Recodedgrade
Dependent Variable: CASSCORE
CHAPTER 5
QUALITATIVE ANALYSIS

This chapter presents the qualitative results of the study and is composed of two major sections. The first section reports the teacher sample demographics. The second section reports the results of data analysis for research question 3. The sample population is described in Table 28.

This chapter presents the results of the study in the second component of this mixed method approach of quantitative and qualitative research. The previous chapter provided an analysis of quantitative research. The purpose of the study was to examine teachers integrating technology and the correlation of student success. It is a mixed method study using both quantitative and qualitative research results. The primary source of data for this analysis was answers to the interview questions (see Appendix F).

Population Sample of Qualitative Data

The sample (N=13) was composed of teachers from southwestern Arizona school districts to provide a diverse population of teachers utilizing technology integration with their teaching methods. The teachers in this sample used technology in similar methods unique to their school environment. Teacher tenure of the 13 teachers in this sample ranged from 3 to 23 years. Table 28 illustrates the specific demographic information for each teacher participant.
**Table 28**

*Teacher Integrator Participant Demographic Data*

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Gender</th>
<th>Tenure</th>
<th>Grade Presently Teach</th>
<th>Grades instructed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. School A</td>
<td>Female</td>
<td>25</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2. School B</td>
<td>Female</td>
<td>6</td>
<td>2</td>
<td>Kindergarten</td>
</tr>
<tr>
<td>3. School C1</td>
<td>Female</td>
<td>20</td>
<td>1</td>
<td>K-3, college level</td>
</tr>
<tr>
<td>4. School C2</td>
<td>Male</td>
<td>No response</td>
<td>5</td>
<td>No response</td>
</tr>
<tr>
<td>5. School D*</td>
<td>Male</td>
<td>12</td>
<td>K-8</td>
<td>College level</td>
</tr>
<tr>
<td>6. School E</td>
<td>Female</td>
<td>15</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>7. School G1</td>
<td>Female</td>
<td>11</td>
<td>1</td>
<td>Kindergarten</td>
</tr>
<tr>
<td>8. School G2</td>
<td>Female</td>
<td>11</td>
<td>1-2 multiage</td>
<td>Pre K-High</td>
</tr>
<tr>
<td>9. School I</td>
<td>Female</td>
<td>25</td>
<td>4</td>
<td>No response</td>
</tr>
<tr>
<td>10. School K1</td>
<td>Female</td>
<td>15</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11. School K2</td>
<td>Female</td>
<td>10</td>
<td>5</td>
<td>6,7,8, adults GE</td>
</tr>
<tr>
<td>12. School L*</td>
<td>Female</td>
<td>3</td>
<td>3</td>
<td>No response</td>
</tr>
<tr>
<td>13. School M</td>
<td>Male</td>
<td>30</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

*Instructed at 2- and/or 4-year college level.

From the pool of 15 elementary schools, 13 schools were identified in which interviewees discussed teaching methods and technology integration. After comparing school size, populations of 100 to 600 students, 10 schools were identified as having little or no access to computers.

A total of 192 teachers were included in the technology integration study discussed in chapters 3 and 4. Thirteen teachers out of 192 were identified for the
interviews in the qualitative component of the study. They were drawn from Pre K-8 grade settings to discuss the use and non-use of computer integration.

The 13 participants' primary occupation has been teaching; Table 28 illustrates that the majority of individuals instructed more than one grade during their 6 through 25 years of teaching. While many of these teachers taught in the same grade, instructional methods and computer integration was not always at the same level.

Data Analysis

This section describes the results of the data, based on the interviews that answer research question 3.

What teaching styles, strategies, and other factors affect technology integration in the classroom?

To answer this research question six emergent themes were identified. These six themes affected the integration of technology developed through interviews to increase student success.

1. Collaborative learning partnerships
2. Learning centers method approach
3. Variations of software applications as tools
4. Teaching practices and strategies affecting incorporation of technology
5. Access & time allotment
6. Training
Given that each teacher was integrating technology in different capacities, it was important to explore their perceptions of technology integration and how they used it in their classrooms.

**Collaborative Learning Partnerships**

Collaborative learning partnerships involve the practice of teachers and students working together and sharing ideas while integrating technology. Teachers and students become partners and sometimes exchange roles in the classroom environment. Teachers become facilitators and students become the leads on subject lessons. Peer to peer collaboration is created by students helping and learning from each other. This method empowers student-centered collaboration in the educational environment. Teachers and students become full partners in the educational setting.

In their quest to integrate technology, collaborative learning partnerships were exercised throughout the school environment. One method used by numerous teachers is working with students as a team while using computers in their classrooms. Students also partnered with teachers in one-on-one settings. This partnership also extended to the public library that was near the schools.

This theme emerged in the data through unique relationships between bilingual students and teachers. Teachers working with their students viewed classrooms as sites for intentional partnerships with students. This type of partnership was exercised in the schools closer to the Mexican border. Collaborative learning partnerships between teachers and English as Second Language students were important to this study.
Teachers felt a strong commitment to teach students at particular sites. Several teachers were bilingual and believed incorporating the Mexican culture into classroom instruction would improve student achievement. For example, teachers who had adequate access to computers worked as partners with their students when exploring the Internet. One particular teacher used the Internet to increase knowledge about international students who have cultural similarities with her students.

As one teacher described her partnership, she incorporated her ability to speak Spanish, thus allowing her to communicate lessons in an effective manner. Several teachers explained that collaborative learning partnerships are taking place with math lessons. Teachers incorporated ideas and concepts about the students' culture into instruction while using computers. In their quest to integrate technology, several teachers emphasized the use of English in their classrooms. The teacher from school I explained that most of the students have been at the school since kindergarten, and they are not a problem (with language barriers) when they reached her fourth grade classroom. Other teachers described their experience with an ESL student entering the classroom and knowing very little English. One teacher reported that she anticipated having a bilingual aid in the classroom in order to help bilingual students; this is another way to incorporate partnerships.

ESL students appear to understand mathematical concepts better than language arts. Teacher D explained about giving students extra instruction and relying on other multilingual students to help each other while working in a partnership environment when aids are not available for specific classes.
As other studies have indicated students experience much greater success in school settings that are structured to create close, sustained relationships between students and teachers (Darling-Hammond, 1998) when building collaborative partnerships.

This shared experience took another form. Teachers believe English acquisition is important; however, it is also important to “put that youngster at a computer so they can get immediate feedback” and perhaps more exposure to the computer. One teacher reported that ESL students use the computer to learn spelling words and to take tests on the computer. Several teachers indicated their lessons are unique for English-only students. A few teachers described their teaching practices with ESL students as partnerships with students in the class. Several teachers mentioned that students in the fourth grade work together to increase knowledge. Overall, the theme of collaborative partnership when incorporating technology effectively integrates teacher and student learning.

**Learning Centers Method Approach**

Learning centers method approach involves teachers and students working in a team approach and moving from center to center simultaneously. These groups are created by two or more students working at learning stations to develop and create projects, increase academic skills, increase globalization in the classroom lesson content.

Like comparable research, integration of technology by using centers in the classroom allows teachers to engage students in a meaningful educational environment.
The learning centers method, also identified as demonstration centers, emerged in the data. Several teachers mentioned their use of learning centers consisting of one group of students that would be assigned to computers for the day and another group rotated to computers on the following day. Students are given the "privilege" to come in during recess or after lunch on "a first-come first-served basis."

Another teacher reported on the positive effect of the centers method approach. She utilized the approach by having one computer to each center in her room. This teacher mentioned, "I actually use my own computer as a part of the demonstration centers. Two students at a time go to a center." In her quest to integrate computers like several teachers, students are allowed to spend 15 minutes on each computer.

Teachers have indicated that initially the centers method approach to learning was used to control behavior in the classroom. This suggests that centers allow students to move freely in the classroom and shift to other tasks. Some teachers reported that centers actually turned into a method that increased student achievement and interest in daily lessons. One teacher indicated, "Since the attention span of first graders is minimal, they would change computers and review another type of software program."

Here the teacher recounts about all the computers having different software programs. Students would receive four different programs (writing, language, math, science) at different centers. Other teachers included computers at social studies and listening centers. One teacher mentioned that limited access to printers, equipment, and other supplies made it difficult to use the demonstration centers. She indicated that "students
are allowed to print one little project,” because like other teachers, she purchased her classroom printer and the ink.

The same teacher mentioned, “When I was a beginner teacher, I taught fourth grade and did not use centers.” Here, this teacher suggests when she started using learning centers she saw the advantages and started to incorporate learning centers with her teaching practices. When it comes to learning centers she indicated that several teachers in her building use this method with computers throughout the school year. There was another teacher (C1) who spoke about being in small groups which included five students and being effective particularly in these settings.

The teacher from school I replied, “I divided the students into groups and let them choose their software programs.” Some students are skills-based and practice their math facts and educational games. Teachers also rearranged the groups in order for students to help each other on certain projects. Teachers also indicated that students work on computers when they have completed class assignments.

When it comes to learning centers teacher C1 expressed, “Certain students are usually on the computer more than students who need additional help with regular class work.”

School teacher C2, like other teachers discussed previously, assigns working groups in order for each student to have the opportunity to work on computers. Several teachers expressed that the centers are used in many ways. This suggests that integration of technology improves the teacher and student relationship while increasing
student success. Here teacher G suggests the centers approach raises the issue of free

time. She explains:

In the morning, small groups are created, group 1 is with me, and group 2 is
with the assistant. Group 3 has an independent activity; however, this group is
divided into a sub group. The students are also free to choose a center at the end
of the day.

Like several teachers mentioned, computer use is alternated on a daily basis.

Based on many teachers’ observations, students experience much greater success in
learning centers than non-learning centered classrooms.

Variations of Software Applications as Tools

Variations of software applications as tools involve the use of computer
technology to create multimedia projects that represent student and teacher
collaboration in the learning process. Software programs are used as teaching tools to
augment learning content. Variations of software applications are used at different
levels in different ways. Software applications are used to enhance pedagogical
practices, not to use exclusively to improve student success. While students and
teachers work together as cohorts, teachers think of students as knowledgeable learners.

Teachers indicated an appreciation of incorporating teaching practices and
technology integration while using computer software to enhance class activities. The
emergent theme of software applications used as tools was prevalent with some
teachers. According to Maurer and Davidson (1998), computers enable teachers to
create better instructional materials. This theme is significant because it identifies how
teachers and students use software that supports or enhances an excellent instructional program (Maurer & Davidson, 1998).

In many instances, teachers used compact discs (CDs) with educational information to practice language arts, improve reading skills, and learn mathematics, as previously indicated. There were also software tools used by other teachers that have different activities to expand students' vocabulary. One teacher reported, "A weakness with Arizona is being an English-only state and Spanish being taught as a foreign language, minimally." The teacher believed it would be hard for her to get a requisition approved for software in Spanish. The teacher also stated, "I don’t have that privilege; it’s hard" to receive educational software to increase student success. Another teacher describes the experience of speaking Spanish to the students while they are using math software. This teacher indicates that students do fine with math, but software of reading comprehension is difficult for ESL students.

Several teachers indicated their quest to integrate technology and use software called "Study Island" for AIMS testing. Teachers used this software to help students with the Arizona state testing standards. Teachers indicated that using software by McGraw and Hill helped students with language arts. Teachers also used software called "Orchard" to help students. Teachers indicated using computers as a word processor with their students. Several teachers used software donated by parents and school volunteers. Teachers expressed an interest to receive academic software that focused less on games and more on academics. Several teachers used the Internet to find material to download and use in class to improve student success.
Teaching Practices and Strategies Affecting Incorporation of Technology

Teaching practices and strategies affecting incorporation of technology encompass different methods and factors that affect a change in the pedagogical use of technology in the classroom environment.

Teaching practices clearly emerged as one of the major factors in technology integration to increase student success. Several teachers identified their styles and strategies in different ways. The teachers use several different learning approaches that include computers in the classroom.

Teaching practices and strategies were not always universal to all 13 teachers while using computers in the classrooms. Teachers from school G for example articulated their teaching practices consisting of a different approach to teaching. Their techniques included balanced literacy, writing assignments, using six trait rubric, section math, cooperative grouping, whole group and students working in pairs.

The emergent themes of teaching practices were prevalent throughout the teacher interviews. Here, teachers from schools A and B expressed “whole group and individual small groups” as their type of teaching practices. Smaller schools that personalize instruction by keeping the same teachers with the same students have higher achievement (Darling-Hammond, 1998) than schools that do not use small group environments.

Teaching strategies acknowledge differences in the ways students learn (Darling-Hammond, 1998). In this study students are encouraged to use the computers to complete written assignments. This teacher also mentioned using the computer for
research and the use of CDs for accelerated readers, while another teacher from school B described their practices as whole group methods.

Teacher C1 reiterated the importance of teaching reading and that the only way they can be effective is “one-on-one” with students. Several teachers indicated their teaching practices and strategies consisted of hands-on supplemented with technology usage. Teachers also pointed out using lecture style, whole language, thematic units, and Madeline Hunter, while others used a combination with cooperative learning.

Teachers from several schools indicated using teaching practices and computers as tools allowed continuous interaction with students. Teachers also indicated that using teaching strategies with “show and tell” indicated an improvement of skills learned. Several teachers believed using computers allowed students to express their individuality by working on computers and gives the opportunity to work with other students in the class. This strategy seems to incorporate with teaching repertoire.

Many of the teaching practices and strategies were similar and found to be effective by teachers in this study. School teacher G1 articulated teaching practices and thoughts in reference to being in the Southwest demographic area. She commented on her use of different types of ESL learning strategies and teaching approach, including collaborative learning, and balanced literacy. She also describes her school’s math program as, “It’s a hands-on manipulative and yet explicit math program, and we have systematic phonics, reading, writing and math.” Teaching practices and strategies were shared not only by teachers at border schools but teachers at several elementary schools.
Teachers were more effective when incorporating individual teaching styles with technology.

Access and Time Allotment

Access & time allotment involve how often students use computers and how much time students receive the opportunity to use technology in a day and weeks time. There are various times during the day students receive time allotment for computer usage. To some students, access and time allotment can be given on a first come, first served basis.

In analyzing the data, access and time allotment practically emerged simultaneously. Research indicates (Norris, Sullivan, Poirot, & Soloway, 2003) that “...technology access and [teachers’] attitudes play a significant role in the use of technology for curricular purposes” (p. 6). In a similar study, computers were used most frequently as enrichment or to add variety to instruction. They were not central to instructional programs (Becker, 1992). Students spent a small amount of time using computers because the ratio of students to computers was so low (Becker, 1992).

In this study several teachers responded that the current student-to-computer ratio was not sufficient computer usage during an instructional day. Teachers indicated, although some computers were available, two and four computers for 15 to 22 students were not enough. A teacher from school E discussed the disparities at the school site. The computer-to-student ratio in their classroom is average, she believed it was enough. This teacher also commented that other teachers in her building and district do not have
sufficient computer use. Teachers had old computers or one computer for 25 students.

One teacher commented about having three groups of students at one time attempting to
learn with computers and also having quick tab small keyboard devices in the classroom
for student usage.

Access to computers appears to be a major concern of all teachers. Several
teachers remarked that students have access on a first-come, first-served basis with three
computers assigned to a classroom. In some classrooms two of the computers are for
student usage and one is for the teacher's use. Several teachers indicated that their
classrooms are equipped with one to six computers and 15 to 20 students in each
classroom.

The majority of the teachers identified some form of rotational access to
computers. Students in this type of environment have access to computers by rotating to
different tasks in their classroom for a minimal amount of time, which indicates students
do not have access every day to utilize computers. One teacher indicated that his school
has a mobile lab, which brings the computers to the classroom upon the teacher's request.

Technology was not always accessible to computer-using teachers. This was an
indicator of why teachers were not able to use computers with their teaching methods.
The dispersal of a few computers across different buildings along with an insufficient
quantity of computers for all students became a major indicator of how minimal
computers were being used. These facts limit the amount of time students can spend on
the computer. Several teachers indicated that students spent a maximum of one hour
(cumulative) or less per day using computers.
Several teachers indicated that, when students completed their in-class assignments they are allowed access to computers. Students who were having difficulty in class or making an adjustment to being in a new classroom did not always receive access to computers for the same amount of time as their classmates. Teachers also indicated that students have adjusted to the rotational method and monitor the amount of time a person is on the computer.

One teacher indicated that her students timed each other by watching the clock and let the computer user know “your time is up.” Another teacher mentioned that when using centers, students had limited access to computers. This made it difficult to incorporate the centers method with teaching methods.

Teachers indicated that funding and facilities management were significant factors impacting access to technology. Computers working (connectivity) for a minimal amount of time and stop working throughout the course of an instructional day limited effective access. They believed funding sources were being allocated to other districts needs as opposed to technology integration. Teachers indicated that administrative issues such as change of personnel in the technology division delayed or eliminated the opportunity for students to access computers.

Several teachers specified having a minimal amount of time to use computers, and the distance to reach computer laboratories was a hindrance in utilization of computers. A teacher from school B recounted that students in her classroom do not spend any time on the computer. This same teacher said, “I am really looking forward to incorporating technology into classroom [instruction].”
Time allotment was identified as another emergent theme. Teachers' concerns for how computers were being used and their availability in the classroom emerged throughout the teachers' interview. Several teachers indicated that there is a minimal amount of time to use computers. Teachers spent 15 minutes or less on projects that include computer integration. Teachers also pointed out, that students spend 20 minutes at a computer center and then move to the next center. A teacher respondent from school B recounts that students in her classroom do not spend any time on the computer, due to lack of time in a school day. More then half of the teachers interviewed candidly commented that more access to resources and training for the teacher are needed in order for teachers to increase computer usage.

Training

Training involves teachers increasing their knowledge to improve pedagogical practices. Teachers attend classroom instruction by peers and knowledgeable educators to change and improve their strategies. In-service training is conducted at different levels and for different styles for teachers. Training can include teachers and students learning together to develop new teaching methods and strategies.

Cuban (1999) pointed out that "...the massive investment in equipment and training is about learning, not about technology." In this study like similar studies, Cuban (1999) stated in most school districts few teachers use technology in meaningful ways. One teacher indicated, "I am really looking forward to incorporating more technology into my classroom." Several teachers indicated that more training is needed
in order to increase the effectiveness of integrating computers. Teachers expressed an interest in attending training on weekends to increase computer skills.

They also suggested building relationships with students by having computer training sessions with students. Several teachers mentioned that district wide technology training is beneficial to all teachers. They indicated that during training sessions they are able to work with teachers on projects and present the project at the end of the training session. Several teachers acknowledged differences in their technology skills. Teachers believed some of their colleagues were still afraid of using the computers and did not use technology as a tool. Some teachers were able to help their colleagues with computers in order to use it in their classrooms.

These teachers believed additional training would decrease the anxiety level and increase their confidence to utilize computers. Several teachers indicated that their district allowed teachers to attend a technology conference and receive information on technology. Teachers believed that more computer training could improve instruction. All of the teachers indicated, "We need more resources." However, teachers' needs for technology training varied. Several teachers indicated receiving in-service training, and additional training through local colleges was beneficial. Several teachers indicated not having the opportunity to attend training to learn how to use academic software.

Some teachers were satisfied in their schools effort to train them in technology. Several teachers indicated that at least one day per month should be set aside for training. Whereas, other teachers believed they did not receive enough training. One teacher stated, "I think the reason we would need more staff training, is that we did not
grow up with computers.” Another teacher indicated, “We’ve always had opportunities to increase our knowledge, and our school encourages it.” Teachers indicated that they want to be equipped with “the knowledge and skills they need to enable all children to learn.”
CHAPTER 6
DISCUSSION

The Information Age has brought many changes to the modern world. Our society has embraced computer technology and has used it to reinvent the ways in which individuals create, find, exchange, and think about information (Pierson, 2001). Educational institutions attempt to create effective environments to incorporate computers into elementary public schools.

In the public school system today, teachers are requested to continue to use their teaching methods and to use technology as a tool. Teachers persist in seeking for innovative ways to improve lessons in order to help students increase their learning strategies. The enormous demand for the use of technology by teachers and students continues to have an impact on the educational system. In many cases the school environment is still not equipped to meet the demands of teachers. Lack of personnel and funding and the need for technical, upgrades and the resources for additional training, and the reality of low income schools continue to be barriers for effective computer integration.

Computing proficiencies are increasingly being expected among members of the teaching profession, but the challenge (Guha, 2001) to educators is to continue to find methods to utilize computers as tools with effective teaching methods. Ultimately, teachers are being challenged to integrate computer technology into students’ academic programs (Glennan & Melmed, 1996; National Education Summit, 1996).
Overview of the Study

The purpose of this study was to examine teachers' perspective of technology integration with pedagogical practices and their perceptions of the correlation with student success. Teachers' perceptions were based on their attitudes including anxiety, likeness, bias, and confidence as subscales. It was also based on teachers' usage of computer integration to increase student success. Part 1 of the scale tested for teachers' attitude of computer use. Part 2 assessed for teachers use of computers in primary classroom environments.

This study was based on the results of a two-part survey administered to teachers at 16 elementary public schools. These schools were located in Arizona and utilized technology in unique and sometimes similar methods. The teachers' from various schools demonstrated distinctive methods of use and their access to computers. A significant component of this research was data composed through 13 telephone interviews. Teachers volunteered to answer 13 questions (Appendix G).

Research Questions

The following research questions were examined in this study.

1. How do gender, race, tenure, educational level, familiarity with and access to technology impact teachers' attitudes toward the use of technology in the classroom?

2. How do gender, race, tenure, educational level, familiarity with and access to technology impact teachers' use of technology in the classroom?
3. What teaching styles, strategies, and other factors affect technology integration in the classroom?

Research Hypotheses

The following hypotheses were tested in this study:

Ho1 There are no statistically significant differences in attitudes of teachers' towards use of technology in the classroom when controlling for gender, race, tenure, educational level, familiarity with and access to technology.

Ho2 There are no statistically significant differences in the teachers' use of technology in the classroom when controlling for gender, race, tenure, educational level, familiarity with and access to technology.

Summary of Findings

The results of this study showed some teachers' perspectives of technology integration with pedagogical practices and their perceptions of the correlation with student success that participated in the research. Research questions 1 and 2 form the basis of the quantitative findings in this study.

Research Question 1

How do gender, race, tenure, educational level, familiarity with and access to technology impact teachers' attitudes toward the use of technology in the classroom? This question is the basis of the quantitative findings.
1. There were four attitude strands in the multidimensional computer attitude scale. Separate sub-scores for anxiety, confidence, bias and like or dislike of computers. Correlations among the part-scores were computed to determine the strength of the relationships among scores. Pearson-Product Moment Correlation analysis of the data indicated correlations between the total attitude score and the part-scores. A confidence value in computer technology of .807 has a strong positive relationship with a liking for computer scores with a correlation coefficient of .81. The correlation indicates 65% of the variation in the confidence score is explained by the variation in the liking score. These results suggest that teachers who are confident about computers and like using computers would be less anxious about using a computer in the classroom. Like similar research, computer-using teachers were found to have more extensive experience with technology (Becker, 1993) and teachers who were experienced at using computers for instruction used technology as a tool in a variety of instructional projects (Evans-Andris, 1995).

2. Descriptive statistics showed low anxiety scores, indicting low levels of anxiety about computer integration in the classroom. This indicates a fairly high level of confidence, a mean of 5.01 which indicates low bias scores. The descriptive statistics also indicated low levels of race and gender bias among the sample of teachers.

3. A series of T-tests was performed to examine computer attitude and anxiety, confidence, bias and liking among male, female, ethnic groups, and educational
background groups. There is no significant difference in attitude except for a one-point difference due to more female teachers in the study. The total like scores for females indicated a mean score of 20.50. The total computer attitude mean score of 65.21 for females and total computer attitude mean score of 63.52 for males indicate no significant difference among gender mean scores.

4. T-test results indicated that there are no significant differences between male and female mean scores for all four computer attitude subscales, as well as for computer attitude mean scores. All five T-test statistics were not statistically significant with P > .05. This suggests that gender does not seem to be a major factor in teachers’ attitudes about computers.

5. The T-test determined the impact of teachers’ ethnicity on their Anxiety, confidence, bias, and liking subscale scores. The Ethnic groups have been collapsed into two groups; White and non-White for purposes of analysis. These groups both had the highest mean value for computer attitude subscales. The difference between mean values for both groups appeared to be minimal across all five subscales. This indicates there are no statistically significant differences between White and non-White teacher’s attitude toward computers in the classroom, indicating, like similar research, ethnicity may have no impact on teacher’s attitude towards computers.

6. The T-test indicated no significant differences between the means for teachers with Associates or Bachelors degrees, and those with Masters and Doctoral
degrees. This indicates teachers’ educational background has negligible influence on their attitude towards computers in the classroom.

7. An independent T-test was used to compare computer usage mean scores. The results indicate the difference between the mean score of 100.82 for female teachers and a mean of 111.74 for male teachers, with an alpha of .05 and unequal sample size of 159 females and 31 males as not being statistically significant. This is an indication that in the sample of 192 teachers’, gender makes no noticeable difference in the use of computers in the classroom.

Research Question 2

How do gender, race, tenure, educational level, familiarity with and access to technology impact teachers’ use of technology in the classroom? This question is the basis of the quantitative findings.

1. Ethnic groups were collapsed into ‘White and non-‘White’ for purposes of this analysis. The regrouping yielded 51 non-White and 137 White teachers. The computer usage mean score for White teachers was 108.5, with the standard error of the mean of 3.18 and 84.6, while a standard error of the mean of 4.86 resulted for the non-White teachers. T-test indicated that the mean difference of 23.87 between White and non-White teachers’ Usage score is statistically significant. This indicates that the majority of non-White teachers have little access to computers. This is due in part to lack of funding, personnel changes, and computer hardware problems (maintenance issues) at the district level. Primarily, these schools are near
the United States and Mexican border and therefore have limited access to technology. These results indicate that geographic location, and cultural barriers are factors of inadequate computer technology. These results suggest that teachers (mostly non-White) at border schools have little or no access to integrating technology. The results indicate that it is not a matter of racial discrimination but complex political and infrastructure issues account for this disparity.

2. The T-test indicated $t = 3.978$ as being statistically significant ($P < .05$). This indicated a mean difference of 23.87 between the White teachers and non-White teachers' computer usage mean score is thus statistically significant. This implies White teachers have a higher mean value, which indicates computer usage is more prevalent across classrooms taught by White teachers and less prevalent in classrooms taught by non-White teachers. Again racial discrimination is not the case, but rather these results indicate that geographical location is a factor in computer usage. White teachers are more prevalent at non-border schools. These schools receive more resources and funding because they are in districts with low income families, and low tax revenue base. Administrators are more aware of funding opportunities and resources from colleges, business adventures and federal government to work in a collaborative effort to integrate technology. However, teachers are unaware of all the resources to obtain funding for educational programs.
3. Comparison of computer usage means scores for Bachelors and Associates degree holders and Masters and Doctoral degree holders indicates a mean difference of 5.20 between the two groups of teachers is not statistically significant.

4. Computer usage mean scores were calculated by grade taught by the teacher across the seven categories. The Grade 4 mean of 127.68 is more statistically significant than the Grade PreK-K mean value of 83.11 and Grade 1 & 2 mean of 91.96. Grades 3, 5 and 6, multi-age, Gifted, K-8; Special Education, and Title one mean scores were not statistically significant.

5. One-way ANOVA results for computer usage scores revealed statistically significant differences in the computer usage scores of teachers teaching the different grades. The Bonferroni method was performed to identify the pairs of grades that actually differed significantly. Teachers with Associates and Bachelors used the computer more. Indicating that teachers holding Masters and Doctoral degrees did not use the computer as much. These teachers have more tenure and have teacher assistants in their classrooms.

6. Multiple comparisons of teachers' computer usage scores as the dependent variable indicated means scores for Grades Pre-K-K of 41.571, which is more statistically significant than Grade K mean of 32.723 and Grade 1 mean of 18.358. Grades 3, 4, and 5 were not statistically significant.

7. The ANOVA results indicate that the age of teachers shows no statistically significant differences among computer usage.
8. Two regression analyses were performed to examine computer usage scale and 
computer attitude scale scores. Most of the independent variables educational 
background, teacher's age, ethnicity and gender were found to be statistically 
significant when testing for computer usage. With the second regression analysis,
where by the Computer Attitude scale is the dependent variable, educational 
background, teacher's age, ethnicity and gender were all not significantly correlated 
with the CAS scores. Only teaching grades had minimal correlation of .15 with 
CUS scores. In CAS scores, the teacher's grade explains 2% of the variance.

Hypothesis Testing

1. Ho1 was not rejected because the T-test for Equality means was performed and 
analysis revealed that there were not statistically significant correlation 
relationships between groups.

2. Ho2 was rejected because significant differences among teachers' Computer 
Usage scores were found on ethnic groups measured by an independent T-test.

Discussion of Findings

The findings presented are directly related to each research question. For the 
purpose of clarity, each question is restated followed by their findings.
Research Question 1

How do gender, race, tenure, educational level, familiarity with and access to technology impact teachers' attitudes toward technology in the classroom?

The dependent variable was Computer Attitude score, and the independent variables were gender, race, tenure, and educational level. The significance of the teachers' attitudes identifies the importance of the correlation for student success. Emphasis on technology may begin with the implementation of instructional programs supported by technology. The computer attitude scale helped to establish a link of each teacher's attitudes and access to technology.

The descriptive statistics indicated that the four subscales presented by the results of the t-test and ANOVA were significant. The teachers reflected low anxiety scores about computers in the classroom. They have fairly high levels of confidence and very low levels of bias, which indicates there were low levels of race and gender bias. Teachers moderately showed a positive attitude towards computers as an instructional tool.

The set of T-tests were performed to examine CAS and anxiety, confidence, bias, and likeness and the differences between male and females, ethnicity, educational background and mean scores by gender. There were differences in the attitude scores for males and females. However, this data was not statically significant, since there were more females than male participants in the study. For the anxiety, confidence, bias and liking scores and the total CAS mean scores between male and females, there were no significant differences. Ethnic groups were collapsed into two categories of White and
non-White, and the data indicated no significant difference between the attitude scores of the two groups. The scores on the CAS scale were minimal when teachers’ educational background was compared by, Associates, Bachelors, Masters, and Doctoral degrees. Teachers’ educational background did not influence their attitude towards the use of computer technology in the classroom.

**Research Question 2**

How do gender, race, tenure, educational level, familiarity with and access to technology impact teachers’ use of technology in the classroom?

The descriptive statistics for the Computer Usage Scale scores presented the t-tests and ANOVAs assess differences in computer usage across gender, race, age, teacher tenure, and teacher educational level. The independent sample t-test was used to compare usage mean for male and female teachers in the sample. The differences between mean scores of 100.82 for female teachers and a mean of 111.74 for male teachers with an alpha of .05 and the unequal sample sizes of 159 and 31 are not significant. In the sample of 192 teachers’ gender, makes no noticeable differences in the use of computers in the classroom by teachers.

Computer usages by teachers’ educational background were also collapsed into two groups in order to increase sample sizes and to increase the power of the test for differences in the computer scores of teachers with educational backgrounds. I anticipated that a large margin between younger and older teachers would be significant. However, research findings indicated no significant difference in the two groups.
the scores were collapsed, computer usage scores of teachers with Associates and Bachelor degrees was slightly higher than that of teachers with Masters and Doctoral degrees and use the computer more than four years of education. This implies that teachers' with Associates and Bachelors without higher degrees are using the computers more than teachers who have Masters and Doctoral degrees. Veteran teachers are more established and willing to teach with current technology; whereas Bachelor-degree participants are part of the explosion to innovating technology as computer automations continues to change.

Once again, the ethnic groups have been collapsed into two groups of White and non-White for the purposes of analysis in this study. The mean score of White teachers was 108.5 with a standard error of the mean of 3.18 and 84.6 with a standard error of the mean of 4.86 for the non-White teachers. A t-test was used to determine that the CUS mean score differences are significant. It concludes that computer usage is more prevalent in classrooms across the southwestern schools in the study taught by White teachers. It also indicates that classrooms taught by non-White teachers were less prevalent. These results indicate that fewer non-White instructors in the classroom have minimal access to computers and funding sources at schools near the United States and Mexican border.

Research Question 3

What teaching styles, strategies, and other factors affect technology integration in the classroom?
The third set of findings attempts to look at teaching practices. These results indicate that the way in which teachers use computers with various teaching styles affect how technology supports educational change. The results suggest that collaborative relationships between teachers, students and community at large explore new ways of enhancing the learning experience. The results indicate a shift from whole class to small group facilitation. The results imply a shift in lecture style teaching to coaching students in small groups.

The data responses were used to determine what teaching styles and strategies are being used in elementary schools. It was difficult to identify teaching styles used because of the wide range of responses and the number of variables that are beyond the scope of the study.

There were six emerging themes identified in the data of this study. These emergent themes included collaborative learning partnerships, learning centers method approach, variations of software applications as tools, teaching practices and strategies affecting incorporation of technology, access and time allotment, training. The results indicated that teachers were unable to use computers because of limited access to computers. This was an indicator of why teachers were not able to use computers with their teaching methods. Teachers cited instances of when they were not able to use computers, due to computers not working in their district because of personnel changes. The results indicate frequent changes in technology departments that impact access to technology.
The results indicate that district-wide construction impacts the use of technology integration in the classroom. Even though there was evidence of computers in the classrooms, students were clustered around one computer. The research suggests that one to two computers in a classroom did not always mean computers in good working order. Like similar research, Norris, Sullivan, Poirot, & Soloway (2003) suggest having one computer in the classroom is not sufficient access nor will it lead to significant student use.

Teachers also discussed not having enough computers for all the students in the classroom due to district funding. Another emergent theme is the utilization of technology to improve student success. Teachers cited instances where minimal amounts of time are used for computers and the location of computer laboratories was an indicator of the minimal amount of time used on the computers. Teachers believed that it took too much class time to take students to the lab and to return to the classroom. This would minimize the time students would actually work on computers.

Additional emerging themes were collaborative learning partnerships through teaching practices. Teachers viewed classrooms as sites for team approaches to learning. Teachers indicated that working with students as a team member introduced new methods of learning environments. The results suggest teachers would also facilitate students working with other students to learn new skills and learning strategies. Teachers also cited one-on-one partnerships with teacher and students in the same learning environment as a positive instructional method.
This theme developed the Learning Centers Method approach that several teachers incorporated into their teaching styles. This emergent theme was shared by several teachers in different grade levels. The learning centers method approach was created in different ways. Several teachers who participated in the study cited that having students rotate from one center to another was a technique that worked in their class. Other teacher indicated that students are able to come on a first-come-first-served basis to use the computers. One teacher indicated that initially, the utilization of learning centers was a way to decrease behavior problems in the classroom. This method has helped students move from one center in the classroom to another, which also helped students who are able to learn different concepts and lessons on the computers. This method actually encouraged a very positive learning environment for students and teachers. Several teachers used their computers and others let their students use the computer because of limited technology in the classroom. Teachers started to share some of their tasks with students by working in a facilitator role. Students started taking on team leader qualities in their class environment.

Social interaction also improved among students in the classroom. Results indicate that students formed new relationships with classmates while working on team projects. The results suggest that teachers believed specific computer software could increase student success when incorporated with instructional methods and materials.

There were several teachers in the same school district that used different types of software as tools with their lesson plans. As indicated earlier, teachers have a need for software to be more learning focused than game oriented to increase student
achievement. Teachers indicated this would enhance learning in the classroom environment. Several teachers used software that can help students learn English while learning other skills. Teachers also indicated not having the opportunity to receive new software due to budget limitations. Jennings (2003) reported that school districts are bracing for intensified budget cuts that can impact information technology. Similar studies (Jennings, 2003) affirmed that up-to-date and well-integrated hardware and software can improve educational outcomes.

The results suggest that teachers wanted more training on how to use hardware and software in the classroom. Teachers indicated that training time consisted of learning the basics to computers and limited knowledge of technology usage in the classroom. The research suggest that teachers need to be trained how to include technology with effective teaching strategies. Many elementary teachers and students do not make effective use of the available computer equipment (Becker, 1991). Due to the limited availability of computers in the elementary schools, teachers have had to decide whether it is better to have students work individually or in small peer to peer group settings.

The results suggest that teachers are trained at different levels to use technology. Teachers indicated that they have some access to new and improved technology, but discouraged to continue usage and revert to only using teaching strategies. On the other hand, the results suggest that several teachers believe they receive adequate training to use computers with teaching strategies but students and parents should have the same opportunities.
The sample population of 13 teachers described in their interviews the need for additional training and resources. They indicated that teachers' and students need additional training of computer technology to understand new hardware and software. The themes and ideas, which emerged from the telephone interviews, support the results of the quantitative survey instrument.

Implications for Practice

Schools of the 21st Century have a need to continue to enhance teaching methods. Teachers continue to be a catalyst for improving teaching practices by using computers as tools in the classroom environment. Teachers project leadership qualities in the classroom by motivating students, while learning to integrate pedagogical practices while incorporating technology. According to Deal and Kennedy (1993), the schools' cultural values and beliefs are focused on the improvement of instruction. Borko and Putnam (1995) believe that teachers' knowledge and beliefs play an essential role in their practice, and shape the learning that goes on inside and outside their classroom. When it comes to assessing teachers' attitudes, bias, confidence, anxiety, and confidence can influence their perspectives of using technology as a tool. As a related topic to this research, the need to determine what factors actually lead to increased utilization continues to be an important issue in research studies.

As this research indicates, the implications associated with teachers between the ages of 46 and above being 50% of the teaching force will be a high attrition rate of retiring teachers within the next 5-10 years. Therefore, the influx of new teachers to
replace retiring teachers will have an impact on elementary schools. This indicates that the demand for elementary school teachers will be at an all time record high. These findings also imply that teacher needs for additional resources will increase. The rapid speed of technological development will introduce new and upgraded computer-mediated tools to the classroom. Teachers will begin their careers with a knowledge base built around technology and thus they will be better prepared to utilize technology with students to improve student success. Teachers' pedagogical practices and computer mediated instruction will shift to transform the school environment to increase student success.

The results of this study provide new insight for teachers, about their approaches that are important for teachers in K-12 settings. Teachers have different levels of computer experience and their level of training needs to be met in order for teachers to utilize technology in a productive manner. Teachers who use technologies enhance their teaching methods.

The data collected from the 16 schools provides a view of the correlation of teachers' perspective of technology and student success. Teachers who often lack skills in using technology must be able to accept unpredictability (Hodas, 1993). This study shows that teachers use various types of hardware and software at the elementary school level. At times, the software use varies among teachers at the same educational setting. Teachers are overwhelmed with recurrent problems of limited school program funding which restricts technology augmentation. In addition, teachers find it difficult to accept technology changes when they are inundated with policy and procedural changes at the
district and site level. In order for school districts, university education programs, and staff development to support teacher preparation programs, funding and administrative support must be improved to accept ever-changing computer technology.

This study indicates some evidence of a need to expand curricula to include more technology teaching methodologies for teachers. Teachers want to be more effective in the classroom and need additional training. This can increase confidence by continuing to add incentives such as giving teachers laptop computers and software. The use of computers continues to increase, while more than half the states require at least recommending pre-service technology programs for all prospective teachers (Kinneman, 1990).

The results of the study suggest that it may be advantageous for school administrators and teacher education programs to include advance and upgraded technology components in teacher training programs. Restructuring curricula and staff development at the public school level must continue to be a priority in school budget items. School administrators must understand the importance of increasing funding for technology. Teachers must play an active role using community resources in developing the technical needs for school systems to achieve student success. By continuing to analyze the data from this research study, educators will be better able to support and improve resources for teachers to utilize technology as a tool.
Recommendations for Further Research

Based on the findings drawn from the study, the following recommendations for additional research are proposed:

1. The sample size increase to enhance the statistical power of the study. There may have been additional statistical significance if the sample included more teachers who receive a survey and who complete the 67 item survey to be a part of the sample population. It is recommended to have the survey available online to all teachers in order to develop a national survey for all computer using teachers and non-users to complete. This would only increase the validity of the study.

2. This study was conducted in elementary schools in the southwest that demonstrated the use and non-use of computers. This study could be the basis for research that would determine teachers' perspective of technology integration in middle and high schools in the southwest.

3. In this study, the results of the telephone interviews were evidence of how computers were used in elementary schools. However, the number of participants was limited. This could add additional knowledge for qualitative research. Furthermore, the results indicate the software use was limited, as was the amount of time and methods used by teachers when accessing computers with their students.

4. The survey used in this study was comprised of two unique surveys using 67 Likert-type items that measure attitudes and use of computers. The CAS and CUS scale measures four subscales and usage of computers. The Level of Technology Instrument
developed by Moersch (1994) can be used to compare southwestern schools to schools in various geographic areas.

5. This study was conducted in a limited geographical area; the sites were identified from a pool of southwestern schools. Additional insight might be gained if the population of teachers included teachers from various parts of the country for the purpose of comparative analysis.

6. In this study, the results indicated teachers’ use of a wide range of software was limited. Additional insight might be gained if teachers had the opportunity to test and evaluate a wide range of software to determine effectiveness in the classroom.

7. In this study, teachers indicated the need for additional resources for instructors and students to be trained to use technology. This could be the basis for a study that would identify two controlled groups using computers; one group of teacher integrators with little training, and teacher integrators with training in technology and teaching practices.

8. This study was conducted in elementary schools consisting of teachers from the southwest. This could be the basis of a study that includes teachers’ students’ and parents’ as the sample population. This study would include the behaviors, access, and usage of technology.

9. In this study teachers use hardware and software that are available at the school. This could be the basis of a study including specific technology to increase student success. This could be the basis for certain teaching approaches that are more successful.
10. To account for this disparity in student achievement between border and non-border schools future research could investigate the complex potential infrastructure issues involved.

11. In this study, teachers are at different levels of utilizing computers. This could be the basis of a study including new teachers’ affiliation with technology in the classroom environment. This could also be the basis for a longitudinal study to take place over a five-year time span.
APPENDIX A

SURVEY
Teachers' Perspective of Technology Integration

Computer Attitude Scale
Survey Questionnaire

Part I

Teachers' perspectives of technology integration with pedagogical practices and their perceptions of the correlation with student success

The purpose of this survey is to gather information concerning people's attitudes toward learning about and working with computers. The survey will take approximately 15 minutes to complete. Your participation and information will remain anonymous and kept confidential. When you are done click on submit and your answers have been accepted. Thank you for your participation.

1. Gender  O Male  O Female

2. Check if you are  O 23 or less  O 24-26 years old  O 27-30 years old  O 31-35 yrs. old  O 36-39 yrs. old  O 40-45 yrs. old  O 46-49 yrs. old  O 50-54 yrs. old  O 55-older

3. What is your ethnic background?
   O American Indian Alaskan Native  O Asian or Pacific Islander  O Black (non-Hispanic)  O White (Non-Hispanic)  O Hispanic (Mexican American, Puerto Rican, Cuban, Spanish)
   O Other please specify:

4. Please indicate how long have you been teaching.
   O 0-1 year  O 2-5 years  O 6-10 years  O 11-20 years  O 21-over

5. Educational Background: (mark all that apply)  O Associates Degree  O Bachelor's Degree  O Masters Degree  O Doctoral Degree  O Other specify:

6. Please indicate what grade you teach.
   O Pre-K  O K  O 1  O 2  O 3  O 4  O 5  O Other specify:

7. Based on my teaching practices, I am comfortable using technology in my class.
   O N/A  O Not true of me now  O Somewhat true of me now  O Very true of me now

How much do you agree with each of the following statements?
SD = Strongly Disagree  D = Disagree  U = Undecided
A = Agree SA = Strongly Agree

<table>
<thead>
<tr>
<th>Statement</th>
<th>SD</th>
<th>D</th>
<th>U</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Computers do not scare me at all.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
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<td>9. I'm no good with computers.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>10. A person's gender influences his or her ability to operate a computer.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>11. I like working with computers.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
## Computer Usage Scale

### Survey Questionnaire

### Part II

The purpose of this survey is to gather information concerning teachers' use of technology. Your participation and information will remain and kept confidential. Thank you for your participation.

1. I design projects that require students to analyze information, think creatively, make predictions, and/or draw conclusions using electronic resources such as multi-purpose calculators, hand-held computers, the classroom computer(s), or computer peripherals (e.g., digital video cameras, probes, MIDI devices).

2. I use our classroom computer(s) primarily to present information to students using presentation software (e.g., PowerPoint) or interactive white boards because it helps students better understand the content that I teach.

3. I currently use instructional units acquired from colleagues, curriculum resource catalogs, or the internet that integrate the use of computers with higher order thinking skills and student-directed learning (e.g., students generate questions, define tasks, set goals, self-assess learning).

4. I have experienced past success with designing and implementing web-based projects that emphasize complex thinking skill strategies such as problem-solving, creative problem solving, investigation, scientific inquiry, or decision-making.

5. My students collaborate with me in setting both group and individual academic goals that provide opportunities for them to direct their own learning within my classroom curriculum.

6. I have stretched the limits of instructional computing in my classroom using the most current and complete technology infrastructure (e.g., small student/computer ratio, high-speed internet access, updated computer software, teleconferencing capability).

7. Students in my classroom use the available technology resources (e.g., websites, multimedia applications, spread sheets, MIDI devices) to complete...
projects that focus on critical content and higher order thinking skills (e.g., analysis, synthesis, evaluation).

N/A  Not true of me now  Somewhat true of me now  Very true of me now

8. I use computers primarily to support my classroom management tasks such as taking attendance, posting assignments to a web page, using a grade book program, and/or communicating with parents via email.

N/A  Not true of me now  Somewhat true of me now  Very true of me now

9. In my classroom, students use multiple software applications/hardware peripherals (e.g., internet browsers, productivity tools, multimedia applications, digital video cameras, MIDI devices) as well as resources beyond that school building (e.g., partnerships with business professionals, other schools) to solve problems of interest to them?

N/A  Not true of me now  Somewhat true of me now  Very true of me now

10. In my classroom, students use computers primarily to improve their basic skills or understand better what I am teaching them with the aid of supplemental instructional resources (e.g., CD's, Internet, integrated learning systems-ILS, tutorial programs).

N/A  Not true of me now  Somewhat true of me now  Very true of me now

11. Technical problems prevent me and/or my students from using the classroom computers during the instructional day.

N/A  Not true of me now  Somewhat true of me now  Very true of me now

12. I access the computer daily to browse the internet, send/receive email, and/or use different productivity and multimedia tools (e.g., word processor, spreadsheet, database, presentation software).

N/A  Not true of me now  Somewhat true of me now  Very true of me now

13. I empower my students to discover innovative ways to use our school's vast technology infrastructure to make a real difference in their lives, in their school, or in their community.

N/A  Not true of me now  Somewhat true of me now  Very true of me now

14. I am proficient with and knowledgeable about the technology resources (e.g., hardware, software programs, peripherals) appropriate for my grade level or content area.

N/A  Not true of me now  Somewhat true of me now  Very true of me now

15. Locating good software programs, websites, or CD's to supplement my curriculum and reinforce specific content is a priority of mine at this time.

N/A  Not true of me now  Somewhat true of me now  Very true of me now

16. I have the background to assist others in the use of a variety of software applications (e.g., Excel, Inspiration, PowerPoint), the internet (web browsers, web page construction and design), and peripherals (e.g., digital video cameras, probes, MIDI devices).

N/A  Not true of me now  Somewhat true of me now  Very true of me now

17. The current student-to-computer ratio in my classroom (s) is not sufficient for me to use computer(s) during my instructional day.

N/A  Not true of me now  Somewhat true of me now  Very true of me now

18. I consistently provide alternative assessment opportunities (e.g., performance based assessment, peer reviews, self-reflection) that encourage students to "showcase" their content understanding in nontraditional ways.

N/A  Not true of me now  Somewhat true of me now  Very true of me now

19. In my classroom, students use the internet for (1) collaboration with others, (2) publishing, (3) communication, and (4) research to solve issues and problems of personal interest to them that address specific content areas.
20. Given my current curriculum demands and class size, it is much easier and more practical for students to learn about and use computers and related technologies outside of my classroom (e.g., computer lab).

N/A Not true of me now Somewhat true of me now Very true of me now

21. I use my classroom computer(s) primarily to locate and print out lesson plans appropriate to my grade level or content area.

N/A Not true of me now Somewhat true of me now Very true of me now

22. Using the classroom computers is not a priority for me this school year.

N/A Not true of me now Somewhat true of me now Very true of me now

23. I do not have to call someone (e.g., computer technician, network manager) to figure out a problem with my computer or a software application; I have the confidence and expertise to "fix" it myself.

N/A Not true of me now Somewhat true of me now Very true of me now

24. I prefer using previously-developed curriculum materials (e.g., instructional kits, existing web-based projects) that (1) emphasize complex thinking skill strategies (e.g., creative problem-solving, decision-making, investigation), (2) promote the use of computers, and (3) provide opportunities for students to direct their own learning.

N/A Not true of me now Somewhat true of me now Very true of me now

25. My students' creative thinking and problem-solving opportunities are supported by our school's extensive technology infrastructure (e.g., high-speed internet access, unlimited access to computers, updated computer software, multimedia and video production stations).

N/A Not true of me now Somewhat true of me now Very true of me now

26. My personal professional development involves investigating and implementing the newest innovations in instructional design and computer technology that takes full advantage of my school's extensive technology infrastructure (e.g., immediate access to the newest software applications, multimedia and video production stations, teleconferencing equipment).

N/A Not true of me now Somewhat true of me now Very true of me now

27. I have an immediate need and interest in contacting other teachers, "qualified" consultants, and/or related professionals who can assist me in my ongoing effort to design and manage student-directed learning experiences using the available computers.

N/A Not true of me now Somewhat true of me now Very true of me now

28. I take into consideration my students' background, prior experiences, and desire to solve relevant problems of interest to them when planning instructional activities that utilize our available technology.

N/A Not true of me now Somewhat true of me now Very true of me now

29. I alter my instructional use for the classroom computer(s) based upon (1) the newest software and web-based innovations and (2) the most current research on teaching and learning (e.g., differentiated instruction, problem-based learning, multiple intelligences).

N/A Not true of me now Somewhat true of me now Very true of me now

30. An ongoing goal of mine is for students to learn how to create their own web page or multimedia presentation that shows what they have been learning in class.

N/A Not true of me now Somewhat true of me now Very true of me now

31. The types of professional development offered through our school, district, and/or professional organizations does not satisfy my need for bigger, more engaging experiences for my students that take advantage of both my "technology" expertise and personal interest in developing student-centered curriculum materials.

N/A Not true of me now Somewhat true of me now Very true of me now
32. Having students apply what they have learned in my classroom to the world they live in is a cornerstone to my approach to instruction and assessment.

33. The curriculum demands at our school such as implementing standards and increasing student test scores have diverted my attention away from using the computers in my classroom.

34. My immediate professional development need is to learn how my students can use my classroom computer(s) to achieve specific outcomes aligned to district or state standards.

35. My students have immediate access to all forms of the most current technology infrastructure available (e.g., easy access to newest computers, latest software applications, small student/computer ratio, video or teleconferencing kiosks) that they use to pursue problem-solving opportunities surrounding issues of personal and/or social importance.

36. I frequently explore new types of software applications, web-based tools, and peripherals as they become available.

37. Students' questions and previous experiences heavily influence the content that I teach as well as how I design learning activities for my students.

Other: ____________________________________________________________

Thank you for your time and participation to complete the survey.

Submit survey responses Clear Form will delete all responses

Website field: SId. PART
APPENDIX B

WEBSITE
Welcome to the website for Teachers' Use and Attitude for Computer Assisted Instruction survey questionnaire. The purpose of this website is to gather information concerning teachers use or non use of technology. An invitational letter, subjects Disclaimer letter and Teacher survey are highlighted on this website. After you have submitted your
answers to the questionnaire
feel free to review the supplemental information page.

**Thank you for your participation**

sysimmon@email.arizona.edu

Sylvia Simmons, Doctoral Candidate & Research Investigator
Copyright 2004 [University of Arizona]. Loyd and Gressard - CAS & Moersh Learning Quest. All rights reserved. Revised: March 30, 04
Teachers' Perspective of Technology Integration

Computer Attitude Scale
Survey Questionnaire

Part I

Teachers' perspectives of technology integration with pedagogical practices and their perceptions of the correlation with student success

The purpose of this survey is to gather information concerning people's attitudes toward learning about and working with computers. The survey will take approximately 15 minutes to complete. Your participation and information will remain anonymous and kept confidential. When you are done click on submit and your answers have been accepted. Thank you for your participation.

1. Gender  O Male  O Female

2. Check if you are  O 23 or less  O 24-26 years old  O 27-30 years old  O 31-35 yrs. old  O 36-39 yrs. old  O 40-45 yrs. old  O 46-49 yrs. old  O 50-54 yrs. old  O 55-older

3. What is your ethnic background?
   O American Indian Alaskan Native  O Asian or Pacific Islander  O Black (non-Hispanic)  O White (Non-Hispanic)  O Hispanic (Mexican American, Puerto Rican, Cuban, Spanish)
   O Other please specify: ___________________________________________

4. Please indicate how long have you been teaching.
   O 0-1 year  O 2-5 years  O 6-10 years  O 11-20 years  O 21+ over

5. Educational Background:  (mark all that apply)  O Associates Degree  O Bachelor's Degree  O Masters Degree  O Doctoral Degree  O Other specify: ___________________________________________

6. Please indicate what grade you teach.
   O Pre-K  O K  O 1  O 2  O 3  O 4  O 5  O Other specify: ___________________________________________

7. Based on my teaching practices, I am comfortable using technology in my class.
   O N/A  O Not true of me now  O Somewhat true of me now  O Very true of me now

How much do you agree with each of the following statements?

SD = Strongly Disagree  D = Disagree  U = Undecided
A = Agree  SA = Strongly Agree

<table>
<thead>
<tr>
<th>Statement</th>
<th>SD</th>
<th>D</th>
<th>U</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Computers do not scare me at all.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>9. I'm no good with computers.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>10. A person's gender influences his or her ability to operate a computer.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>11. I like working with computers.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>12. Working with computers makes me very nervous.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>13. A person's race/influences his or her ability to operate a computer.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>14. In general, boys are better than girls at using computers.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>15. I do not feel threatened when others talk about computers.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>16. I don't think I would do advanced computer work.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>17. I think working with computers is enjoyable and stimulating.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>18. A student's ethnicity influences his or her ability to operate a computer.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>19. I am sure I could do work with computers.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
20. It wouldn't bother me at all to take computer courses.  
21. I'm not the type to do well with computers.  
22. When there is a problem with computer software that I can't immediately solve, I would stick with it until I have the answer.  
23. I am sure I could learn a computer language.  
24. I don't understand how some people can spend so much time working with computers and seem to enjoy it.  
25. I would feel comfortable working with a computer.  
26. Once I start to work with the computer, I would find it hard to stop.  
27. I do not think I could handle returning to school to take a course.  
28. I am sure I could learn a computer language.  
29. I do not enjoy talking with others about computers.

Computer Usage Scale  
Survey Questionnaire  
Part II

The purpose of this survey is to gather information concerning teachers' use of technology. Your participation and information will remain and kept confidential.

Thank you for your participation,

1. I design projects that require students to analyze information, think creatively, make predictions, and/or draw conclusions using electronic resources such as multi-purpose calculators, handheld computers, the classroom computer (s), or computer peripherals (e.g., digital video cameras, probes, MIDI devices).

2. I use our classroom computer (s) primarily to present information to students using presentation software (e.g., PowerPoint) or interactive white boards because it helps students better understand the content that I teach.

3. I currently use instructional units acquired from colleagues, curriculum resource catalogs, or the internet that integrate the use of computers with higher order thinking skills and student-directed learning (e.g., students generate questions, define tasks, set goals, self-assess learning).

4. I have experienced past success with designing and implementing web-based projects that emphasize complex thinking skill strategies such as problem-solving, creative problem solving, investigation, scientific inquiry, or decision-making.

5. My students collaborate with me in setting both group and individual academic goals that provide opportunities for them to direct their own learning within my classroom curriculum.

6. I have stretched the limits of instructional computing in my classroom using the most current and complete technology infrastructure (e.g., small student/computer ratio, high-speed internet access, updated computer software, teleconferencing capability).

7. Students in my classroom use the available technology resources (e.g., websites, multimedia applications, spreadsheets, MIDI devices) to complete
projects that focus on critical content and higher order thinking skills (e.g., analysis, synthesis, evaluation).

N/A Not true of me now Somewhat true of me now Very true of me now

8. I use computers primarily to support my classroom management tasks such as taking attendance, posting assignments to a web page, using a grade book program, and/or communicating with parents via email.

N/A Not true of me now Somewhat true of me now Very true of me now

9. In my classroom, students use multiple software applications/hardware peripherals (e.g., internet browsers, productivity tools, multimedia applications, digital video cameras, MIDI devices) as well as resources beyond that school building (e.g., partnerships with business professionals, other schools) to solve problems of interest to them?

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10. In my classroom, students use computers primarily to improve their basic skills or understand better what I am teaching them with the aid of supplemental instructional resources (e.g., CD's, internet, integrated learning systems-ILS, tutorial programs).

N/A Not true of me now Somewhat true of me now Very true of me now

11. In my classroom, students use the Internet for (1) collaboration with others, (2) publishing, (3) communication, and (4) research to solve issues and problems of personal interest to them that address specific content areas.

N/A Not true of me now Somewhat true of me now Very true of me now

12. I access the computer daily to browse the internet, send/receive email, and/or use different productivity and multimedia tools (e.g., word processor, spreadsheet, database, presentation software).

N/A Not true of me now Somewhat true of me now Very true of me now
32. Having students apply what they have learned in my classroom to the world they live in is a cornerstone to my approach to instruction and assessment.

N/A Not true of me now Somewhat true of me now Very true of me now

33. The curriculum demands at our school such as implementing standards and increasing student test scores have diverted my attention away from using the computers in my classroom

N/A Not true of me now Somewhat true of me now Very true of me now

34. My immediate professional development need is to learn how my students can use my classroom computer(s) to achieve specific outcomes aligned to district or state standards.

N/A Not true of me now Somewhat true of me now Very true of me now

35. My students have immediate access to all forms of the most current technology infrastructure available (e.g., easy access to newest computers, latest software applications, small student/computer ratio, video or teleconferencing kiosks) that they use to pursue problem-solving opportunities surrounding issues of personal and/or social importance.

N/A Not true of me now Somewhat true of me now Very true of me now

36. I frequently explore new types of software applications, web-based tools, and peripherals as they become available.

N/A Not true of me now Somewhat true of me now Very true of me now

37. Students' questions and previous experiences heavily influence the content that I teach as well as how I design learning activities for my students.

N/A Not true of me now Somewhat true of me now Very true of me now

Optional enter your comments in the space provided below:

Thank you for your time and participation to complete the survey.

Submit survey responses Cancel Form will delete all responses

Website field: SID. PART
APPENDIX C

SUBJECT'S DISCLAIMER FORM
Subject’s Disclaimer Form

Title of Project: Teachers’ Perspective of Technology Integration with Pedagogical Practices and Their perceptions of the Correlation with Student Success

You are invited to voluntarily participate in the above-titled research study. The purpose of the study is to investigate the perspective of teachers’ integrating technology using pedagogical practices and their perceptions of the correlation with student success. You are eligible because you are an elementary teacher and teaching in southern Arizona.

If you agree to participate, your participation will involve completing a survey questionnaire. The survey will take approximately 30 minutes and take place at your school site. You may choose not to answer some or all of the questions.

Any questions you have will be answered and you may withdraw from the study at any time. There are no known risks from your participation and no direct benefit from your participation is expected. There is no cost to you except for 30 minutes of your time.

Only the principal investigator will have access to the name and the information that you provide. In order to maintain your confidentiality, your name will not be revealed in any reports that result from this project. Interview information will be locked in a cabinet in a secure place.

You can obtain further information from the principal investigator, Sylvia Simmons at (520) 227-4093. If you have questions concerning your rights as a research subject, you may call the University of Arizona Human Subjects Protection Program office at (520) 626-6721.

By participating in the interview, you are giving permission for the investigator to use your information for research purposes.

Thank you.

Sylvia Simmons
Principal Investigator
Ss
APPENDIX D

LETTER TO PRINCIPALS
March 29 04
Att: Principal

Dear Principal,

Your school is invited to participate in a study of elementary teachers. As per our conversation on March 29, 04, Thank you for granting permission to conduct research at your site. The subject of my dissertation is teachers’ perception of integrating technology and teaching practices at the elementary school level. The results of the study will be published in the form of a dissertation.

I will provide your teachers of your school site with a copy of the computer assisted instruction survey instrument, which is a two-part survey, and ask them to complete it and return it to a designated area at your school. The survey will take approximately 15 minutes to complete. I would also like to know if I could interview one staff member over the phone for 12 minutes at a time convenient for them.

Your school may benefit from participating in this study by contributing to a better understanding of how technology integration impacts student success. Teachers will also have the opportunity to enter a raffle on the same day. A ticket with a number will be drawn. The numbers will be read when the surveys are completed. Teachers will be drawing for free computer educational software given to 2 winners on the same day.

All information obtained in connection with this study that can be identified with, a school, or a particular individual will remain confidential. All responses on the survey instruments will be anonymous. I have enclosed an instruction sheet for survey distribution. If you have any questions I can be reached at 520-227-4093 or e-mail simmonssl@hotmail.com.

Thank you so much for your consideration of this matter. I am looking forward to hearing from you.

Sincerely,

Sylvia Simmons
APPENDIX E

LETTERS FROM SUPERINTENDENTS
Dear Superintendent,

Your schools are invited to participate in a study of elementary teachers. I would like to ask your permission to conduct research with your elementary school teachers. The subject of my dissertation is teachers' perception of integrating technology and teaching practices at the elementary school level. The results of the study will be published in the form of a dissertation.

If you agree to allow access I will provide your teachers of your school sites with a copy of the computer assisted instruction survey instrument, which is a two-part survey, and ask them to complete it and return it to me. The survey will take approximately 15 minutes to complete.

Your schools may benefit from participating in this study by contributing to a better understanding of how technology integration impacts student success. Teachers will also have the opportunity to enter a raffle on the same day. A ticket with a number will be drawn. The numbers will be read when the surveys are completed. Teachers will be drawing for five computer educational software given to the winner on the same day. All information obtained in connection with this study that can be identified with a school, or a particular individual will remain confidential. All responses on the survey instruments will be anonymous. If you agree to have your schools participate, I will call you by March 25, 04. I can be reached by 520-227-4093 or e-mail simmonssl@hotmail.com. After permission is granted I will contact the elementary Principals to set up an appointment to discuss my research and survey distribution.

Thank you so much for your consideration of this matter. I look forward to hearing from you.

Sincerely,

Sylvia Simmons, M.Ed
Principal Investigator
Doctoral Candidate
University of Arizona
Tucson
APPENDIX F

TELEPHONE INTERVIEW QUESTIONS
Teachers' Perspective of Technology Integration with Pedagogical Practices and their Perceptions of the Correlation with Student Success
Telephone Interview Questions

1. How long have you been teaching?
2. Have you always instructed at the same grade level?
3. What kind of teaching practices do you use in the classroom?
4. What kind of technology do you use in your class?
5. How much time on a daily basis do your students spend on the computer?
6. What are your thoughts and feelings about computers in the classroom?
7. How do you integrate teaching practices and technology?
8. Is the current student-to-computer ratio in your classroom(s) sufficient for you to use computer(s) during your instructional day? (how many)
9. How do you help multilingual students with computers in your class?
10. How do you utilize access to computers?
11. How would you rate the technology at your site? Why?
12. Have the curriculum demands at your school such as implementing standards and increasing student test scores diverted your attention away from using the computers in your classroom? Or not? Why?
13. Do you think that more access to resources and/or training is needed?
REFERENCES


