RELATIONSHIPS BETWEEN STUDENT ACHIEVEMENT AND LEVELS OF COMPUTER TECHNOLOGY INTEGRATION BY TEXAS AGRISCIENCE TEACHERS

A Dissertation

by

JASON B. PEAKE

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

December 2003

Major Subject: Agricultural Education

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Approved as to style and content by:

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ABSTRACT

Relationships between Student Achievement and Levels of

Technology Integration by Texas Agriscience Teachers

(December, 2003)

Jason B. Peake, B.S., University of Kentucky;

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The purpose of this study was to determine if agriscience teacher integration of instructional technology was related to student achievement. Knowledge of these correlations will assist teacher educators in offering more appropriate professional development opportunities for agriscience teachers. This information will also assist secondary schools in making decisions regarding technology purchases for agriscience departments.

Instructional technology researchers have worked since the 1960s to gain a better understanding of the role that instructional technology plays in student achievement. Many researchers have found that instructional technology influences student learning. In the early 1980s Richard Clark published controversial findings that media has no influence on student learning. These conflicting findings led to the development of this study.

A survey was developed to collect information on the level at which teachers integrate technology into their instruction. The instrument was pilot tested, and a

reliability measure of .95 was found for the 42 items measuring the technology skills of teachers. Section three of the instrument had a reliability of .93 for the nine items that were used to measure teacher integration of technology. Teachers' demographics, teachers' technology integration skill levels, teachers' administrative use of technology skill levels, and teachers' technology integration levels were collected from a random sample of 150 agriscience teachers in Texas.

Student achievement was measured using the Texas Assessment of Academic Skills (TAAS) test. Student data were collected on 10^{th} grade students in classes taught by the 150 teachers selected to participate in the study. The Texas Education Agency provided all TAAS data in a single data file. The primary student variables used in the study to quantify math, reading, and writing achievement were the total number of multiple choice items correct for each of these three subject areas.

A low positive correlation was found between student achievement in math and teacher instructional technology integration level (.14). Negligible positive correlations ($r < .10$) were found between teacher instructional technology integration level and student achievement on the writing portions and reading portions of the TAAS.

DEDICATION

This is dedicated to my parents, James and Paula Peake. Thank you for all of your support and encouragement throughout my lifetime. Mom, thank you for always being there to talk to me and thank you for all of the advice that you have given me over the years; I listened. Dad, thank you for instilling in me the dedication and the work ethic to stay in school and achieve my goals.

I would also like to thank all of my siblings: Jeffrey, Mathew, Michael, Joseph, Martha, Mary, John, Anne, Kirby, and Elizabeth for all of their contributions to my life which have shaped me into the person that I am. A special thanks to my sister Elizabeth for all of her support that made it possible for me to stay in school for this degree; I would not have been able to complete this without your help. I thank all of you.

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Sincere appreciation is extended to the members of the author's doctoral committee: Drs. Gary Briers, Tim Murphy, Julie Harlin, Jimmy Lindner, and Christine Stanley. The relationships assembled and the experiences gained from this research project will serve as a guide to me through the rest of my career.

Special thanks are extended to Dr. Gary Briers for his personal attention and guidance during this research project. His patient assistance with the statistical analysis and genuine interest in learning are the reason that this research project was a success.

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CHAPTER I

INTRODUCTION

In January 1996, the National Information Infrastructure Council called for tripling the national investment in information infrastructure in schools and libraries. The KickStart Initiative called for networking all schools and putting computers in every classroom (Information Infrastructure Task Force, 1996). Nationally, in 2001, there were 4.2 students for every instructional school computer, and the number of students per Internet-connected computer in schools dropped from 7.9 in 2000 to 6.8 in 2001 (Skinner, 2002). In 2001, the National Assessment of Educational Progress reported that Texas was above the national average with 3.7 students for every instructional school computer (Zehr, 2003). With this increase in instructional technology has been an increased concern for how this technology is being used and the impact that it has on student learning.

Richard Clark (1994) argued that the literature clearly demonstrates that media does not determine learning. Clark's argument is most clearly stated as follows:

> The best current evidence is that media are mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in nutrition… Only the content of the vehicle can influence achievement (Clark, 1983, p. 445).

The *Journal of Agricultural Education* was used as the model for style and format of this dissertation.

Clark's arguments were not popular among instructional technology researchers, but there is some support for his ideas. He continued to promote the idea that media are merely methods of message storage and delivery; they do not influence student achievement (Clark, 1983). Clark goes on to warn educators to "avoid rationalizing computer purchases by referencing the achievement gains" (Clark, 1985, p. 458).

Summers (1990-1991), Marcus (1995), Kozma and Croninger (1992), and McNeil and Wilson (1991) all attempted to show that instructional technology does have an influence on student achievement. Kozma and Croninger (1992) identified ways in which technology might help to address the cognitive, motivational, and social needs of at-risk students. Summers (1990-1991) found that technology seemed to help focus students' attention and encourage them to spend more time learning. In 1995, Marcus found that instructional technology can make learning more meaningful to students when they used telecommunications technology to create their own projects. McNeil and Willson (1991) found that students with weak learning skills seemed to profit when teachers supplied structure to activities using hypertext and interactive videodisc applications.

Early research concerning instructional technology simply compared one instructional media to another. Furthermore, researchers who hoped to prove the value of instructional technology focused on identifying the appropriate techniques of message organization and the correct process of instructional delivery. Researchers have more recently begun to design cost effectiveness and cost/benefit studies in an effort to establish the value of increasing instructional technology (Thompson et al., 1996).

In spite of the findings of Clark (1983), there has been an increased emphasis on the integration of computers in the curriculum, especially in the ninth through twelfth grades (Birkenholz & Stewart, 1991). Educators have placed an emphasis on the need to prepare technologically literate students. Most states have adopted state technology standards and have charged schools with meeting those standards. Texas established the Texas Essential Knowledge and Skills (TEKS); these standards describe what students should know and what skills they should possess when using technology in each grade level.

As early as 1983, Camp (1983) suggested that the primary thrust of instructional technology in agriscience programs will be the use of the microcomputer. For the past decade much of the research conducted regarding the use of instructional technology in agriscience classrooms has focused on microcomputers for instructional purposes. Much of this research has compared traditional instructional methods with the use of microcomputers as a teaching method. Many of the leading agriscience researchers have conceded the need for more research describing the influence of instructional technology on student achievement.

Statement of the Problem

To prepare and equip future agriscience teachers, it is prerequisite that we know what should be included in their preparation. Much has been published in the literature in about many types of instructional technology and the effects of media on learning. George (2000) found that technology can be vital in helping students achieve higher standards and perform better. There is a need to identify relationships that may exist between the use of instructional technology and student achievement in agriscience.

Significance of Study

If the most prevalent correlations can be identified, then more effort can be directed to the correct type of preparation for future agriscience teachers. This may help to better prepare agriscience teachers to improve student achievement.

Purpose and Objectives

The purpose of this study was to determine if agriscience teacher use of instructional technology is related to student achievement in math, reading, and writing. To accomplish this purpose, the following objectives were proposed.

1. Describe the teachers who are participating in this study.
2. Determine the technology skill level of Texas agriscience teachers.
3. Determine the current level of instructional technology integration by Texas agriscience teachers.
4. Identify the Texas Assessment of Academic Skills (TAAS) test scores of students who were enrolled in agriscience courses of those teachers surveyed.

5. Identify correlations between teacher technology skills and teacher demographics.
6. Determine if correlations exist between instructional technology integration by agriscience teachers and agriscience student achievement.

Research Questions

The following research questions will be addressed in this study:

1. What are the demographic characteristics of Texas agriscience teachers?
2. What is the technology skill level of Texas agriscience teachers?
3. What is the current level of instructional technology integration by Texas agriscience teachers?
4. What are the TAAS test scores of students who were enrolled in agriscience courses of those teachers surveyed?
5. What correlations exist between Texas agriscience teacher technology skill levels and teacher demographics?
6. What correlations exist between Texas agriscience teacher instructional technology integration and student learning?

Assumptions

The following assumptions were made in regard to this study:

1. The results of the surveys completed by participants accurately reflect their integration of technology into their instruction.
2. The results of the survey completed by teacher participants reflect their level of technology integration skills.

3. Student scores on the TAAS test will reflect the amount of student achievement.
4. Students receive instruction throughout the school year and by many teachers other than the agriscience teacher. Thus, the observable relationship of the agriscience teacher's integration of technology and student achievement in basic academic skills would be moderate.

Limitations

The findings of this study were subject to the following limitations:

1. Because this study uses TAAS data to determine student learning and it also uses single teacher Texas agriscience programs, generalizations are restricted to single teacher Texas agriscience programs.
2. Because of other factors which may influence student achievement on the TAAS test there are limitations to the correlations that are identified.
3. Because students were not surveyed, the number of agrisciene classes in which the students were enrolled are not determined. Students were selected from all sophomores in a selected school if they had completed one or more agriscience classes.

Delimitations

The study, conducted during the Fall semester of 2002 and the Spring semester of 2003, was delimited to 87 agriscience teachers in Texas and the tenth grade agriscience students of those teachers. These teachers were listed in the Agriscience Teachers (AST) Directory System housed at Texas A&M University, Department of Agricultural Education.

Definitions

For the purpose of this study, the term instructional technology will be used in lieu of educational technology or microcomputers. In 1994 The Association for Educational Communications and Technology (AECT) published *Instructional Technology: The Definition and Domains of the Field* in which authors preferred "instructional technology" to "educational technology and microcomputers" as it is a more widely accepted term in the United States.

The following definitions were used for the purpose of this study:

1. Instructional technology: "the theory and practice of design, development, utilization, management and evaluation of processes and resources for learning." (Association for Educational Communications and Technology, 1994, p. 5)

2. Administrative Technology Skill Level: Administrative technology skill level is operationally defined for the purpose of this study as the teacher's score on section two of the instrument on the following areas: file management, e-mail, word processing, spreadsheets, Internet use, and creating web pages.

3. Technology Integration Skill Level: Technology Integration Skill Level is operationally defined for the purpose of this study as the teacher's score on section two of the instrument on the following areas: presentation software, presentation hardware, and integration of technology.

4. Technology Integration Level: Technology Integration Level is operationally defined as the teacher's self assessment of technology integration as measured by section three of the survey instrument which is based off of Intel's Teach to the Future benchmarks for technology integration.

5. Technology in education: "The application of technology to any of those processes involved in operating the institutions that house the education enterprise, including the application of technology to finance, scheduling, grading, and other processes that support education" (Thompson et al., 1996, p. 3).

6. Student achievement: For the purpose of this study, student achievement was defined as the score received by the student on the Texas Assessment of Academic Skills Test. More specifically the total number of multiple choice questions that the student answered correctly on each of the three major sections of the test: math, reading, and writing.

CHAPTER II

REVIEW OF SELECTED LITERATURE

This chapter has three sections. A review of the types of instructional technology research is discussed first. Second, an examination of the theories that influence instructional technology is presented. Third, an outline of current research and projects associated with technology integration and student achievement is offered as further justification of the need for this study.

Types of Instructional Technology Research

Evaluation

As new technologies are developed and introduced to the education system, researchers typically begin investigating the new technologies with media comparison studies. The first concern that researchers investigate is the degree to which new technologies can improve learning, if the technology influences learning at all.

Levie and Dickie (1973) stated that people can learn from a variety of media. Much of the research on different instructional technologies has produced similar findings; people can learn from computers (Salomon & Gardner, 1986; Schlosser & Anderson, 1994). Agricultural education researchers have experimented and discovered that this holds true for agriscience classes; students can learn from different computer technologies (Zidon & Lunft, 1987). Salomon and Gardner (1986) and Schlosser and Anderson (1994) determined that content and instructional variables as well as media play large roles in student learning.

Media Comparison

Early research regarding media selection focused on selecting the media that most influenced learning, determining which media was the best for teaching. As this research was compiled and analyzed, researchers came to realize that other factors also play a large role in student achievement. Content, teaching style, and learner characteristics were found to influence student achievement (Kotrlik et al., 2000). As a result researchers began to move away from media comparison studies and focus more on how to best use the instructional technology that is available.

Intra-Medium

In the late 1970s and early 1980s, Richard Clark and other media researchers began to focus their research on more specific independent variables. Instead of comparing one medium to another, researchers began to design studies that compared alternate methods of using a particular medium. Salomon observed that effectiveness of a medium depended on the nature of the instruction (Salomon, 1981). The question for researchers to answer began to move from which technology should be selected to how to best use the technology that was selected.

These intra-medium studies used a particular medium in all groups and the independent variable was the instructional approach. The studies helped provide a necessary and useful focus for studies on the effectiveness of instructional technology; many of the studies do not consider specific student aptitudes in their design. Next, instructional technology researchers began to examine aptitude treatment interaction.

Aptitude Treatment Interaction

Clark and Salamon (1986) found that research on learning in education was moving from a behaviorist to a cognitive or constructivist theoretical base. When evaluating student learning from the cognitive learning perspective, learning was viewed as “the degree to which previously learned knowledge and skills can be transferred to new contexts and problems” (Clark & Surgure, 1988, p. 20). Cognitive theory defines learning as a process in which the learner is actively engaged in integrating new knowledge with old knowledge. This view of what learning is altered the direction of instructional technology research because of student ability, prior knowledge, motivation, and instructional methods are considered to be factors that influence whether or not learning will occur (Clark & Surgrue, 1988).

Instructional technology researchers realized the interaction that occurs with external stimuli and the learner’s internal cognitive processes that can support learning (Clark & Surgrue, 1988).

Cronbach and Snow (1977) stated that information about the learner is helpful in adapting instruction in order to provide an environment in which the learner can thrive. “It is inconsistent to suppose that there is a single, global learning ability. The skills and habits that make a person a superior learner no doubt depend on the test, the methods of instruction, the conditions of practice, and the criterion against which learning is judged" (Cronbach & Snow, 1977, p. 13). Cronbach and Snow believed that there was a need "to design a true education that employs unique means wherever the learner's distinctive development makes traditional methods ineffective for him/her" (Cronbach & Snow, 1977, p. 11). Education researchers began to focus attention on whether or not specific instructional methods tended to facilitate or inhibit learning for individuals of particular aptitudes.

Theories Influencing Instructional Technology

Process Theories

Systems Theory

Systems theory deals with the organization and the structure of the entire education system (Thompson et al., 1996). The systems approach gives teachers and researchers a rational procedure to follow when designing instruction; it gives educators a procedure for using what is known about learners and learning in the design of instruction. This approach provides teachers and instructional researchers with a series of steps that guide them in the design of learning activities. Thompson, Simonson, and Hargrave (1996) explain systems theory in three major stages.

> "Stage I or systems definition refers to the start-up activities that must be planned and organized. The instructional problem in terms of a broad goal is identified. Next, the setting, or instructional situation, is analyzed. Information about students, such as background knowledge, learning styles, and motivation are matched to instructional resources and teaching strategies. Last, the procedures used to manage the instructional activities are organized.
>
> Stage II is called the system design stage. Here, specific performance standards, materials specifications, and design limits are stated. Precise behavioral objectives are

> written, teaching methods are identified, materials are chosen and developed and entire instructional procedure is designed. This instructional plan is called a prototype because it is tested and revised in Stage III of the instructional development approach.
>
> Stage III, the system evaluation stage, identifies evaluation procedures. During this stage, prototype instructional materials and techniques are evaluated and revised. The revision process continues until the validity of the new instructional system is determined. Feedback connects all stages of the process. In the context of the systems approach, feedback refers to information that is used to make adjustment to the instructional materials and procedures." (Thompson et al., 1996, p. 7)

The systems approach is derived from behaviorist theory. The systems theory and instructional development models give considerable guidance to educators interested in designing or evaluating instruction (Dick & Carey, 1990). It allows educators to identify ineffective materials and techniques, and gives them support for selecting more effective materials and techniques.

Communication Theory

Communication theory is based on scientific studies that examine all the components influencing communication (Thompson et al., 1996). Von Bertalanffy's systems theory evolved in to the first communications model and contributed to understanding the role of feedback in systems.

In 1949 Claude Shannon and Warren Weaver in their book titled *The Mathematical Theory of Communication* further refined the communication model. The original Shannon-Weaver Model was linear, but they later added more dimensions to their model (Simonson & Volker, 1984). As the communication model became more popular, theorists added the concepts of feedback and overlapping fields of experience (Simonson & Volker, 1984). This provided educators with a more complete explanation of what is happening during communication (Simonson & Volker, 1984).

> "Fields of experience refer to all events that an individual has perceived, recognized, or communicated, and includes such things as language, cultural background, and education. Communication occurs in the area of overlap between the sender's experiences and the receiver's experiences. If a message is prepared that is not based on what the sender and receiver have in common, then it is unlikely that the communication process will be successful.
>
> The sender is the individual who wants to communicate something. The task of the sender is to prepare a message that informs or influences the receiver toward the objective of the message. In education the sender is traditionally the teacher.
>
> The message is the idea the sender wishes to convey. This idea is coded in some transmittable form, usually involving symbols such as words or pictures. Symbols serve as clues to the meaning of the message. It is in the coding and decoding of messages where many of the problems of communication found. Generally, the more realistic, authentic, or familiar the symbols are to the receiver, the more successful will be the communication process. The receiver must be able to easily, quickly, and accurately decode the message into the idea originally held by the sender.
>
> The channel is considered to be the vehicle for carrying the message. There are two categories of channels – sensory and technological. Sensory channels are those involving the five senses. Teachers talk to their classes. Dinner speakers use gestures to visualize ideas, and lovers touch to show their feelings. Sensory channels are generally quite limited. Voices can be heard only over short distances, and gestures convey only limited meanings. Touching, tasting, and smelling are limited in both variability and because of the need for close proximity between the sender and the receiver. Sight is the most complex of the senses. However, the eyes only receive messages, just as the voice is used only to send messages." (Thompson et al., 1996, p. 9).

Communication is the process of message delivery; communication theory attempts to explain this process (Thompson et al., 1996). Learning and instructional technology are closely tied to communication theory due to the purpose of the technology. Educators are attempting to teach their students using the technology, and in doing so, must communicate with those students.

Learning Theory

Behaviorism

When all theories of learning are considered, behaviorism has had the greatest impact on instructional technology (Thompson et al., 1996). Thorndike's connectionism, Pavlov's classical conditioning, and Skinner's operant conditioning were all ideas used to give direction to early researchers who examined the impact of instructional technology on behavior (Skinner, 1954; Thorndike, 1969).

> "The use of behaviorism in education is based on the principle that instruction should be designed to produce observable and quantifiable actions by the learner. Behaviorists consider the mental state of a learner to be merely a predisposition. Because mental states can not be observed, behaviorists do not believe teaching should be directed toward strengthening the mind, a common goal of educators of the early 20th century, but should be aimed at producing desirable outcomes in students. In other words, behaviorists expect any effective instructional activity, such as a computer-based tutorial, to change the student in some obvious and measurable way. After completing a lesson, students should be able to do something that they could not do, or could not do as well, before the lesson." (Thompson et al., 1996, p. 10).

With a focus on measurable outcomes, behaviorism theory helped to drive the integration of technology into the education system. "Because behaviorists seek to produce observable and measurable outcomes in students, they had a tremendous influence on the development of instructional technology." (Thompson et al., 1996, p. 10).

Cognitive Theory

Cognitive theory researchers study the learning process itself and place greater emphasis on the learner than do behaviorists (Bruner, 1960; Carey, 1986; Hilgard & Bower, 1975). A shift in research direction occurred that moved from studying the media and observable outcomes to studying internal processes of the learner and what was going on inside the learner's brain. Bruner (1960) focused on how knowledge is organized in the learner's brain, the readiness of the learner, and the intuition of the learner. Instead of focusing on measurable outcomes, cognitive researchers emphasize cognitive functions of the learner like motivation and desire to learn.

Cognitive theory takes a much closer look at the learner and gives a broader view of what is being learned. Where behaviorists examine measurable outcomes, cognitive theorists examine the learners and processes of the learner's thoughts (Thompson et al., 1996).

Selected Research

Early Research

Beginning in the 1940s and stretching into the 1980s, use of different types of technologies in schools slowly increased as universities began to offer courses in the use of technology for teaching. In the 1980s more personal computers began to find their way into schools (Pett & Grabinger, 1995).

As society has produced new technologies, education has attempted to adopt and integrate those technologies to improve the education process. As technology becomes more prevalent in society and our schools, educators are faced with the task of determining how to best utilize the technology to improve student learning. For the past twenty years educators have struggled with the task of how to effectively integrate this technology into the K-12 classroom.

Jonassen (1966) recommended that computers be used in the educational environment to cause students to think in meaningful ways, to encourage students to think critically. Even though Jonassen made his suggestions as early as the 1960s, technology in schools during the 1970s and 1980s was used for drill and practice (Jonassen, 1966; Schofield, 1995). Questions would be presented by the computer and the student would receive feedback as to whether or not the student had answered the question correctly (Murphrey, 1997). Educators and researchers continue to research and question what the most effective use of instructional technology is.

In the 1980s, Becker identified computers as the single medium for instruction that produced the most excitement in all of education (Becker, 1998). In the ten years from 1985 to 1995, the number of computers in schools increased from about 50,000 in 1985 to roughly 2,400,000 in 1995 (Thompson et al., 1996).

During the last decade, U. S. K-12 schools have approximately tripled their spending for instructional technology, from $2.1 billion in 1991-1992 to a $6.2 billion in 1999-2000, not including E-rate funding (National Center for Education Statistics, 1999). Similar increases have occurred in higher education, with estimated total technology expenditures of $2.7 billion in 1999-2000 (Software and Information Industry Association, 2003).

In order for public schools to apply for certain types of federal funds, they are required to have a plan for integrating technology into their school. Monies are also available from state grants, grants from businesses, or philanthropies who are all interested in an increase of technology integration in education (Alston, Miller, & Williams, 2003).

As the amount of money that is being invested in technology grows, and the integration of technology grows so do the accountability measures attached to it. Parents, the federal government, and business investors demand accountability in the form of higher test scores. Glenn (1997) stated that public support for technology in schools is "…strong and vocal, and there is an expectation that no school can prepare students for tomorrow's society if new technologies are not available for students" (Glenn, 1997, p. 123). Much research exists on this topic, but the findings of this research are inconclusive as to the influence of technology on student learning.

Instructional Technology Based Learning

"Technology is changing more rapidly than ever before, causing more and more confusion about the best way to use it in schools" (Bailey, 1997, p. 57). Today's technology-driven economy has impacted all aspects of society, including the workplace (Center for Occupation and Research Development, 1999). How technology is used may be the most important question of all (Milkin Exchange on Education Technology, 1999).

Several different factors have been identified as having an influence on student learning (Rosenshine & Furst (1973). “Technology can play a vital role in helping students meet higher standards and perform at increased levels by promoting alternative, innovative approaches to teaching and learning” (George, 2000, p. 57). Kuperstein and Gentile (2001) found that technology is a powerful way to call students back to a natural, experiential, and enjoyable way of learning. They supported the theory that engaged learning produces more acquisition of knowledge and understanding. Kuperstein and Gentile (2001) suggested being flexible in the ways in which new technologies are presented and learning how to guide students in asking probing questions.

Harrison (1999) found that many students have embraced the computer age and others are waiting for someone to help guide them. Harrison’s research looked at assumptions made by teachers about what students know and what they want to know. Harrison found that once students were given minimal instructions, they were soon exploring with other students and entering into conversations with each other about how to complete a task on the computer.

Some educators see technology as a way to help prepare students for the workplace while others see it as a way to improve standardized test scores. Still others see technology as a way to foster education reform, changing the way teachers teach and the way learners learn (Alston, Miller, & Williams, 2003). Educators need to clarify their goals for using technology in the classroom before effectiveness can be assessed (Trotter, 1998).

Teacher Attitudes

Zimbardo and Leippe (1991) define attitudes as an evaluative disposition based upon cognitions, affective reactions, behavior intentions, and past behaviors. Teacher attitudes influence whether one accepts computers, and also influences future behaviors such as their use of a computer as a professional tool and using instructional technology in the classroom (Woodrow, 1991). The literature indicates that an individual's attitudes toward computers influence their use of computers (McInerney, McInerney, & Sinclair, 1994).

Evidence that agriscience teachers in Texas have adopted computers and information technology has been unreported in the literature over the past decade (Fraze, 2001). A study by Brown, Townsend, and Carnes (1985) found that 19.7% of Texas agriscience teachers used microcomputers in their programs and a similar study by Cepica et al. (1984) reported that 26.73% of Texas agriscience teachers used computers for their classes. More recently, a nationwide survey of agriscience teachers reported that 72.08% used computers in their programs (Birkenholz & Stewart, 1991).

Many teachers, especially more experienced teachers, have been unable to find effective ways to use technology in their classrooms (Smerdon et al., 2000).

Teacher technology training frequently produces less than desirable effects for a number of reasons including lack of time, funds, and direct connection of the technology training to the curriculum (Rakes & Casey, 2002).

Research also reports that comfort with the use of computers is related to the use of computers (Gilmore, 1995; Mitra, 1994). The increased access to information technology and the popularization of the personal home computer (U.S. Department of Commerce, 1998) have lent to the increased comfort levels over the last decade. The increase in use and computer knowledge has also been a major factor in reducing computer anxiety that serves as a barrier to information technology (Crable et al., 1994; Loyd & Gressard, 1984). Teacher in-services and regional educational service centers have provided staff development for Texas teachers regarding technology use for professional productivity and integration into the classroom environment for many years (Fraze, 2001).

Sandholtz, Ringstaff, and Dwyer (1997) described an evolutionary process that teachers go through as they continue to increase their use of technology. They described five phases: 1) Entry – teachers adapt to changes in physical environment created by technology; 2) Adoption – teachers use technology to support text-based instruction; 3) Adaptation – teachers integrate the use of word processing and databases into the teaching process; 4) Appropriations – teachers change their personal attitudes toward technology; and 5) Invention – teachers have mastered the technology and create novel learning environments. Sheingold and Hadley (1990) found that teachers need five to six years of working with technology before they felt they had developed their expertise, and that once they were at this level, they modified instructional strategies and dramatically changed the classroom environment.

"If the integration of technology in the classroom in the next ten years is to look any different from the last ten, we must focus time, money, and resources in areas that can have the greatest impact for our students, our teachers" (Fabry & Higgs, 1997, p. 393). According to the Office of Technology Assessment's 1995 report on teachers and technology, schools have made significant progress in implementing technology and helping teachers to use basic technology tools, but they still struggle with integrating technology into the curriculum. "Curriculum integration is central if technology is to become a truly effective educational resource, yet integration is a difficult, time consuming, and resource-intensive endeavor" (Office of Technology Assessment, 1995, p. 1). A task force of the National Council for the Accreditation of Teacher Education (NCATE) concluded that colleges are not properly preparing teachers to use technology in their teaching. The report stated, "Bluntly, a majority of teacher education programs are falling far short of what needs to be done" (NCATE, 1997, p. 6). Teachers will be less inclined to integrate technology in their classrooms if teacher education faculties do not model the integration of technology in their classrooms (Zehr, 2003). Glenn (1997) maintained that teacher training has focused on "…word processing, test construction, automated transparency creation, and grading rather than creating a different learning environment" (Glenn, 1997, p. 126).

There are conflicting findings regarding integration of technology by teachers. A National Center for Education Statistics (NCES) study (Smerdon et al, 2000) reported that several factors were related to the extent to which technology was integrated into schools: socioeconomic characteristics of students; teachers' years of experience; sources of training - college, graduate work, professional development, and independent learning; availability of technology at school and at home; incentives for integrating technology such as support for participating in training or provision of release time for teachers to learn how to use this technology; availability of time in the school schedule for student computer use; and technical support for technology integration. However, Kotrlik, Harrison, Redmann, and Handley (2000) found that degree held, gender, ethnicity, age, years teaching experience, usefulness of instructional technology, participation in the state vocational convention and participation in regional and national Association of Career and Technical Education conventions did not explain the variance in the value vocational teachers placed on technology.

Teacher Integration of Technology

M. Eisenberg and D. Johnson (1996) suggests that there are two requirements for effective integration of technology skills: 1) the skills must directly relate to the content area and to the classroom assignments, and 2) the skills themselves need to be tied together in a logical and systematic model of instruction.

Computer and Internet use by Texas educators has increased over the past decade with contributions from many factors. One of the most contributing factors is the increased access to information and communication technology such as electronic mail, discussion groups, newsgroups, and a text-based version of the Internet (Fraze, 2001). Research shows that increased access dismantles some of the differences between the novice and expert users that become barriers to the use of information technology (Mitra et al., 1999).

Agricultural education has a philosophy with several distinguishing tenets. Emphasis is placed on solving problems in real-world settings, learning by doing, individualized learning, career guidance, leadership and citizenship development, and community-oriented programs (Phipps & Osborne, 1988). These tenets are used as guides in the planning of courses and programs, the selecting of methods and materials, and ultimately, teaching and learning in agricultural education (Alston, Miller, & Williams, 2003).

The National Center for Education Statistics (NCES) (2000) studied the integration of various technologies in the teaching/learning process. NCES reported the following examples of how teachers had integrated technology: 44% used technology for classroom instruction, 42% used computer applications, 12% used practice drills, 41% required research using the Internet, 27% had students conduct research using CD-ROMs, 27% assigned multimedia reports/projects, 23% assigned graphical presentations of materials, 21% assigned demonstrations/simulations, 20% required students to use technology to solve problems and analyze data, and 7% assigned students to correspond with others over the Internet (NCES, 2000).

Barriers to Technology Integration

Despite technologies being available in schools, many teachers report little or no use of computers for instruction (Pellegrino & Altman, 1997). Cost and “don’t want to” have been identified as leading reasons for not accessing the Internet (U.S. Department of Commerce, 1998). Reliability, price, size, and complexity are identified as drawbacks to computer systems (Baker & Blue, 1999). The location of computers within schools (Becker, 1998) and the computers control issue have also been identified as barriers to integration (Liu, Macmillan, & Timmons, 1998). Teacher training and computer background also have an effect on the adoption of information technology (Mitra et al, 1999; Liu et al., 1998; Pellegrino & Altman, 1997). Lack of teacher training in how to innovatively use technology is one of the major barriers preventing the infusion of technology in the classroom (Fabry & Higgs, 1997; Pelgrum, 1992).

The Computers in Education study (COMPED) conducted by the International Association for the Evaluation of Educational Achievement (IEA) involved 21 countries, including the United States (Pelgrum, 1992). This study described the ways that computers have been introduced into schools and used by teachers and students (Pelgrum, 1992) by analyzing the results of 70,000 respondents. The results indicated that lack of computers and instructional hardware were preventing the successful adoption of instructional technology by schools (Pelgrum, 1992). Eight years later, Fuller (2000), using data from Stage II of COMPED, reported similar findings.

Millions of dollars have placed technology in PK-12 classrooms, but there has been considerably less attention paid to helping teachers make the transition into a technology-rich learning environment which would, in turn, impact student learning (National Center for Education Statistics, 1999).

Perkins (1992) points out in his book *Smart Schools: Better Thinking and Learning for Every Child* that "… students are learning and teachers are teaching in much the same way they did twenty or fifty years ago. In the age of CDs and VCRs, communication satellites and laptop computers, education remains by and large a traditional craft" (Perkins, 1992, p. 3).

Nordheim and Connors (1997) identified two major obstacles to the integration of technology by classroom teachers. First, the computer hardware and software are too expensive. Second, there is a lack of proper training of teachers to use technology as an instructional tool. Murphy and Terry (1998) went on to identify eight more obstacles: 1) lack of administrative support, 2) lack of support services for equipment and maintenance, 3) resistance to change by educators, 4) lack of reward system for technology implementation, 5) lack of teacher preparation time, and 6) lack of access to up-to-date equipment.

Several authors have written about barriers to the implementation of technology. Kerr (1989) stated that "…the teacher's world is substantially limited by powerful social and administrative pressures to teach in a particular way" (Kerr, 1989, p. 5). In his article, Glenn supported Kerr by noting that the organizational structure of schools inhibits teachers' efforts to learn about new technologies and resists innovation (Glenn, 1997).

In their review of several meta-analyses, Febry and Higgs (1997) found that the major issues in the implementation and integration of technology in the teaching/learning process were resistance to change, teachers' attitudes, training, time, access, and cost.

Budin (1999) stated that, until recently, schools had their priorities backwards. They were more concerned with acquiring equipment and software rather than emphasizing staff development and planning for the integration of technology. Budin questioned what will happen to support for technology integration in the future if funding for technology integration results in test scores, student writing, and other measures that fail to live up to expectations. Budin indicated that curriculum, teacher's training, and research have received minimal attention. He also indicated that the students' and teachers' roles in using technology, how technology fits into the curriculum, what teachers should know and how teachers will learn about technology, and how we should assess the impact of technology have also received minimal attention from researchers. Bosch (1993) reported that teachers did not see computers as part of the normal classroom process and often used them for ancillary activities. He recommended that administrators look beyond the number of computers in schools and determine whether real integration across the curriculum had occurred.

Student Achievement

With regards to the influence of instructional technology on student achievement, there are conflicting reports. Meta-analysis of instructional technology research has demonstrated that instructional technology has a positive effect on student achievement (Khalili & Shashoani, 1994; Moore & Kearsley, 1996; Bialo & Sivin-Kachala 1999). Entire publications such as Report on the *Effectiveness of Technology in Schools*, '90-'97, written by the Institute for Energy and Sustainable Development (IESD), Inc., and published by the Software Publishers Association, offer pages of evidence of technology's impact on schools. Technology, in the form of computers and the Internet within the classroom, has been shown to increase student performance and provide the teacher with a powerful tool for information gathering, communication, and presentation (Goldberg, 1996; Sion, 1998; Lewis, 1998; Baker & Blue, 1999). "Computer software can change the way we learn in school" (Schank & Cleary, 1995 xii). Computers have the potential to help improve the educative process (Milkin Exchange on Education Technology, 1999). In 1990, the Software Publishers Association (SPA) published its first "Report on the Effectiveness of Microcomputers in Schools." (SPA and IIA merged in 1999 to become the Software & Information Industry Association.) In that report, numerous research studies supporting the use of technology as a valuable tool for learning were described. These studies indicated that the use of technology as a learning tool could make a measurable difference in student 1) achievement, 2) attitudes, and 3) interaction with educators and other students. The evidence suggested that positive effects of technology were dependent upon the subject area, characteristics of the student population, the teacher's role, student grouping decisions, the design of the software and the level of access to technology. Since then, research documenting the effectiveness of instructional technology has continued to grow and become more detailed.

On the other side of this debate, a group of education technology researchers support the findings of Clark (1984) who stated that media and instructional technology will never have an influence on student achievement. It is only the content of the material that matters. Newman (2000) claims that the debate about the advantages and disadvantages of using technology in instruction is a false issue. She believes that the way technology is used should be based on what educators believe about the teaching/learning process and that the truly important questions that need to be answered deal with curriculum and instructional design. She maintains that technology applications offer potential as a teaching and learning tool-but "…the way we are using them looks to me like we are following a yellow brick road" (Newman, 2000, p. 774). Information technology cannot produce learning if the instructional environment fails to provide opportunities for genuine problem solving, decision-making, and communication. "What matters ultimately is the experience that learners have and what they make of that experience" (Newman, 2000, p. 775).

There is research that suggests that instructional technology can help to improve student achievement in science classes in K-12 classes. Christmann and Badgett (1999) conducted a meta-analysis that examined the effect of instructional technology on student achievement in four science areas across urban, rural, and suburban educational settings. More than 2000 subjects and eleven studies were included in this meta-analysis which found that instructional technology has a positive effect on student achievement. Results showed that when traditional instruction was supplemented with instructional technology, students achieved higher scores than 60.4 % of those students who did not receive supplemented instruction (Christmann & Badgett, 1999).

Summary

As researchers began to study the effects of instructional technology on student learning, the focus was on selecting the media that help students learn the most. Later research began to move from this behaviorist approach to more of a cognitive approach; researchers began to study independent variables. In general instructional research has found that students can learn effectively from different media and that computer work can improve students' achievement. The research is repetitive that it is not how much a computer is used when teaching, but how the computer is used.

Simonson and Thompson (1997) identified behaviorism, systems theory, and cognitive theory as driving educational theories that have provided direction for technology research and practice.

Bower summarized the need for the integration of technology in the teaching/learning process in the following way: "Is computer based instruction popular with students and educators? Yes. Does it improve student performance?

Maybe. Is it worth the cost? Probably. Must we continue to explore this innovative pathway to education? Definitely." (Hilgard & Bower, 1975, p. 65). This study is designed to look for relationships that may exist in the level of technology integration by Texas agriscience teachers and their students' TAAS test scores in math, reading, and writing.

CHAPTER III

METHODOLOGY

The primary purpose of this research was to search for and examine relationships that may exist between Texas agriscience teachers' level of technology integration and their students' achievement on the Texas Assessment of Academic Skills (TAAS) tests. The students' math, science, and reading scores on the TAAS were examined individually to determine if any correlations existed specific to that subject area and the level of integration of technology by their teachers.

The research was a descriptive correlational study. It utilized Correlational methods to describe and explore the possible relationships that may exist between teacher integration of instructional technology and student TAAS test scores. This study attempted to contribute to the body of knowledge concerning instructional technology; it did not attempt to find all the answers quickly. The correlational design seemed to be the appropriate method to use based on Tuckman's (1999) statement that even though correlational studies cannot establish causal relationships among variables, they are very useful when a researcher collects two or more sets of data from a group of subjects.

To accomplish the assessment of the teachers' technology integration levels, the researcher used a survey containing three parts: 1) demographic information, 2) teacher technology skill level, and 3) the level at which the teacher integrates technology into his or her curriculum. The first two parts were modeled after Albright (2002) and part three was modeled after the Intel Teach to the Future program (2002). Respondents were prompted to think about their current level of adopted instructional technology and answer the questions as best they could to represent their own level of technology integration.

The math, reading, and writing portions of the Spring 2003 TAAS test were used to measure student achievement for the sample. As of October, 2003, the Spring 2003 TAAS test had not been released by the Texas Education Agency (TEA) for the population. Due to the 2003 TAAS data not being available for the population comparisons made between the sample and the population utilize 2003 sample data and 2002 population data. The most current reading and math TAAS test sections that were available are the ones used in the Spring 2002 test, available from the Texas Education Agency website at http://www.tea.state.tx.us (Texas Education Agency, 2003b).

Population

The target population for this study consisted of agriscience programs, teachers, and their students in public secondary schools. The accessible population was defined as single teacher agriscience programs in the sate of Texas during the 2002-2003 school year, both the teachers and their tenth grade students.

Sample

The sample frame of teachers were identified using the *Agriscience Teachers Directory System* (AST) housed at Texas A&M University. The *Agriscience Teachers Directory System* was determined to be the most complete listing of Texas agriscience teachers (Consortium of Texas Personnel Database, 2002). A sample was drawn by applying random sample techniques as described by Gall, Borg, and Gall (1996). According to Gall, Borg, and Gall (1996) a random sample can create research data that can be generalized to a larger population within margins of error that can be determined. Teachers' names were entered into Microsoft Excel 2000 and each teacher was assigned a random number using the random number generation formula function that is available in Microsoft Excel 2000. After the random numbers were assigned, they were arranged in numerical order and the first 213 names were selected as the preliminary list of teachers to participate in the study. However, this list included 63 agriscience teachers who were later eliminated from the study because there was more than one teacher in their agriscience program. The final sample of agriscience teachers was composed of 150 teachers.

The expected effect size for the variable being studied was determined to be medium using Cohen's effect size index (Cohen, 1988). Desired sample size was determined to be 85 by using Cohen's table for determining sample size of a nondirectional study with an alpha of .05 (Cohen, 1988). Over sampling was employed to ensure a large enough sample size; the survey was mailed to 150 teachers with an expected response rate of approximately 60%.

The student data used in this study came from tenth grade students of the agriscience teachers in the sample. Tenth graders were selected as the subjects because they are required by Texas state law to be tested using the TAAS test near the end of their tenth grade year.

Instrumentation

Teachers were asked to complete a three-part survey instrument (Appendix B). The first section included demographic information such as gender, teaching experience, age, availability of technology to the teacher, availability of technology to the students at the school, type of Internet connection available at the school, and where the teachers learned their technology skills. The second section included questions that were designed to determine the teachers' competence level concerning specific computers skills such as: e-mail, word processing, spreadsheets, presentation software, internet, web pages, file management, presentation equipment, and using computers to complete administrative tasks. The third section included questions designed to determine the level to which teachers were comfortable with integrating technology into their teaching. The third section was modeled after the Intel Teach to the Future Scoring Guide for Integration of Technology by Teachers (Intel Teach to the Future, 2002). This third section used behavioral anchored response scales to assess the teachers technology integration level.

The selection of these topics was accomplished by reviewing the research and extrapolating which areas were most likely related to student achievement on standardized tests.

The instrument was pilot tested at the 2002 Texas Agriscience Teacher Conference in Corpus Christi. Convenience sampling was employed to select twenty Texas agriscience teachers to participate in the pilot test. The responses of teachers were compiled and entered into Statistical Package for Social Science (SPSS) 11.5 and reliability was calculated for the scales on the instrument.

Reliability was not calculated on section one of the instrument as responses to demographic data by teachers were expected to be reliable and valid reliability. Section two of the instrument had a reliability measure of .95 for the 42 questions measuring teacher technology skills. Section three of the instrument had a reliability of .93 for the nine items that were used to measure teacher integration of technology.

The instrument used to measure student achievement was the TAAS test as administered by the Texas Education Agency in Spring of 2003.

Collection of Data

For the purpose of collecting data Dillman's procedures for collecting survey data were used (Dillman, 2000). The Agriscience Teacher Directory compiled by Instructional Materials Services, Texas A&M University (2002) was used as the list from which to pull the random sample of Texas agriscience teachers. The mailing list contained 1,876 names and addresses, from which 213 names were randomly selected. After the initial random selection was made, names of 63 teachers were removed from the selection for not meeting the criteria of teaching in a single teacher department. The final sample consisted of 150 agriscience teachers. The initial contact for the final sample of 150 agriscience teachers was made via a packet that was mailed September 12, 2002. The packet included a letter (Appendix A), survey (Appendix B), and a self-addressed envelope. The letter provided an explanation of the purpose of the study, the researcher's background and interest in technology integration, and the researcher's contact information in case participants had any questions or concerns regarding the instrument. From the initial mailing of 150 packets, 51 agriscience teachers returned a completed survey.

The 99 non-respondents to the September 12, 2002 mailing were mailed a postcard on October 11, 2002 (Appendix C). The postcard reminded the selected teachers that a survey had been mailed to them regarding technology integration and that their response was needed. The postcard also stated that if they did not receive a questionnaire or if it was misplaced, then the researcher would mail them another one upon their request. The researcher's contact information was included so that the participants could communicate with the researcher if they had any questions. After the postcard was mailed on October 11, 2002 two more surveys were returned bringing the total completed surveys to 53.

On November 4, 2002 a third mailing was sent to the 97 non-respondents. The packet included a second letter (Appendix D), a copy of the survey (Appendix B), an attachment (Appendix E), and a self addressed return envelope. The attachment (Appendix E) reminded the agriscience teachers that a survey had been sent to them earlier and that their participation in this study was greatly appreciated. After the third mailing was sent out, 24 more completed surveys were received bringing the total number of responses to 77.

December 2 through December 4, 2002 telephone calls were made to the remaining 73 non-respondents. Of the 73 calls made, agriscience teachers were reached 51 times. From these phone calls, 18 of the non-respondents were eliminated from the study as they were no longer eligible to participate. Reasons for noneligibility included the school eliminated its agriscience program, a second teacher was added to the agriscience program, the school was not a high school, or a new agriscience teacher was at the school with less than one year of experience.

During the telephone conversations the agriscience teachers were asked if they had received any of the surveys which had been mailed to them. A brief explanation was given as to the purpose of the study and the agriscience teachers were asked if they still had a copy of the survey. If they still had a copy of the survey they were asked to complete it and return it in the self addressed envelope. If they did not have a copy of the survey, they were asked if they would like another copy of it mailed to them.

On December 5, 2002 a fourth mailing was sent out to the remaining 55 eligible non-respondents; the packet contained the original cover letter, the survey, and a self addressed envelope. After this mailing 20 more completed surveys were returned, which brought the total number of responses to 97 respondents of the 150 randomly selected or a response rate of 65%. All data collection from teachers was stopped on December 31, 2002.

The respondent's names and mailing information were processed using Excel 2002 and MS Word 2002 (Microsoft Office XP). First, the names of all the teachers in the population were listed in the Excel 2002 file. Once the random selection was complete, each selected teacher received a sample number from 1 to 150. This number was the code for each survey mailing and data entry for each returned survey.

The number was used on the survey to alleviate the necessity of including the person's name on each survey. This was used also to maintain anonymity of respondents when their completed surveys were returned. The mailings were accomplished by merging the addresses from Excel 2002 to Microsoft Word 2002 by utilizing the mailing label merge process.

Data entry was accomplished by entering the survey results in an Excel 2002 spreadsheet and importing the resulting data file into SPSS 11.5. The coding of the data was accomplished by entering the questions into rows, with each row of data representing one teacher respondent. The entries included numeric values for questions such as age, years of experience, and results from the selected behavioral anchored response scales on each section of the survey. The data was reviewed for input accuracy by visually reviewing all entries and looking for "likely" entries, such as zeros or ones where they should be and behavioral anchored response scales items from zero to four. Any questionable entries were checked against the actual survey for verification. Pulling every fifth survey from the stack and checking every entry in the Excel 2002 data file was used as a second method for insuring the accuracy in the data. As a final check on the data entry, frequency counts were run on all data using SPSS 11.5; outliers were identified and checked against the actual surveys to further insure accuracy.

Student data were collected by contacting the Texas Education Agency (TEA) and requesting a data file containing all TAAS data for students whose agriscience teacher participated in the study. The TEA produced data files containing the TAAS test scores for students who met the qualifications of completing the TAAS test in the Spring of 2003 and also who had been enrolled in agriscience class for either or both 2001-2002 or 2002-2003 school years.

Of the 97 teachers who participated in the mail survey portion of this study, ten were removed from the study as corresponding student data could not be collected for their students. The TEA refused to release student data for any school in which fewer than five students were included for that school. This policy of not releasing student data for students in groups smaller than five was TEA’s method to comply with Texas state law which protects the identity of student’s test scores so that no one can identify specifically which student achieved which scores. This loss of ten participants in the study resulted in a final sample of 87 participant “schools,” that is, the agriscience teacher and his or her tenth grade students.

After all student and teacher data collection had been completed, telephone calls were made to the 87 schools who were participating in the study. Each school was asked if the agriscience teacher who taught in that school for the Fall of 2002 was the same agriscience teacher who was teaching in that school for the Spring of 2003. This was done in an effort to make sure that there was no changing of agriscience teachers at the midyear point, and thus a change in teacher technology skills and technology integration level. All 87 schools retained the same agriscience teacher from Fall of 2002 to the Spring of 2003.

Analysis of Data

The data were analyzed using SPSS 11.5 (SPSS, Inc., 2003). The data generated were both descriptive and comparative. The first portion of the analysis process was strictly descriptive. The survey described the current demographics of Texas agriscience teachers. SPSS 11.5 (SPSS, Inc., 2003) was used to calculate frequency, percentage, mean, and standard deviation for each question (as appropriate) of the teacher demographics section of the survey instrument.

The SPSS 11.5 (SPSS, Inc., 2003) procedure *Frequencies* and *Descriptives* was used to calculate central tendencies, frequencies, and variability. The SPSS 11.5 procedure *Reliability Analysis* (SPSS, Inc., 2003) was used to determine the internal consistency of each measurement scale. Descriptive analysis was conducted on the demographic portions of the teacher data using SPSS 11.5. Correlations were calculated using the procedure *Bivariate Correlation* (SPSS, Inc., 2003) to determine significant correlations between teacher data and student data.

For the purpose of making comparisons between section two of the instrument which uses “yes” and “no” responses and section three of the instrument which uses behavioral anchored response scales that range from “1” to “5” all data was recoded to a scale of 0 to 1. For example, if a teacher’s mean response score on section three of the instrument was 5 than that teacher’s score was converted to a mean score of 1.0, if the teacher’s mean response score on section three was 2 than that teacher’s score was converted to a mean score of 0.25. This conversion of data was completed by using the “recode” tool of SPSS 11.5.

Analysis of Instrument Scales

Items 17d and 21f were removed from calculating the scale scores for technology integration scale because they detracted from internal consistency as illustrated in Appendix F. Furthermore, the researcher, upon examining the questions, determined them to be a measure of the teachers' trust in the Internet and their knowledge of state technology standards and not a measure of technology integration.

Table 1 illustrates the technology administration and integration skill scales, the number of items comprising each scale, and the reliability of each scale.

Table 1

Technology Skill Area and Technology Integration Level Reliability

Technology Skill Area / Integration Level	Number of Items	Reliability
E-mail	4	.78
Word Processing	5	.83
Spreadsheet	4	.90
Presentation Software	4	.89
Internet	4	.73
Web Pages	6	.93
File Management	5	.86
Presentation Hardware	4	.86
Integration of Technology	5	.91
Overall Technology Skill	41	.96
Technology Integration Level	9	.93

Procedures for Determining Generalizability of Results

Research has shown that responses of late respondents are often similar to non-respondents (Lindner, Murphy & Briers, 2001). It is reasoned that if there is no difference between early respondents and late respondents, than there is little need to pursue additional efforts to increase responses from non-respondents. Therefore, a comparison was made between early respondents and late respondents to the survey based on date received to determine the level of probability that non-respondents differed significantly from respondents (Lindner, Murphy, & Briers, 2001).

The 67 teachers who responded before December 4 were classified as early respondents; the 20 who responded after December 4 were identified as late respondents. A comparison of early and late responding teachers is given in Table 2.

Table 2

T-tests Comparing Early and Late Respondents – Teacher Data

Variable	M	SD	t-value	t-probability
Teacher Administration Skills				
Early Respondents	.62	.30	-.22	.83
Late Respondents	.60	.27		
Teacher Integration Skills				
Early Respondents	.57	.35	.25	.80
Late Respondents	.59	.33		
Teacher Level of Integration				
Early Respondents	.46	.69	.02	.98
Late Respondents	.46	.82		

Likewise, the students of the 67 teachers who responded before December 4 were classified as early respondents. The students of the 20 teachers who responded after December 4 were classified as late respondents. A comparison of early and late responding teachers' students are given in Table 3.

Table 3

T-test Comparing Early and Late Respondents – Student Data

Variable	M	SD	t-value	t-probability
Total Math Correct				
Early Respondents	46.4	4.1	.87	.39
Late Respondents	45.5	3.9		
Total Writing Correct				
Early Respondents	33.2	2.2	-.13	.89
Late Respondents	33.3	1.7		
Total Reading Correct				
Early Respondents	41.5	1.6	1.16	.25
Late Respondents	40.8	2.3		

Lindner, Murphy, and Briers (2001) also recommend comparing respondents to non-respondents as another method of dealing with nonresponse in survey research. Since teacher data were not available on non-respondents, comparisons could not be made between respondent and non-respondent teachers. However, data were available on students of both respondent and non-respondent teachers. A comparison of means on key demographic variables is shown in Table 4.

Table 4

Descriptive Comparison of Respondents and Non-respondents on Demographic Data – Student Data

Demographic Characteristics of Students	Respondents % "Yes" (N=87)	Non-respondents % "Yes" (N=45)
Students Per School	23.3	20.5
Gender		
Male	67.7	68.7
Female	32.3	31.3
Ethnicity		
White, not of Hispanic origin	74.2	63.4
Hispanic	19.3	26.8
African American	5.8	8.4
American Indian or Alaskan Native	.4	.7
Asian or Pacific Islander	.3	.6
Participated in Free or Reduced Meals		
Not identified as economically disadvantage	69.8	61.6
Eligible for Free Meals	24.2	31.4
Eligible for Reduced-Price Meals	5.8	5.8
Other Economic Disadvantage	.2	1.2
English Proficiency		
Student Identified as LEP	2.4	4.0
Student Not Identified as LEP	97.6	96.0
Special Education		
Student Participating in Special Ed	19.9	21.1
Student Not Participating in Special Ed	80.1	78.9
Gifted and Talented		
Student Participating in Gifted/Talented	7.3	8.1
Student Not Participating in Gifted/Talented	92.7	91.8

Respondent and non-respondent teachers' students' key test variables are illustrated in Table 5.

Table 5

T-test Comparing Respondents and Non-respondents Test Data – Student Data

Variable	M	SD	t-value	t-probability
Total Math Correct				
Respondents	45.7	4.0	1.76	.08
Non-respondents	44.4	3.5		
Total Writing Correct				
Respondents	33.2	1.8	.49	.63
Non-respondents	33.1	2.1		
Total Reading Correct				
Respondents	41.0	2.2	.91	.36
Non-respondents	40.6	2.4		

Thus, in no instance were early responding teachers statistically significantly different from late responding teachers. Also, students of responding teachers were not statistically significantly different from students of non-responding teachers. Therefore, the responding sample was deemed to be representative of the population from which it was drawn. Based on the findings from this sample, generalizations will be made to the target population.

CHAPTER IV

FINDINGS

The purpose of this study was to determine if agriscience teacher integration of instructional technology is related to student achievement. To accomplish this purpose, the following objectives were proposed:

1. Describe the teachers who are participated in this study.
2. Determine the technology skill level of Texas agriscience teachers.
3. Determine the current level of instructional technology integration by Texas agriscience teachers.
4. Identify the Texas Assessment of Academic Skills (TAAS) test scores of students who were enrolled in agriscience courses of those teachers surveyed.
5. Identify correlations between teacher technology skills and teacher demographics.
6. Determine if correlations exist between instructional technology integration by agriscience teachers and agriscience student achievement as found by this study.

The following research questions were used to guide this study and will be addressed in this study:

1. What are the demographic characteristics of Texas agriscience teachers?
2. What is the technology skill level of Texas agriscience teachers?

3. What is the current level of instructional technology integration by Texas agriscience teachers?
4. What are the TAAS test scores of students who were enrolled in agriscience courses of those teachers surveyed?
5. What correlations exist between Texas agriscience teacher technology skill levels and student achievement?
6. What correlations exist between Texas agriscience teacher instructional technology integration level and student achievement?

Demographic Characteristics of Teachers

To achieve objective one, describe the teachers, teachers were surveyed concerning their gender, age, and teaching experience (Appendix B). Only three of the teachers were female, 83 were male.

To calculate the teachers' mean age, the midpoint of each age range was calculated and then a grouped data mean age was calculated for all of the teachers. This procedure yielded a mean age of 41.9 years for the 87 teachers. The mode age range for the agriscience teachers was 31 - 40 years of age, and the median age was 40.7.

The teachers possessed an average of approximately 15.0 years of teaching experience with a standard deviation of 10.2 years. To provide a profile of the 87 participating agriscience teachers in this study their demographic information has been summarized as frequencies in Table 6.

Table 6

Selected Frequencies of Demographic Characteristics for Texas Agriscience Teachers (N=87)

Demographic Characteristics	f	% "yes"
Gender		
Male	83	95.4
Female	3	3.4
Age		
21-30 years old	16	18.4
31-40 years old	28	32.2
41-50 years old	19	21.8
51-60 years old	24	27.6
Teaching Experience		
1-5 years	21	24.1
6-10 years	14	16.1
11-15 years	13	14.9
16-20 years	11	12.6
21-25 years	13	14.9
26-30 years	3	3.4
31-35 years	9	10.3

Other teacher demographics captured include data regarding teacher access to and experience with instructional technology. The explanation of that data is presented as frequencies and percentages in Table 7.

Table 7

Availability/Access to Computer Technology for Texas Agriscience Teachers (N=87)

Computer Access/Availability	f	Percentage
Teacher Access to a Computer at Home		
Yes	86	98.9
No	1	1.1
Teacher Access to a Computer at School		
Yes	68	78.2
No	16	18.4
Number of Computers in Teacher's Classroom		
0	9	10.3
1	28	32.2
2	15	17.2
3	12	13.8
4	10	11.5
5	5	5.7
6	5	3.4
8	3	3.4
10	1	1.1
11	1	1.1
Time in School Computer Labs can be Scheduled Easily by the Teacher		
Yes	65	74.7
No	21	24.1
Teacher Classroom has a Method of Displaying Electronic Presentations to Students		
Yes	35	40.2
No	52	59.8
Teacher Departmental Internet Connection		
56K	6	6.9
ISDN	4	4.6
Cable	9	10.3
DSL	5	5.7
T1	24	27.6
Don't know	33	37.9

To better understand the teachers' demographic characteristic "Where Teacher's Skills Were Learned" this characteristic is further simplified into the three categories. The three categories are "Informal Training," "Formal Training," and "Both Informal and Formal Training." The breakdown of categories and subcategories are illustrated in Table 8 along with the frequency and percentage for each.

Table 8

Frequencies and Percentages for Where Teacher Technology Skills were Learned (N=82)

Where Teacher Technology Skills were Learned	f	Percentage
Informal Training		
Self Taught	26	31.7
Informal (learned from family or friends)	4	5.0
Learned from Students	1	1.2
Formal Training		
Formal Education (college or classes)	1	1.2
Learned at Work (in-service)	21	25.6
Both Informal and Formal Training	29	35.4

To provide a more complete description of the teacher participants of this study, the mean and standard deviation of selected teachers' demographic characteristics are provided in Table 9.

Table 9

Mean and Standard Deviation of Computer Usage by Teachers and Students as Reported by Texas Agriscience Teachers (N=87)

Computer Usage by Teachers and Students	M	SD
Number of Computers in Agriscience Classroom	2.6	2.3
Hours Teacher on Computer per Week	7.4	6.8
Hours Teacher Assigns Students Computer Time per Week	1.6	2.1

Skill Level of Texas Agriscience Teachers

To accomplish the second objective of determining the technology skill level of Texas agriscience teachers, section two of the instrument measured the teachers' technology skill level.

Teachers were asked questions measuring their competency on nine technology skill sets: 1) e-mail, 2) word processing, 3) spreadsheets, 4) presentation software, 5) Internet use, 6) creating web pages 7) file management, 8) presentation hardware, 9) administrative use of technology (Appendix B).

The questions asked of participants measured specific technology skills. Participants were asked to respond by circling "Y" for yes, they do possess that skill or "N" if they do not possess that skill. The results are summarized in Table 10. Questions 17d and 21f were excluded from the data analysis because they detracted from the instruments internal consistency (Appendix F).

Table 10

Technology Skill Levels of Texas Agriscience Teachers

Technology Skill	N	f "yes"	%"yes"
E-mail			
use e-mail	87	79	90.8
attach and send files in e-mail	86	62	71.3
use the address book	86	75	86.2
create an address book	87	64	73.6
Word Processing			
use a word processing software	87	78	89.7
set page margins	87	72	82.8
create tables	86	48	55.2
manipulate font settings	86	76	87.4
use edit features	86	69	79.3
Spreadsheet			
use spreadsheet software	87	57	65.5
format alphanumeric cells	87	40	46.0
create a graph or chart	87	40	46.0
create functions and formulas	87	42	48.3
Presentation Software			
use presentation software	87	45	51.7
create presentations	87	45	51.7
views in presentation software	87	44	50.6
insert pictures	87	48	55.2
Internet			
browse the Internet	87	80	92.0
bookmark used web pages	87	69	79.3
download files from the Internet	87	74	85.1
use a search engine	87	74	85.1
Web Pages			
create a web page	87	19	21.8
create tables using HTML	87	14	16.1
create active hyperlinks	87	16	18.4
incorporate graphics in web pages	87	15	17.2
convert existing files into html	87	13	14.9

Table 10 - Continued

Technology Skill	N	F "yes"	%"yes"
upload files to a web server	87	20	23.0
File Management			
manage computer files	87	58	66.7
delete files	87	74	85.1
move files	87	59	67.8
create shortcuts	87	49	56.3
install software	87	60	69.0
Presentation Hardware			
set up a video projector	87	51	58.6
use a digital camera	87	55	63.2
use a TV	87	44	50.6
use a scanner	87	45	51.7
Integration of Technology			
write letters to parents	87	73	83.9
access information	87	66	75.9
build presentations	87	58	66.7
students conduct research	87	61	70.1
technology in ag program	87	64	73.6

A review of the literature and subsequent reliability analysis suggested that the technology skill portion of the teacher data could be condensed from nine "subscales," to only two measurement scales: 1) Teacher administrative use of technology skills and 2) Teacher use of technology in instruction skills (Thompson et al., 1996). Table 11 illustrates the two scales, the subscales comprising those scales, and the mean, standard deviation, and reliability for each of the subscales.

Table 11

Mean, Standard Deviation, and Scale Reliability of Texas Agriscience Teachers for Use Various Technologies

Technology Skill	M	SD	Scale Reliability
Administrative use of technology skills			
file management	.69	.36	.78
e-mail	.81	.30	.83
word processing	.79	.30	.90
spreadsheets	.52	.43	.89
Internet use	.85	.27	.73
creating web pages	.19	.34	.93
Teacher use of technology in instruction skills			
presentation software	.52	.44	.86
presentation hardware	.56	.42	.86
integration of technology	.75	.37	.91

The subscale scores were calculated to range from "0" (no skill) to "1" (highly skilled). Moderate skill or "average" skill was deemed to be .50. So, teachers earned highest on their skill in using the Internet (x = .85), email (x = .81), and word processing (mean = .79). They scored low on skills used in creating web pages (mean = .19).

Table 12 reports the mean and standard deviation of the two technology scales.

Table 12

Descriptive Statistics for Scales Assessing Administrative and Instructional Level of Skills in Technology of Texas Agriscience Teachers (N=87)

Technology Scale	M	SD
Administrative use of technology skill level	.61	.36
Teacher integration of technology skill level	.63	.26

Overall, teachers believed that their skill level in administrative use of technology (mean = .61) was "above average" and essentially the same as their skill level in integration of technology in instruction (mean = .61).

Current Level of Instructional Technology Integration by Texas Agriscience Teachers

To accomplish the third objective of determining the instructional technology integration level of Texas agriscience teachers, section three of the instrument measured the teachers' level of technology integration. Teachers were asked to rate their own competency on nine technology integration items:

1) technology is used to enhance student learning

2) technology is integral and important to lessons

3) relationships between technology and student leaning exhibited in student work

4) technology used as a research tool, publishing tool, and communication device

5) lessons require students to analyze, apply information, and solve problems

6) learning objectives are tied to technology

7) student utilizes technology for research, constructing new ideas, and communication

8) learning objectives align with Texas Essential Knowledge and Skills

9) learning objectives are aligned with Texas Standard for Technology Literacy. (Appendix B).

The questions asked the teachers concerning their level of technology integration used behavioral anchored response scales. The N, mean, and standard deviation are reported on each of the nine scales in Table 13.

Table 13

N, Mean, and Standard Deviation for Level of Technology Integration by Texas Agriscience Teachers

Technology Integration Item	N	M	S.D.
1. tech. enhances student learning	87	.42	.22
2. tech. is important to the lessons	84	.44	.20
3. relationships between tech. and learning	86	.42	.22
4. tech. is used in the lessons	86	.46	.22
5. lessons require higher order thinking skills	84	.44	.20
6. learning objectives are targeted	84	.40	.20
7. student's work utilizes tech.	85	.40	.20
8. objectives align with the TEKS	83	.76	.20
9. obj. align with Tx Standards for Tech. Literacy	85	.36	.24
Technology Integration Scale (alpha = .91)		.46	.16

The scale score of .46 for the level of technology integration by teachers is "average" and lower than both their skill level of administrative use and of integration. In other words, the level at which they have been able to integrate technology into their instruction is less than their level of skills.

Texas Assessment of Academic Skills Test Scores for Students

The Texas Education Agency was contacted to accomplish the fourth objective of determining the academic achievement of the students as measured by their TAAS test scores. The TEA produced data files containing the TAAS test scores for students who met the qualifications of completing the TAAS test in the Spring of 2003 and also being enrolled in agriscience class for either the Fall 2001, Spring 2002, Fall 2002 or Spring 2003. Also, the student test scores that were collected are the test scores of students who were in enrolled in agriscience classes of the teachers who participated in this study.

Demographic information regarding the students who participated in this study is illustrated in Table 14.

Table 14

Selected Frequency Demographic Characteristics of All Students in Sample (N=3009)

Demographic Characteristics	f	%
Gender		
Male	2040	67.8
Female	969	32.2
Ethnicity		
White, not of Hispanic origin	2128	70.7
Hispanic	653	21.7
African American	200	6.6
American Indian or Alaskan Native	13	0.4
Asian or Pacific Islander	15	0.5
Participated in Free or Reduced Meals		
Not identified as economically disadvantage	2021	67.2
Eligible for Free Meals	798	26.5
Eligible for Reduced-Price Meals	174	5.8
Other Economic Disadvantage	16	0.5
English Proficiency		
Student Identified as LEP	87	2.9
Student Not Identified as LEP	2922	97.1
Special Education		
Student Participating in Special Ed	610	20.3
Student Not Participating in Special Ed	2399	79.7
Gifted and Talented		
Student Participating in Gifted/Talented	228	7.6
Student Not Participating in Gifted/Talented	2780	92.4

The students' TAAS test score data are illustrated in Table 14. The TAAS test variables that were made available from the TEA were provided as a simple "pass" or "fail" score. Because of this, the percentage of passing students is reported in Table 15 in place of the means.

Table 15

Frequency and Percent Passing of Selected Students for TAAS Test Scores, Spring 2003

TAAS Test Category	f	%
Mathematics		
Met Minimum Expectation on Mathematic Test	2172	95
All Objectives Mastered in Mathematics	329	15
Writing		
Met Minimum Expectation on Writing Test	2169	94
All Objectives Mastered in Writing	740	34
Reading		
Met Minimum Expectation on Reading Test	2154	96
All Objectives Mastered in Reading	1079	50

Table 16 illustrates the student TAAS test scores of the sample as compared to the 2002 TAAS test scores of all tenth grade students in the state of Texas (Texas Education Agency, 2003a) (Data for all students in Texas for the 2003 version were not available as of October 2003). The data indicate that the sample of agricultural science students participating in the study performed as well or perhaps somewhat better than did “similar” students in 2002.

Table 16

TAAS Scores from All Students in the State of Texas Compared to TAAS Scores of Sample Broken down by Race, Economically Disadvantaged, and Limited English Proficiency

TAAS Test Category	2002 Students % Passing	AgSc Sample	
		n	% Passing
Math			
All Students	92	2172	95
White, not of Hispanic origin	96	1557	96
Hispanic	88	410	92
African American	85	105	90
Economic Disadvantage	87	588	95
Limited English Proficient	71	36	86
Writing			
All Students	91	2169	94
White, not of Hispanic origin	96	1615	95
Hispanic	85	444	90
African American	90	104	91
Economic Disadvantage	85	536	91
Limited English Proficient	47	38	61
Reading			
All Students	94	2154	96
White, not of Hispanic origin	98	1604	97
Hispanic	90	441	91
African American	92	104	94
Economic Disadvantage	90	550	93
Limited English Proficient	66	37	70

* n for 2002 students passing not available.
** 2003 TAAS data not available at the time this paper was written (October 2003).

In comparing specific groups of students selected for this study to their counterpart 2002 test-takers in the state of Texas, the sample students performed better than their 2002 counterparts among underserved populations of students.

Correlations between Teacher Technology Skill and

Integration Levels and Teacher Demographics

To achieve the objective of determining the correlations that exist between teacher technology skill and integration levels and teacher demographic characteristics SPSS 11.5 *Bivariate Correlations* was used. Table 17 illustrates the correlations between teacher demographics and teacher technology administration skills, teacher technology integration skills, and teacher technology integration level.

Table 17

Teacher/School Information Correlated to Teacher Administrative Use of Technology Skills, Teacher Integration of Technology Skills, and Teacher Integration of Technology Level

Teacher / School Variables	N	Admin Skills	Integrate Skills	Integrate Level
Gender (Male=0; Female=1)	86	.20	.20	.14
Teaching Experience	87	-.55	-.53	-.25
Age	87	-.52	-.52	-.22
Computer Access at School	87	.22	.16	.16
Computer Access at Home	84	.08	.00	-.02
Number of Computers in Classroom	87	.15	.16	.30
Ease of Access to School Computer	86	.13	.14	.14
Presentation Equip. in the Classroom	87	.45	.48	.30
Hours per week Teacher uses a Comp.	86	.52	.52	.43
Hours per week Students are Assigned	84	.24	.24	.36

Davis (1971) identified correlations of .10 to .29 as low associations, .30 to .49 as moderate correlations, and .50 to .69 as substantial correlations (Appendix G). Substantial positive correlations were found for:

1. Number of hours per week the teacher is on the computer and teacher technology administration skills.
2. Number of hours per week the teacher is on the computer to teacher technology integration skills.

That is, the more highly skilled the teacher was – both in administrative skills and integration skills, the more likely the teacher was to spend time on the computer. Substantial negative correlations were found for:

1. Teaching experience and teacher technology administration skills.
2. Teaching experience and teacher technology integration skills.
3. Teacher age and teacher technology administration skills.
4. Teacher age and teacher technology integration skills.

These results mean that teachers with more "tenure" – both in chronological ages and in years of teaching experience – tended to view themselves as being less skilled in computer skills than did their younger, less-experienced (in teaching) peers. Moderate positive correlations were found for:

1. Presentation equipment in the classroom and teacher technology administration skills.
2. Presentation equipment in the classroom and teacher technology integration skills.
3. Presentation equipment in the classroom and teacher technology integration level.

4. Number of computers in the classroom and teacher technology integration level.
5. Hours per week the teacher uses a computer and teacher technology integration level.
6. Hours per week the students use a computer and teacher technology integration level.

Low positive correlations were found for all remaining interactions except for the teacher access to a computer at home which had negligible correlation with all teacher technology variables.

Correlations between Instructional Technology Uses by Agriscience Teachers and Agriscience Student Achievement

The individual student names and identification numbers were not provided, but their campus identification numbers were provided. The student and teacher data were paired using the campus identification number. The student variable that was used in statistical analysis for correlations that involved math, reading, and writing was the total number of multiple choice items correct for each of the three subject areas. Table 18 illustrates the teacher technology administrative skills, teacher technology integration skills, and teacher technology integration level correlated with student achievement scores on the TAAS math, writing and reading scores.

Table 18

Teacher Technology Administrative Skills, Teacher Technology Integration Skills, and Teacher Technology Integration Level Correlated with Student Achievement Scores on TAAS Math, Writing and Reading (N=87)

TAAS Sections	Admin Skills	Integrate Skills	Integrate Level
Math Total Number Correct	.13	.10	.14
Writing Total Number Correct	.17	.12	.04
Reading Total Number correct	-.01	-.07	-.06

Data are presented on the teachers' administrative use of technology skills and on the teachers' level of skill in integrating technology, but the teacher variable that most directly influences student achievement is the teacher's technology integration level. While no statistically significant correlations were found for these variables, there were some descriptively significant differences found. Low associations exist between the teacher's ability to use technology for administrative purposes and student math and writing scores on the TAAS. More importantly to the purpose of this study, Table 18 also illustrates a low positive association between how much the teacher actually integrates technology and the students TAAS math scores. Also of importance is that no correlations were found between teacher integration levels of technology and students' reading and writing TAAS test scores.

CHAPTER V

SUMMARY, CONCLUSIONS, RECOMMENDATIONS, AND IMPLICATIONS

Summary

The purpose of this study was to determine if agriscience teacher integration of instructional technology is correlated with student achievement. Knowledge of these correlations will assist teacher educators in offering more appropriate professional development opportunities for agriscience teachers. This information will also assist secondary schools in making decisions regarding technology in relation to agriscience departments.

Instructional technology researchers have worked since the 1960s to gain a better understanding of the role that technology plays in student achievement (Thompson et al., 1996). Researchers have found that instructional technology does have an influence on student learning. In the early 1980s Richard Clark published controversial findings that media has no influence on student learning. These conflicting findings are what led to the development of this study.

A survey was developed to gather information on teachers' technology integration level. The instrument was pilot tested and a reliability measure of .95 was found for the administrative use skills and integration skills section of the survey (section two). Section three of the instrument had a reliability of .93 for nine items that were used to measure teacher integration of technology. The survey was constructed of scales to collect this information; a complete copy of the instrument and the scales are available in Appendix B. Demographics, teachers' technology integration skill level, teachers' administrative use of technology skill level, and teachers' technology integration level were collected and examined for correlations with student achievement.

Student achievement was measured using the Texas Assessment of Academic Skills (TAAS) test. Student data were collected on the tenth grade students of teachers who responded to the technology survey. The Texas Education Agency provided all TAAS data in a single data file; all variables provided are listed in Appendix J (Texas Education Agency 2003b).

Ninety-seven of 150 teachers responded to the questionnaire requesting information about them and their schools. A comparison was made between teachers who were early and late respondents in order to determine the probability that non-respondents differed from respondents. The distinction between early and late respondents was based on the "waves" which the surveys were received by the researcher; late respondents were identified as those who responded to the final request for information. It was determined that no significant differences existed between early and late responding teachers. Likewise, a comparison was made between the students of early and late responding teachers; no significant differences were found in those two groups. As a final effort to determine if any difference existed between respondents and non respondents, the student data of responding teachers was compared to the student data of non responding teachers. No significant differences were found in the students of the teachers who responded as compared to the students of teachers who did not respond. Thus, results were deemed generalizable to the population of Texas teachers and students from whom the sample was drawn.

To accomplish the purpose of this study the following objectives were proposed.

1. Describe the teachers who are participating in this study.
2. Determine the technology skill level of Texas agriscience teachers.
3. Determine the current level of instructional technology integration by Texas agriscience teachers.
4. Identify the Texas Assessment of Academic Skills (TAAS) test scores of students who were enrolled in agriscience courses of those teachers surveyed.
5. Identify correlations between teacher technology skills and teacher demographics.
6. Determine if correlations exist between instructional technology integration by agriscience teachers and agriscience student achievement as found by this study.

Findings Related to Specific Objectives

Objective number one is to describe the teachers who participated in this study. To collect the demographic information on agriscience teachers, data were collected on teachers by means of a survey. There was a final sample of 97 teachers who responded to the survey and for whom we had student data, their demographic data compiled and analyzed using SPSS 11.5.

96% of the agriscience teachers are male with 4% being female. The smallest age range of agriscience teachers are the 18.4% who are between 20 and 30 years of age, the largest age group of 32% are between the age of 31 and 40 years old, 21.8% are between the age of 41 to 50 years of age, and 27.6% are between the ages of 51 to 60 years old. Mean age for the 87 teachers was 41.9 the median age for the agriscience teachers was 40.7 years of age.

Teaching experience varied greatly: 24.1% of the teachers had 1 to 5 years experience, 16.1% had 6 to 10 years experience, 14.9% had 11 to15 years experience, 12.6% had 16 to 20 years experience, 14.9% had 21 to 25 years experience, 3.4% had 26 to 30 years experience, and 9% had 31 to 35 years experience. The teachers possessed an average of approximately 15.0 years of teaching experience with a standard deviation of 10.2 years. To provide a profile of the 97 participants in this study their demographic information has been summarized as frequencies in Table 6.

Objective number two is to determine the technology skill level of Texas Agriscience teachers. The literature suggested that teacher technology skill level should be broken into two categories: administrative use of technology skills and instructional use of technology skills. These two large categories can be further broken down to nine “subscales.” Teacher use of technology in instruction was measured using three scales (presentation software, presentation hardware, and integration of technology) while teacher administrative use of technology was measured using six subscales (file management, e-mail, word processing, spreadsheets, Internet use, and creating web pages) (Appendix B).

Measuring teacher technology skills revealed that they were most proficient on Internet use with a mean response of .85, a mean of .81 for e-mail, .79 for word processing, .75 for integration of technology, .69 for file management, .56 for presentation hardware, .52 for presentation software, and a mean score of only .19 for creating web pages.

The mean responses for all teachers on the six scales were used to calculate an administrative use of technology skills score of .61 and an instructional use of technology skills score of .63 was calculated using three scales. The reliability, mean, and standard deviation for each of the scales and subscales are reported in Table 11.

Objective number three is to determine the Current Level of Instructional Technology Integration by Texas Agriscience Teachers. The literature suggested that teacher technology integration level should be measured using nine behavioral anchored response scales with five points on each of the scales (Intel Teach to the Future program, 2002). Intel's Exemplary Scoring Guide for Integration of Technology was used in the construction of the items and the response scale.

Data were collected from the teachers, entered into SPSS 11.5, and analyzed to generate the mean and standard deviation for each of the nine subscales and the two scales. Next comparisons were made between: 1) teacher technology integration level, 2) teacher technology integration skill level, and 3) teacher administrative use of technology skill level.

Teachers scored the highest on being familiar with the Texas Essential Knowledge and Skills with a mean score of .76. However, they scored the lowest on being familiar with the Texas Standards for Technology Literacy with a mean score of .36.

For the remaining seven items that measured teacher level of technology integration, teachers averaged scores of between .40 and .46. The seven items and their mean scores were as follows: technology is used to enhance student learning (.42), technology is integral and important to lessons (.44), relationships between technology and student leaning exhibited in student work (.42), technology used as a research tool, publishing tool, and communication device (.46), lessons require students to analyze, apply information, and solve problems(.44), learning objectives are tied to technology (.40), and student utilizes technology for research, constructing new ideas, and communication (.40).

The mean response for teachers on the last seven items was used to calculate their total technology integration score of .46 for all teachers (the results are illustrated in Table 13).

Objective number four of the study is to identify the Texas Assessment of Academic Skills (TAAS) Test Scores of Students Who were Enrolled in Agriscience Courses of Those Teachers Surveyed.

To achieve this objective a list was compiled of teachers who responded to the survey. Before each survey was mailed it was coded with a unique identification number that allowed the researcher to match the survey with an individual agriscience teacher and an individual school. A list of responding schools was constructed, which included the school name, teacher name, and the unique school identification number used by the Texas Education Agency. The list was sent to the Texas Education Agency along with a request for the TAAS student data of tenth grade students who were enrolled in agriscience classes within those schools during the 2001-2002 or 2002-2003 school year. The Texas Education Agency supplied the researcher with the TAAS test scores of students who were enrolled in agriscience courses of those teachers surveyed (Texas Education Agency, 2003b).

There were a total of 97 teachers who responded to the survey and school data was requested for those 97 schools from the Texas Education Agency. However, the Texas Education Agency provided student data for only 87 of the schools. The Texas Education Agency would not release student data for schools that had fewer than five students on whom to report data. Due to the Right to Privacy Act, the Texas Education Agency could not release student data on groups smaller than five for fear that the researcher may be able identify a specific student and their test scores by analyzing different variables for each of the students. The Texas Education Agency removed key student data for 10 of the schools; for this reason, 10 schools were eliminated from the study.

There was also some missing student data due to the student being absent, student is ARD exempt (do not score), Previous Pass (District indicated that the student previously passed the exit level TAAS test), Other (e.g., illness, cheating) (Texas Education Agency, 2003). To deal with this problem of missing data the researcher filtered the data each time it was analyzed to remove any cases of missing data for the key variable that was being analyzed.

The three key test categories that were analyzed by the researcher were math, writing, and reading. The three key variables for each of these categories were: 1) met minimum expectations on that portion of the test, 2) all objectives were mastered for that portion of the test, and 3) the total number of multiple choice questions correct for that portion of the test.

In describing the student test scores the variables of "met minimum expectations on the test" and "all objectives mastered on the test" were used to describe the students (Table 15) and make comparisons with all tenth grade students who took the test in 2002 (Table 16) (Texas Education Agency, 2003). Calculating correlations between teacher characteristics and student achievement on the TAAS, the student variable that was used was the total number of multiple choice questions that the student answered correctly for each portion of the test. Total number of multiple choices correct was used for this correlation because it generated the most accurate measurement of the students' actual performance on each portion of the test.

Objective number five of the study is to identify Correlations between Teacher Technology Skills and Teacher Demographics.

In order to correlate teacher technology skills with teacher demographics all teacher data were entered into SPSS 11.5 for statistical analysis. Correlations were calculated using the *Bivariate Correlations* (SPSS, Inc., 2003) function to determine significant interactions between teacher technology skill levels and teacher demographics.

The two strongest correlations found were substantial correlations where teaching experience and age were negatively correlated with teacher technology administrative skills and teacher technology integration skills. These findings offer support to the findings of Smerdon et al., (2000) who found that more experienced teachers, have been unable to find effective ways to use technology in their classrooms.

Another moderate correlation, a positive correlation, exists between the number of hours a week that the teacher uses the computer and the teachers' instructional technology skill levels which is in agreement with the findings Gilmore (1995) and Mitra (1994) who reported that skill or comfort with the use of computers is related to the amount of use of computers.

Objective number six of the study is to determine if Correlations Exist between Instructional Technology Integration Level by Agriscience Teachers and Agriscience Student Achievement

In order to correlate instructional technology level by agriscience teachers and agriscience student achievement, all student and teacher data were entered into SPSS 11.5 for statistical analysis. Student data were filtered and aggregated by school number so that teacher and student data could be paired based on the school number.

Correlations were calculated using *Bivariate Correlations* (SPSS, Inc., 2003). The key variables that were correlated were the teachers' technology administrative skills, teachers' technology integration skills, and teachers' technology integration levels which were all correlated with the total number of multiple choice questions that the students answered correctly on the math, writing, and reading sections of the TAAS test.

Low positive correlations were found between teacher administrative technology skill level and student math (.13) and writing (.17) scores. Likewise, low positive correlations were found between teacher instructional technology integration skill level and student math (.10) and writing (.12) scores. Negligible correlations were found between teacher technology skills and student reading scores.

A low positive correlation was found between student achievement on the math portion of the TAAS and teacher instructional technology integration level (.14). Negligible correlations were found between teacher instructional technology integration level and student achievement on the writing portion and reading portion of the TAAS. The correlations are illustrated in Table 18. While several of the correlations are in the "low" range descriptively, none are statistically significantly different from 0.

These findings agree with the earlier findings of Zidon and Lunft (1987) who determined that students can learn from different computer technologies. These also support the findings of Salomon and Gardner (1986) and Schlosser and Anderson (1994) who determined that content and instructional variables as well as media play large roles in student learning. These findings also support the research of

Christmann and Badgett (1999) who suggested that instructional technology can help to improve student achievement in science classes in K-12 classes.

Conclusions and Implications

1. The primary purpose of this study was to determine if correlations existed between agriscience teacher integration of instructional technology and student achievement. The findings of this research show that there was a positive low correlation found between student achievement on the math portion of the TAAS and teacher instructional technology integration level (r = .14). Negligible correlations were found between teacher instructional technology integration level and student achievement on the writing portion and the reading portions of the TAAS. The correlations are illustrated in Table 17.

While there are no cause and effect relationships addressed in this study, the findings of this study do offer support that a positive relationship exists between the level of agriscience teacher technology integration and student achievement in basic academic subjects.

2. Teacher technology integration skills have a low correlation with student’s scores on the math and writing portion of the TAAS. Likewise, there are low positive correlations between teacher technology skill level for administrative purposes and student test scores on the math and writing portions of the test.

3. No differences were found between teachers who participated in this study and teachers who did not participate. Likewise, no differences were found between students who participated and students who did not participate. Early and late

responding teachers were compared and no significant differences were found. To further ensure that the sample represented the population, student data from responding schools were compared to student data from schools that did not respond; again, no significant differences were found.

4. Ninety-nine percent of the teachers who participated in this study have access to a computer at home while only 78% of them have access to a computer at school. Seventy-five percent of the teachers report that it is easy for them to schedule time in the school computer lab for their students to work, and 40% of them have a method for displaying electronic media in their classroom. Also, 25% of the teachers reported that they learned their technology skills exclusively from formal training while another 33% reported that they learned their technology skills from both formal and informal training.

These findings indicate that agriscience teachers have access to at least one computer in their school and most of them have access to computers for their students to use. Also, these findings show that 58% of teachers have learned some of the technology skills from formal training. These findings illustrate the current status of technology training that is available to teachers and where they have learned their technology skills.

5. Table 16 illustrates increased student achievement for underserved populations who are enrolled in agriscience courses. This was a serendipitous finding as a result of making comparisons between the sample used in this study and the population for generalizability purposes. Never the less this finding deserves greater

investigation to determine if indeed student achievement of underserved populations is increased by their enrollment in agriscience courses. At the time of this study was completed (October, 2003) student data for the TAAS 2003 were not available for further comparisons. This possible relationship should be investigated further.

Recommendations

Recommendations for Practice

1. Teachers scored .61 on administrative use of technology skills and .63 on technology integration skills level. However, they scored only .46 on actually integrating the technology into their curriculum. Therefore, to increase the level of technology integration, it is recommended that teacher educators shift their focus (if one exist) from teaching new and current agriscience teachers' specific technology skills to a focus on training that involves actual technology integration in instruction.

These findings of a higher score on technology skill level than on technology integration level offer support to the findings of the Office of Technology Assessment's 1995 report on teachers and technology, which stated that schools have made significant progress in implementing technology and helping teachers to use basic technology tools, but they still struggle with integrating technology into the curriculum. These findings also support those of the task force of the National Council for the Accreditation of Teacher Education (NCATE) which concluded that colleges are not properly preparing teachers to use technology in their teaching. The report stated, "Bluntly, a majority of teacher education programs are falling far short of what needs to be done" (NCATE, 1997, p. 6). Teachers will be less inclined to integrate technology in their classrooms if teacher education faculties do not model the integration of technology in their classrooms (Zehr, 2003). This is also in agreement with Rakes and Casey (2002) who found that teacher technology training frequently produces less than desirable effects for a number of reasons including a lack of a direct connection between technology integration and the curriculum.

2. Table 10 and 11 illustrate the technology areas and how proficient agriscience teachers are at each of these areas. The agriscience teachers in this sample perceived their ability to use the Internet and use e-mail as their strongest technology skills. The teachers perceived their ability to create and edit web pages as their weakest technology skill. Thus, teachers perceive themselves to be proficient at accessing information on the Internet; they do not see themselves as proficient at delivering or providing information via the Internet.

This information may help teacher educators better prepare in-service trainings for current agriscience teachers and may also help teacher educators have a better idea of what to teach to their current students. Fabry and Higgs (1997) promote the idea that "if integration of technology in the classroom in the next ten years is to look any different from the last ten, we must focus time, money, and resources in areas that can have the greatest impact for our students, our teachers" (Fabry and Higgs, 1997, p. 393).

3. What are the barriers that are preventing the integration of technology by agriscience teachers? A disconnect seems to exist between knowing how to use technology and actually integrating that technology into the curriculum. If this

disconnect can be identified then teachers and teacher educators may be able to eliminate it.

4. Agriscience teachers scored .76 on familiarity with the Texas Essential Knowledge and Skills, but scored only .36 on familiarity with the Texas Standards for Technology Literacy. Due to these findings and because the standards are appropriate the as of instruction for agricultural science and technology, it is recommended that teacher educators make a greater effort to educate current and future agriscience teachers on the Texas Standards for Technology Literacy.

Recommendations for Future Research

Based on the findings and conclusion of this study, the following recommendations are suggested for further research.

1. Why do agriscience teachers score .61 on administrative use of technology skills and .63 on technology integration skills level, but only .46 on actually integrating the technology into their curriculum? It has been identified in this study that teacher technology integration level has a positive low correlation with student achievement. Further research needs to be conducted to determine what is limiting agriscience teachers from integrating technology into their curricula.

Glenn identified that teacher training has focused on "…word processing, test construction, automated transparency creation, and grading rather than creating a different learning environment" (Glenn, 1997, p. 126). More research is needed to determine a more appropriate direction for teacher training to ensure that the significance of technology integration is instilled in agriscience teachers.

2. Is there a level of diminishing returns when it comes to the amount of technology that agriscience teachers integrate into their curriculum? With the existing curriculum standards that are in place for agriscience courses, it is evident that agriscience teachers already have obligations to what they are responsible for teaching in their classrooms. To what level should agriscience teachers integrate technology in order to maximize the benefit to their students?

3. Are extraneous variables responsible for the correlations that were found between agriscience teacher technology integration and student achievement? Content, teaching style, and learner characteristics have been found to influence student achievement (Kotrlik et al., 2000). This study failed to control for these variables. Further research needs to be conducted where these variables are controlled to better understand what is actually causing the increased test scores for students who are enrolled in the schools with increased technology integration.

4. Where do agriscience teachers consider the best place to obtain their technology training? If it is not from in-service training that teacher educators offer then how can that in-service training be improved? Forty-One percent of the teachers in this study reported that their primary source for technology training is informal sources such as being self taught, student, or family and friends. Should teacher educators offer less formal technology trainings? Is there a percentage of agriscience teachers who simply prefer to learn from sources outside of a formal setting?

5. What specific variables that deal with technology have the greatest influence on student achievement? This study identified nine technology variables to

measure teacher technology skill level. Using the Internet proved to be the agriscience teachers strongest area while building web pages proved to be their weakest area. Which of these scales has the strongest correlation to student achievement?

6. Why are the test scores of special populations that are enrolled in agriscience classes higher than their counterparts in the population? The findings of this study indicate that special populations students such as minorities, economically disadvantaged, and limited English proficiency perform better on standardized test than do their counterparts who are not enrolled in agriscience courses. This lends evidence to an idea that special populations who are enrolled in agriscience classes benefit – perhaps even more than others – resulting in an increase in student achievement.

7. Is it worth it to invest greater effort to educate current and future agriscience teachers on the Texas Standards for Technology Literacy? Is it appropriate for agriscience teachers to deal with the Texas Standards for Technology Literacy, and if so, does knowledge of these standards correlate with student achievement? Currently, agriscience teachers list lack of time as one of their most limiting factors in learning and using new technologies (Fraze, 1999). Is it appropriate and time worthy to educate them on the Texas Standards for Technology Literacy?

8. Is there a correlation between the number of agriscience courses that a student takes and student achievement? If low correlations exist between agriscience

teacher instructional technology integration levels and student achievement, it is logical to investigate if increased exposure to this technology integration yields greater student achievement. Is there a limit to the effect that instructional technology integration has on student achievement? Can a specific number of agriscience courses for students to take be identified in order to maximize student achievement?

9. What is the cost effectiveness of integrating instructional technology into agriscience courses? Are there other variables that correlate to student achievement that are less expensive per unit of student achievement? Could it be more beneficial to students if educators reallocate yearly technology budgets to pay for more agriscience teaching assistants, supervised agricultural experience projects, or increased agriscience teacher pay?

10. How does the "totality" of integration of technology into the curriculum of a high school affect academic achievement of its students? That is, in this study, the relationship between technology integration of perhaps one-sixth to one-seventh of a high school student's program and subsequent academic performance was examined. If one examined technology integration throughout the school, would the relationship between technology integration and academic achievement be more substantial?

11. Table 16 illustrates increased student achievement for underserved populations who are enrolled in agriscience courses. This finding deserves greater investigation to determine if indeed student achievement of underserved populations is increased by their enrollment in agriscience courses. At the time of this study was

completed (October, 2003) student data for the TAAS 2003 were not available for further comparisons. This possible relationship should be investigated further.

REFERENCES

Albright, B. B. (2002). *Cooperative extension and the information technology era: An assessment of current competencies and future training needs of County Extension Agents*. Unpublished doctoral dissertation, Texas A&M University, College Station.

Alston, A. J., Miller, W. W., & Williams, D. L. (2003). The future role of instructional technology in agricultural education in North Carolina and Virginia. *Journal of Agricultural Education, 44*(2), 38-39.

Association for Educational Communications and Technology. (1994). *Educational technology: Definition and glossary of terms*. Washington DC, National Academy Press.

Bailey, G. D. (1997). What technology leaders need to know: The essential top 10 concepts for technology integration in the 21st century. *Learning and Leading with Technology, 25*(1), 57-62.

Baker, R. J. & Blue, M. C. (1999). The Cost-effective multimedia classroom. *T.H.E. Journal*. *17*(1), 46-50.

Becker, H. J. (1998). Running to catch a moving train: Schools and information technologies. *Theory into Practice*. *37*(1), 20-30.

Bialo, E. R. & Sivin-Kachala, J. (1999). The effectiveness of technology in schools: A summary of recent research. Retrieved April 4, 2003, from http://www.ala.org/aasl/SLMR/slmr_resources/select_ bialo.html.

Birkenholz, R. J. & Stewart, B. R. (1991). The use of instructional technologies in agricultural education. *Journal of Agricultural Education*. *32*(2)40-48.

Bosch, K. A. (1993). Is there a computer crisis in the classroom? *Schools in the Middle, 2*(4), 7-9.

Brown, H. D., Townsend, J. D, & Carnes, J. E. (1985). *Personnel training-secondary vocational agriculture teacher education*. College Station: Texas A&M University, Department of Agricultural Education. (ERIC Document Reproduction Service No. ED261 252)

Bruner, J. (1960). *The process of education*. New York: Random House.

Budin, H. (1999). The computer enters the classroom. *Teaches College Record, 1000*(3), 656-669.

Camp, W. G. (1983). Microcomputers: A "byte" of the action. *The Agricultural Education Magazine*. *55*(7), 13-14.

Carey, S. (1986). Cognitive science and science education. *American Psychologist, 41*(10), 1123-1130.

Center for Occupation and Research Development (1999). *The ABCs of tech prep*. Waco, TX: The Cornerstone of Tech Prep.

Cepica, M. J., Stockton, J., Eggengberger, L., Dillinghma, J., Igo, C. C. & Snodgrass, T. D. (1984). Integration of computer related instruction in Texas vocational agriculture programs. Lubbock: Texas Tech University. (ERIC Document Reproduction Service No. ED 256 943).

Christmann, E., & Badgett, J. (1999). A comparative analysis of the effects of computer-assisted instruction on student achievement in differing science and demographical areas. *Journal of Computers in Mathematics and Science Teaching, 18*, 135-143.

Clark, R. (1983). Reconsidering research on learning from media. *Review of Educational Research*, *53*(4), 445-459.

Clark, R. (1985). Evidence for confounding in computer-based instruction studies: Analyzing the meta-analysis. *Educational Communications and Technology Journal*, *33*(4), 249-262.

Clark, R. (1994). Media will never influence learning. *Educational Technology Research and Development*, *42*(2), 21-29.

Clark, R., & Salomon, G. (1986). Media in teaching. In M. Wittrock (Ed.), Handbook of research on teaching (Ed. 3). New York: Macmillan, 464-478.

Clark, R., & Surgrue, B. M. (1988). Research on instructional media, 1978-1988. In D. P. Ely, B. Broadbent, and R.K. Wood (Eds), *Educational media and technology yearbook, 14*, 19-36. Englewood, CO: Libraries Unlimited, Inc.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2^{nd} ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Consortium of Texas Personnel Database (2002). Retrieved on September 12, 2002, from http://www.agintexas.org/AST-Directory/.

Crable, E. A., Brodzinkski, J. D., Scherer, R. F. & Jones, P. D. (1994). The impact of cognitive appraisal, locus of control, and level of exposure on the computers anxiety of novice computer users. *Journal of Educational Computer Research. 10*(4), 329-340.

Cronbach, L. J. & Snow, R. E. (1977). *Aptitudes and instructional methods: A handbook for research on interactions.* New York: Irvington Publishers.

Davis, J. A. (1971). *Elementary survey analysis*. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Dick, W., & Carey, L. (1990). *The systematic design of instruction, 3rd ed.* New York: Scott, Foresman.

Dillman, D.A. (2000) *Mail and Internet Surveys the Taylored Design Method, 2nd ed.* New York: John Wiley & Sons, Inc.

Eisenberg, M. & Johnson, D. (1996), *Computer skills for information problem-solving: Learning and teaching technology in context*. Syracuse, NY: ERK Clearinghouse on Information and Technology (ED392 463).

Fabry, D. L. & Higgs, J. R. (1997). Barriers to the effective use of technology in education: Current status. *Journal of Educational Computing Research, 16*(4), 385-95.

Fraze, D. K. (2001). Attitudes and adoption of information technology by Texas agri-science teachers, Texas Tech University, Lubbock.

Fuller, H. L. (2000). First teach their teachers: Technology support and computer use in academic subjects. *Journal of Research on Computing in Education, 32*,(4) 511-532.

Gall, M. D., Borg, W. R., & Gall, J. P. (1996) *Educational research: An introduction* (6th ed.). White Plains, NY: Longman.

George, P. (2000). Breaking ranks. *Principal Leadership, 1*(4), 56-61.

Gilmore, A. (1995). Turning teachers on to computers: Evolution of teacher development program. *Journal of Research on Computing in Education, 27,* 251-269.

Glenn, A. D. (1997). Technology and the continuing education of classroom teachers. *Peabody Journal of Education*, *72*(1), 122-128.

Goldberg, M. W. (1996). *CALOS: First results from an experiment in computer-aided learning*. Retrieved February 8, 2003 from http://homebrew1.cs.ubc.ca/papers/calos-res/.

Harrison, C. R. (1999, August). Spinning a web around forensic science and senior biology. *Australian Science Teachers Journal*, *45*, 17-20.

Hilgard, E. & Bower, G. (1975). *Theories of learning.* Englewood Cliffs, NJ: Prentice-Hall.

Information Infrastructure Task Force (1996). *KickStart Initiative: Connecting America's Communities to the Information Superhighway*. Information Infrastructure Task Force, U.S. Department of Commerce, Washington D.C., September 13.

Intel Teach to the Future Program (2002). *Innovation in Education Scoring Guide.* Retrieved on August 22, 2002, from http://www.intel.com/education/ unitplans/scoring_guide.htm.

Jonassen, D. H. (1966). *Computers in the classroom: Mind tools for critical thinking*. Englewood Cliffs, NJ: Prentice Hall.

Kerr, S. P. (1989). Technology, teachers, and the search for school reform. *Educational Technology Research and Development*, *37*(4), 5-17.

Khalili, A., & Shashoani, L. (1994). The effectiveness of computer applications: A meta-analysis. *Journal of Research on Computing in Education*, *27*(1), 48-61.

Kotrlik, J. W., Harrison, B. C., Redmann, D. H., & Handley, C. H. (2000). Information technology related professional development needs of Louisiana agriscience teachers. *Journal of Agricultural Education, 41*(1), 18-29.

Kozma, R. & Croninger, R. (1992). Technology and the fate of at-risk students. *Education and Urban Society*, *24*(4), 440-453.

Kuperstein, J., & Gentile, C. (2001, October). *Calling students back: Using technology to support engaged learning.* Retrieved October 15, 2001, from http://www.microsoft.com/education/instruction/articles/miami_engage.asp.

Levie, H. W., & Dickie, K. E. (1973). The analysis and application of media. In R.M.W. Travers (Ed.), *Second handbook of research on teaching; a project of the American Educational Research Association.* Chicago: Rand McNally, 4-28.

Lewis, J. D. (1998). How the Internet expands educational options. *Teaching Exceptional Children, 30*(5), 34-41.

Lindner, J. R., Murphy, T. H., Briers, G. E. (2001). The handling of nonresponse in agricultural education. *Journal of Agricultural Education*, *42*(4), 233-245.

Liu, X., Macmillan, R. B. & Timmons, V. (1998). Integration of computers into the curriculum: How teachers may hinder student's use of computers. *McGill Journal of Education, 33*(1), 51-69.

Loyd, B. H. & Gressard, C. (1984). Reliability and factorial validity of computer attitude scales. *Educational and Psychological measurement*. *44*(2), 501-505.

Marcus, S. (1995). E-meliorating student writing. *Electronic Learning*, *14*(4), 18-19.

McInerney, V., McInerney, D. M., & Sinclair, K. E. (1994) Student teachers, computer anxiety, and computer experience. *Journal of Educational Computing Research, 11(*1), 27-50.

McNeil, B. & Wilson, K. (1991). Meta-analysis of interactive video instruction: A 10-year review of achievement effects. *Journal of Computer-Based Instruction*, *18*(1), 1-6.

Milken Exchange on Education Technology. (1999). The state of the states: North Carolina. *Education Week on the Web* [On-line]. Retrieved on August 15, 2003, from http://www.edweek.org/sreports/tc98/states/nc.htm.

Mitra, A. (1994). Instructor-effect in determining effectiveness and attitude toward technology-assisted teaching: Report of a case study. *Journal of Research on Computing in Education. 32*(1). 189-202.

Mitra, A., Steffensmeirer, T. & Lenzmeier, S. (1999). Changes in attitude toward computers and use of computers by university faculty. *Journal of Research on Computing in Education*, *32*(1), 189-202.

Moore, M. G., & Kearsley, G. (1996). *Distance education: A systems view.* Belmount, CA: Wadsworth Publishing Company.

Murphy, H. & Terry, H. R. (1998). Opportunities and obstacles for distance education in agricultural education. *Journal of Agricultural Education, 39*(1), 28-36.

Murphrey, T. P. (1997). *Comparing and contrasting the effectiveness of computer-based instruction with traditional classroom instruction in the delivery of a cross-cultural educational module for agriculturalists.* Unpublished doctorial dissertation, Texas A&M University, College Station.

National Center for Education Statistics, Washington, DC, U.S. Department of Education. (2000). *Status in brief: Teacher use of computers and the Internet in public schools.* Author.

National Council for the Accreditation of Teacher Education. (1997). *Technology and the new professional teacher: Preparing for the 21st century classroom.* Washington, DC: Author.

Newman, J. M. (2000). Following the yellow brick road *Phi Delta Kappan, 81*(10), 774-779.

Nordheim, G., & Connors, J. (1997). *The perceptions and attitudes of Northwest agriculture instructors towards the use of computers in agricultural education programs.* In J. Connors and T. Murphy (Eds.), Proceedings of 24th National Agricultural Education Research Meeting, (pp. 320-329). Las Vegas, NV.

Office of Technology Assessment (1995). *Teachers and Technology: Making the Connection*. Retrieved May 5, 2003, from http://www.wws.princeton.edu/~ota/ns20/year_f.html

Pelgrum, W. J. (1992). International research on computers in education. *Prospects, 22*(3), 341-349.

Pellegrino, J.W., & Altman, E.A. (1997). Information technology and teacher preparation: Some critical issues and illustrative solutions. *Peabody Journal of Education, 72*(1), 92-93.

Perkins, D. (1992). *Smart schools: Better thinking and learning for every child.* New York: The Free Press.

Pett, D., & Grabinger, S. (1995). Instructional media production. In G. Anglin (Ed.). *Instructional technology: Past, present, and future.* Englewood, CO: Libraries Unlimited, Inc., 305-313.

Phipps, L. J, & Osborne, E. W. (1988). *Handbook on agricultural education in the public school.* Danville, IL: Interstate.

Rakes, G. C. & Casey, H. B. (2002). *An analysis of teacher concerns toward instructional technology.* Retrieved on March 15, 2003 from http://www.ao.uiuc.edu/ijet /v3n1/rakes/index.html.

Rosenshine, B., & Furst, N. (1973). The use of direct observation to study teaching. In R.M.W. Travers (Ed.), *Second handbook of research on teaching*. Chicago: Rand McNally, 122-183.

Salomon, G. (1981). *Communication and education.* Beverly Hills, CA: Sage.

Salomon, G., & Gardner, H. (1986). The computer as educator: Lessons from television research. *Educational Researcher, 15*(1) 13-19.

Sandholtz, J. H., Ringstaff, C., & Dwyer, D. C. (1997). *Teaching with technology: Creating student-centered classrooms.* New York: Teachers College Press.

Schank, R. C. & Cleary, C. (1995). *Engines for education.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Schlosser, C. & Anderson, M. (1994). *Distance education: Review of the literature.* Washington, DC: Association for Educational Communications and Technology.

Schofield, J. W. (1995). *Computers and classroom culture*. Melbourne, Australia: Cambridge University Press.

Shannon, C. & Weaver, W. (1949). *The mathematical theory of communication.* Urbana, IL: University of Illinois Press.

Sheingold, K. & Hadley, M. (1990). *Accomplished teachers: Integrating computers into classroom practice.* New York: Center for Technology in Education, Bank Street College of Education.

Simonson, M., & Volker, R. (1984). *Media planning and production.* Columbus, OH: Merrill.

Simonson, M. R., & Thompson, A. (1997). *Educational computing foundations.* Upper Saddle River, NJ: Merrill.

Sion, R. T. (1998). The sixth technological revolution shaping today's high school curriculum. *The Educational Forum, 62*(4), 316-322.

Skinner, B. (1954). The science of learning and the art of teaching. *Harvard Educational Review, 24*, 86-97.

Skinner, R. (2002). *Tracking Tech Trends*. Retrieved August 1, 2003, from http://www.edweek.org/sreports/tc02/article.cfm?slug=35tracking.h21

Smerdon, B., Cronen, S., Lanahan, L., Anderson, J., Iannotti, N., & Angeles, J. (2000). *Teachers' tools for the 21st century: A report on teachers' use of technology*. Washington, D.C.: National Center for Education Statistics, U.S. Department of Education.

Software and Information Industry Association (2003). *Higher Educational Technology Expenditures*. Retrieved June 5, 2003, from http://f1.grp.yahoofs.com/v1/oKoqP4RmkcGDJPJeN221yhOB2-7GOwTY6I_AfEucYvlxHHYjNmfFHr-pfCZPI86K7IRsAlkfZAOzjTk1/Effectiveness%20Study.pdf

Summers, J. (1990-1991). Effect of interactivity upon student achievement, completion intervals, and affective perceptions. *Journal of Educational Technology Systems*, *19*(1), 53-57.

Texas Education Agency (2003a). *Percent Meeting Minimum Expectations – All Students*. Retrieved on February 18, 2003, from http://www.tea.state.tx.us/studentassessment/reporting/results/swresults/august/g10all_au.pdf.

Texas Education Agency (2003b). *Data File Format – Data Diskette & CD ROM Fall 2002 through Summer 2003*. Retrieved on January 6, 2003 from http://www.tea.state.tx.us/student.assessment/reporting/results/swresults/swresults/august/g10all_au.pdf.

Thompson, A. D., Simonson, M. R., & Hargrave, C. P. (1996) *Educational technology: A review of the research*, (2nd ed.). Ames, IA. College of Education, Iowa State University.

Thorndike, E. (1969). *Educational psychology*. New York: Arno Press.

Trotter, A. (1998). *A question of effectiveness*. Retrieved on August 20, 2003 from http://www/edweek.org/reports/tc98/intro/in-n.htm.

Tuckman, B. W. (1999) *Conducting educational research* (5th ed.). Orlando, FL: Harcourt Brace College Publishers.

U.S. Department of Commerce (1998). *National Telecommunication and Information Administration.* Economics and Statistics Administration. Falling Through the Net: Toward Digital inclusion: A Report on American' Access to Technology Tools. Washington, D.C.: December 1998.

Woodrow, J. E. (1991). A comparison of four computer attitude scales. *Journal of Educational Computing Research, 7*(2), 165-187.

Zehr, M. (2003). Teaching the teachers. *Education Week on the Web.* Retrieved on January 6, 2003 from http://www.edweek.org/sreports/tc/misc/tctoc.htm.

Zidon, M. G. & Luft, V. D. (1987). Assessment of the use of microcomputers in North Dakota secondary vocational agriculture departments. *The Journal of the American Association of Teacher Educators in Agriculture. 28*(1), 16.

Zimbardo, P. G., & Leippe, M. R. (1991). *The psychology of attitude change and social influence*. Philadelphia: Temple University Press.

APPENDIX A

FIRST SURVEY LETTER

September 12, 2002

Dear Selected Teacher:

Dr. Briers, Dr. Harlin, and I are attempting to identify ways in which agriculture teachers are using computer technology. We invite you to participate in this study of technology use and integration into your courses. Having recently left the agriculture classroom myself, I often wondered if I was using technology often enough, or too much, and if I was using it correctly to cause the most student learning. Now that I have moved into a graduate assistant position I am able to look at these questions more closely. Your school and agriculture department have been chosen as one of only a few in the state. So, your response is critical and valuable. We are asking that you take fifteen minutes, complete the survey, and return it to us in the enclosed envelope by Christmas Break. We know your time is valuable; therefore this instrument has been kept as short as possible. If you have any questions concerning the survey or this study please contact Jason Peake at (979) 458-1021 or by e-mail at jpeake@tamu.edu. We truly appreciate your time and thank you for participating.

Sincerely,

Jason Peake	Julie Harlin	Tim Murphy
Graduate Assistant	Assistant Professor	Assistant
Professor		

APPENDIX B

SURVEY INSTRUMENT

Computer Technology Use Survey

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1. What is your zip code? ________________

2. What is your gender?
_____Male _____Female

3. Total teaching experience: ________ years

4. Which grouping includes your age?
_____20-30 _____31-40 _____41-50 _____51+

5. Do you have access to a computer:
at school _____yes _____no
at home _____yes _____no

6. How many computers do you have in your classroom? ______

7. Can you schedule time in school computer labs easily? ______yes _______no

8. Does your Agriscience classroom have a method of displaying electronic presentations to your students?
yes______ no______

9. What type of Internet connection does your department have?
____ 56K _____ ISDN _____cable ______DSL _____ don't know

10. In a normal week, estimate the total number of hours you spend using a computer. ______ hours

11. In a normal week, estimate the total number of hours you assign your students to use a computer. ______ hours

12. Where have you learned most of your computer skills?
_____Self taught _____Formal education (college or classes)
_____Learned at work (in-service) _____Informal (learned from family or friends) _____Learned from students _____Other

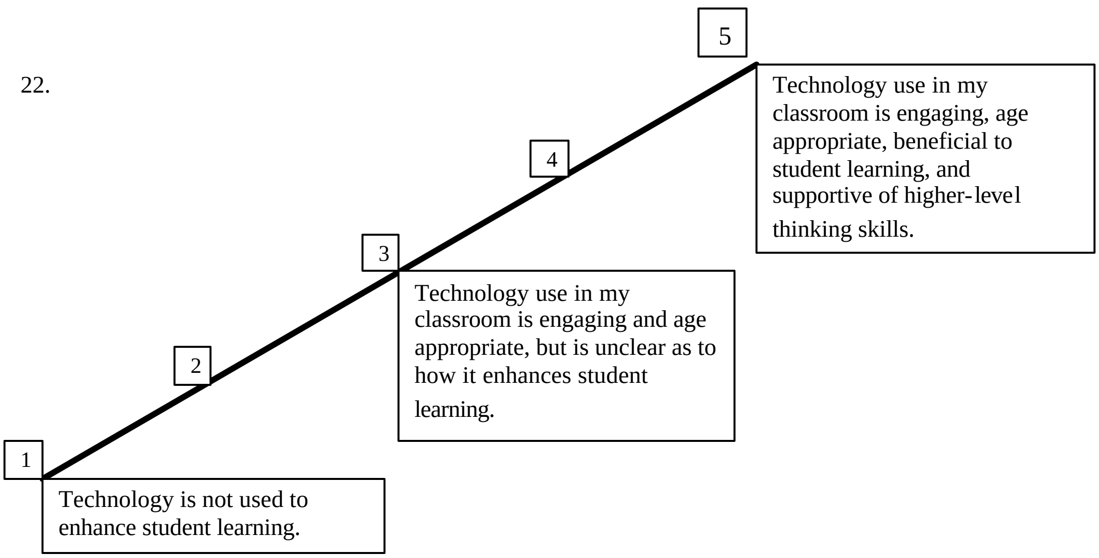
CIRCLE YES=Y OR NO=N FOR THE FOLLOWING TECHNOLOGY SKILLS:

13a.	Do you use e-mail?	Y	N
13b.	Can you attach and send files (attachments) through e-mail?	Y	N
13c.	Can you find addresses in the address book?	Y	N
13d.	Can you create an address book?	Y	N
14a.	Do you use word processing software (such as Microsoft Word or WordPerfect)?	Y	N
14b.	Can you set page margins?	Y	N
14c.	Can you create tables in word processing?	Y	N
14d.	Can you change the font (such as Times New Roman or Arial) and the font style (such as bold, *italic*, or underline)?	Y	N
14e.	Can you use edit features such as cut and paste?	Y	N
15a.	Do you use spreadsheet software?	Y	N
15b.	Can you format alphanumeric cells in a spreadsheet?	Y	N
15c.	Can you create a graph or chart from data in a spreadsheet?	Y	N
15d.	Can you create functions or formulas in a spreadsheet?	Y	N
16a.	Do you use presentation software (such as Presentations or PowerPoint)?	Y	N
16b.	Can you create a technology-enhanced presentation using presentation software?	Y	N
16c.	Can you use different views in the presentation software package such as slide sorter, slide, outline, or slide show?	Y	N
16d.	Can you insert graphics and pictures from a variety of resources?	Y	N
17a.	Can you "surf" or browse the Internet?	Y	N
17b.	Can you bookmark frequently used web pages?	Y	N

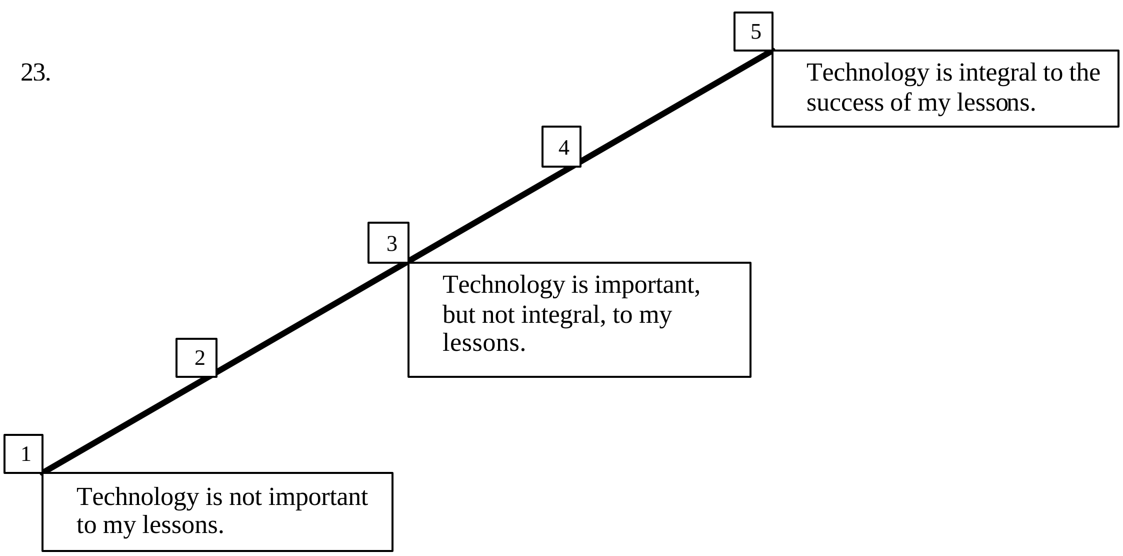
17c.	Can you download files from the Internet?	Y	N
17d.	Have you ever made an online purchase?	Y	N
17e.	Can you use a search engine (such as Yahoo or Alta-Vista) to find web pages?	Y	N
18a.	Have you created or edited web pages?	Y	N
18b.	Can you create tables using HTML?	Y	N
18c.	Can you create active hyperlinks?	Y	N
18d.	Can you incorporate graphics into web pages?	Y	N
18e.	Can you convert existing files into HTML?	Y	N
18f.	Can you upload files to a web server?	Y	N
19a.	Do you know how to manage your computer files?	Y	N
19b.	Can you delete files?	Y	N
19c.	Can you move files from one location to another?	Y	N
19d.	Can you create shortcuts?	Y	N
19e.	Can you install software?	Y	N
20a.	Can you set up and use a video projector to display a presentation?	Y	N
20b.	Can you use a digital camera and incorporate photos in your work?	Y	N
20c.	Can you connect a TV to a computer to display a presentation?	Y	N
20d.	Can you scan documents utilizing a scanner?	Y	N
21a.	Do you know how to use technology to assist you in administrative tasks such as writing letters to parents and keeping track of fundraising finances?	Y	N
21b.	Do you know how to integrate technology to help you access current/reliable information?	Y	N
21c.	Do you know how to integrate technology to help you communicate current/reliable information to your students?	Y	N
21d.	Do you know how to integrate technology to help students in research, constructing new ideas, and communication?	Y	N
21e.	Do you know how to integrate technology into your agricultural program?	Y	N
21f.	Are you aware of the Texas Standards for Technology Literacy?	Y	N

Rate your integration of computer technology by circling 1 to 5 on the following items.

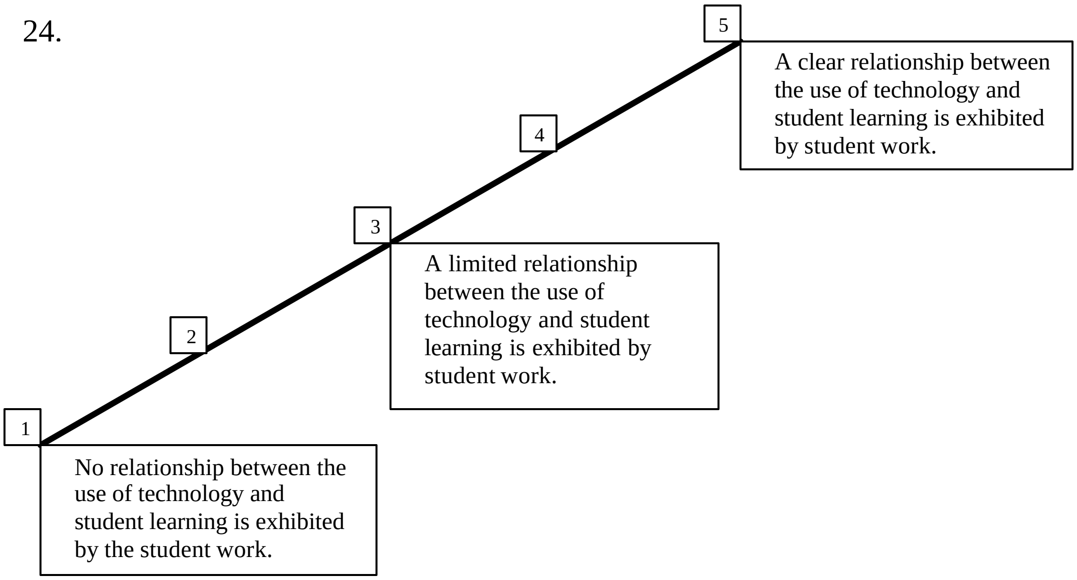
22.



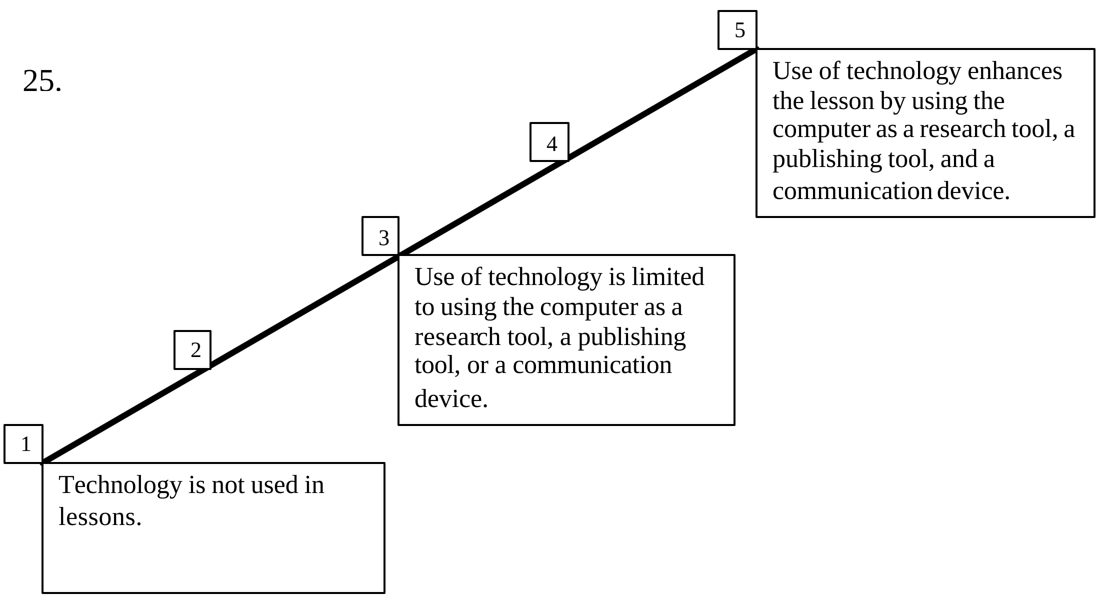
23.



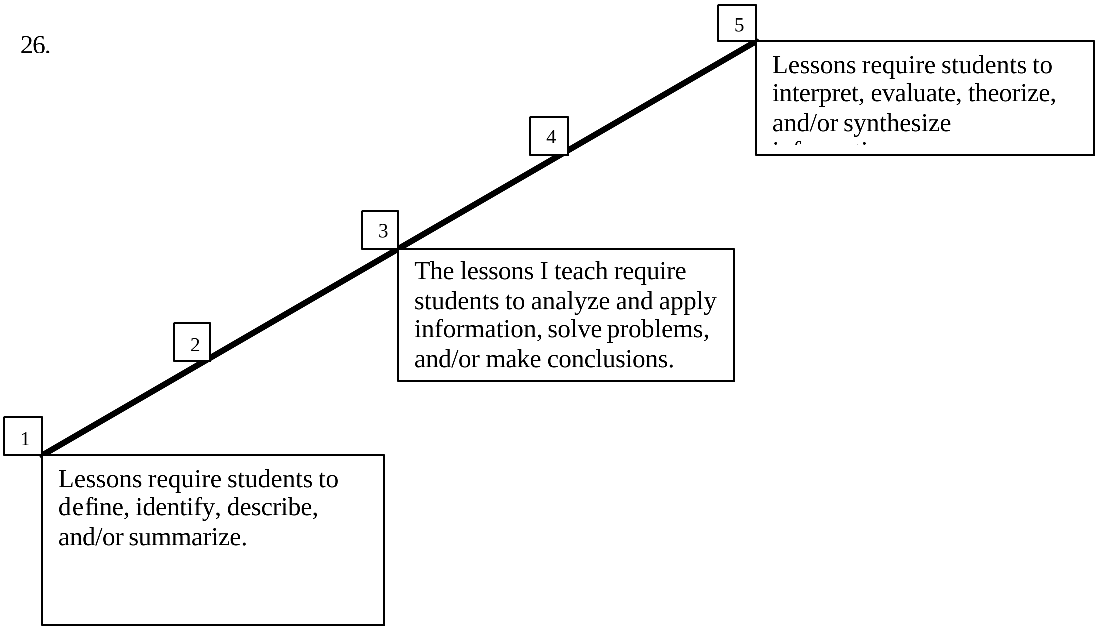
24.


5
A clear relationship between the use of technology and student learning is exhibited by student work.
4
3
A limited relationship between the use of technology and student learning is exhibited by student work.
2
1
No relationship between the use of technology and student learning is exhibited by the student work.

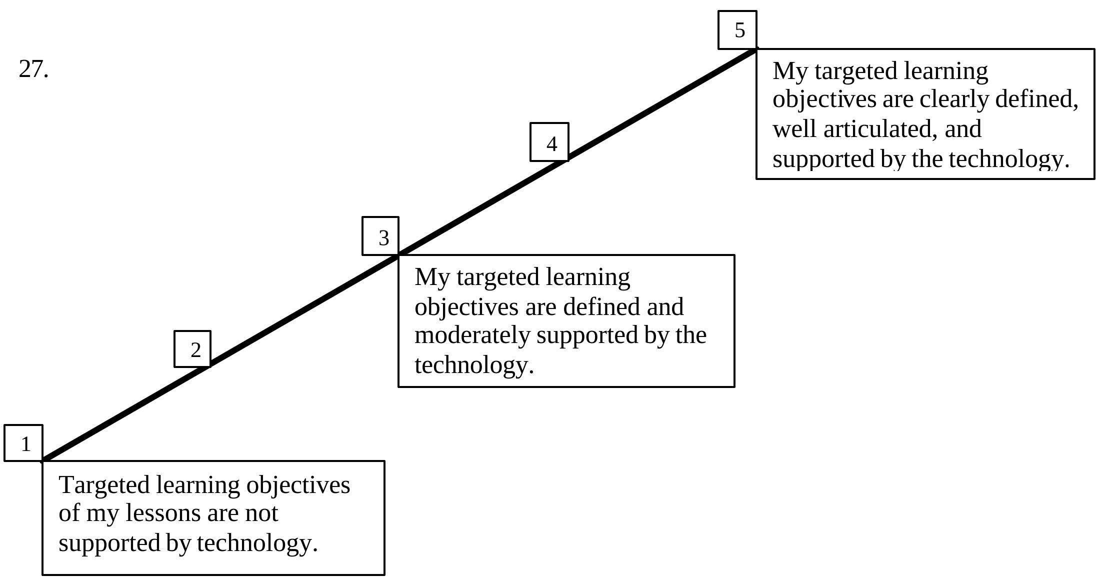
25.


5
Use of technology enhances the lesson by using the computer as a research tool, a publishing tool, and a communication device.
4
3
Use of technology is limited to using the computer as a research tool, a publishing tool, or a communication device.
2
1
Technology is not used in lessons.

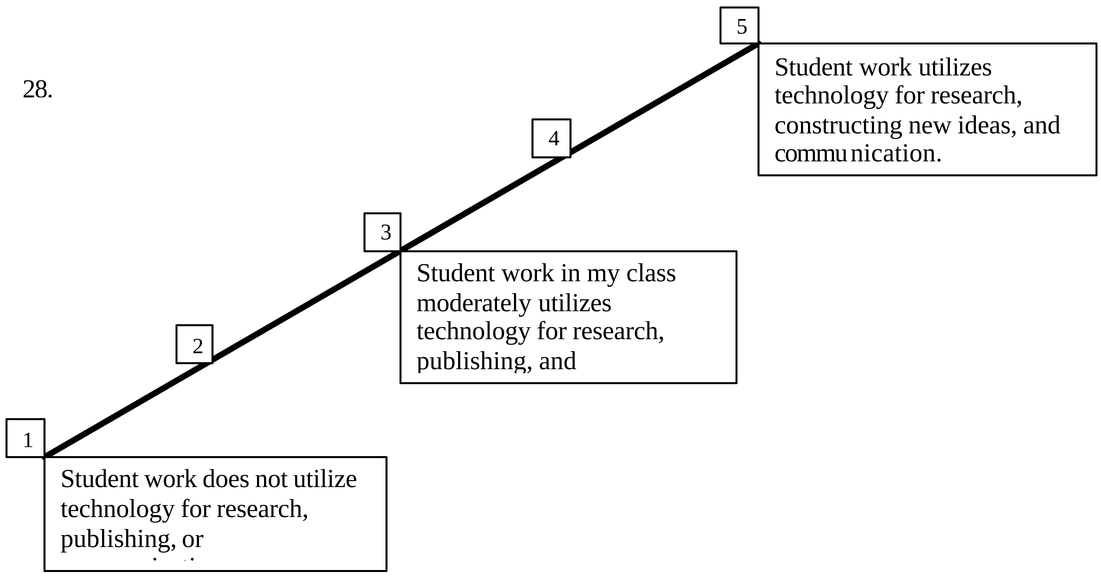
26.


5
Lessons require students to interpret, evaluate, theorize, and/or synthesize
4
3
The lessons I teach require students to analyze and apply information, solve problems, and/or make conclusions.
2
1
Lessons require students to define, identify, describe, and/or summarize.

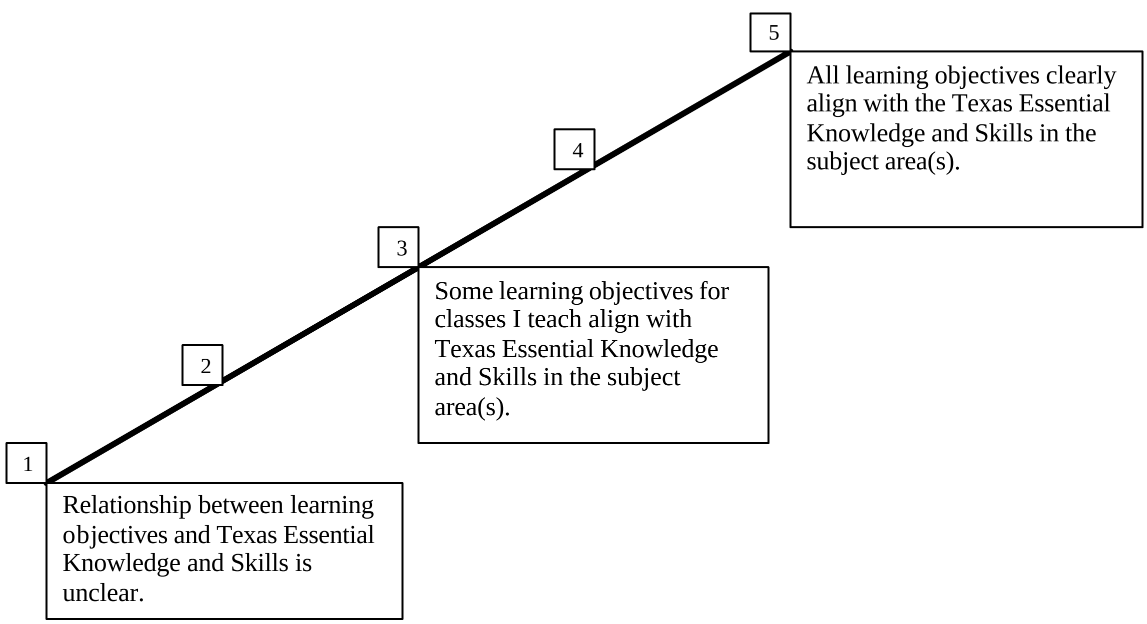
27.


5
My targeted learning objectives are clearly defined, well articulated, and supported by the technology.
4
3
My targeted learning objectives are defined and moderately supported by the technology.
2
1
Targeted learning objectives of my lessons are not supported by technology.

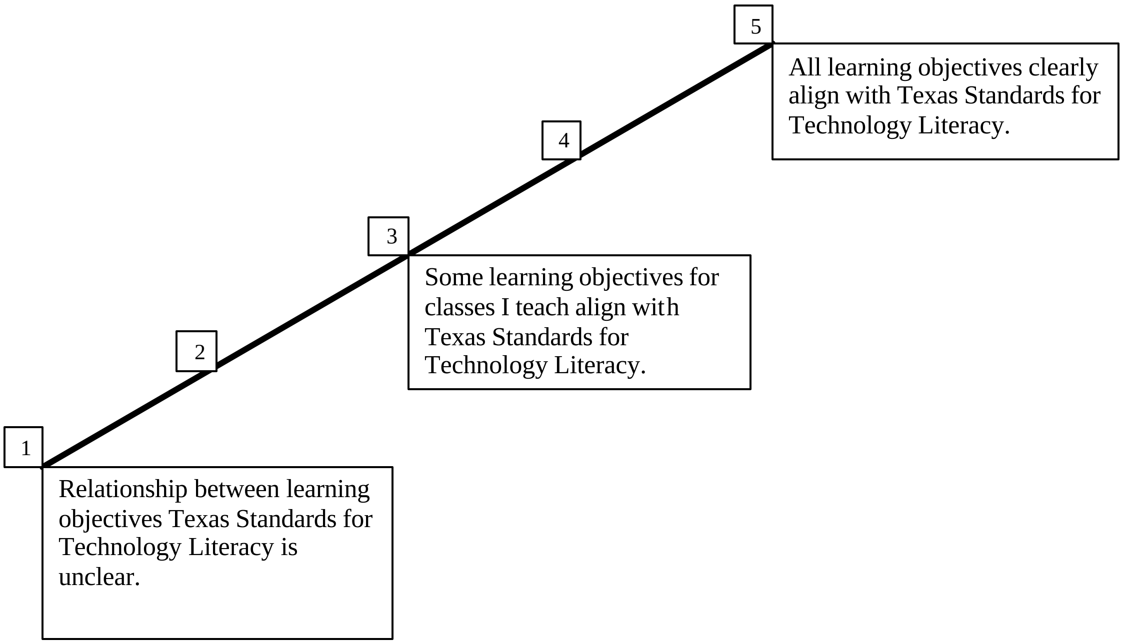
28.



29. I am familiar with Texas Essential Knowledge Skills.
______yes ______no



30. I am familiar with Texas Standards for Technology Literacy.
_____yes _______no



APPENDIX C

POSTCARD

TEXAS A&M AGRICULTURAL EDUCATION DEPARTMENT

October 11, 2002

A month ago a questionnaire concerning your use of technology in teaching was mailed to you. All participants in this study were mailed the questionnaire.

If you have already completed and returned the questionnaire to us, please accept our sincere thanks. If not, please do so today. We are especially grateful for your help because it is only by asking people like you to share you experiences that we can help to improve Agriscience instruction across the state of Texas.

If you did not receive a questionnaire or if it was misplaced, please call Jason Peake at (979) 458-1021 and I will be glad to get another one in the mail to you today. Thank you for your time.

Jason Peake
Graduate Student
Agricultural Education
Texas A&M University
College Station, TX 77843

APPENDIX D

SECOND SURVEY LETTER

November 4, 2002

Dear Selected Teacher:

My name is Jason Peake and Dr. Briers, Dr. Harlin, and I are attempting to identify ways in which agriculture teachers are using computer technology. This is my second mailing of the survey, and even though I know your days are busy, I hope you can find the time to complete it.

We invite you to participate in this study of technology use and integration into your courses. Having recently left the agriculture classroom myself, I often wondered if I was using technology often enough, or too much, and if I was using it correctly to cause the most student learning. Now that I have moved into a graduate assistant position I am able to look at these questions more closely. Your school and agriculture department have been chosen as one of only a few in the state. So, your response is critical and valuable. We are asking that you take fifteen minutes, complete the survey, and return it to us in the enclosed envelope by Christmas Break. We know your time is valuable; therefore this instrument has been kept as short as possible. If you have any questions concerning the survey or this study please contact Jason Peake at (979) 458-1021 or by e-mail at jpeake@tamu.edu. We truly appreciate your time and thank you for participating.

Sincerely,

Jason Peake	Julie Harlin	Tim Murphy
Graduate Assistant	Assistant Professor	Assistant
Professor		

APPENDIX E

THIRD SURVEY LETTER ATTACHMENT

Dear Selected Teacher:

I just wanted to send you a friendly reminder note concerning the technology survey that you received from me on September 12. I realize that your time is very valuable and that you are busy preparing for the upcoming Leadership Development Events, but I would like to ask you again to take some time to complete this survey. I have included another copy of the survey and a return envelope for you incase you misplaced the first one. Thank you in advance for your time and I really appreciate you filling this out for me.

Jason Peake
Julie Harlin
Tim Murphy

APPENDIX F

RELIABILITY ANALYSIS

Descriptive and Summary Statistics for Construction
of Scale "Technology Integration"

(N=87)

Item	M	SD	total-correlation
13a	.92	.27	.52
13b	.73	.45	.50
13c	.88	.33	.46
13d	.77	.42	.65
14a	.92	.27	.55
14b	.85	.36	.63
14c	.59	.49	.75
14d	.90	.29	.56
14e	.83	.37	.63
15a	.69	.47	.66
15b	.50	.50	.62
15c	.50	.50	.69
15d	.51	.50	.67
16a	.54	.50	.71
16b	.54	.50	.62
16c	.53	.50	.67
16d	.58	.50	.71
17a	.93	.25	.42
17b	.81	.39	.57
17c	.88	.33	.60
*17d	.64	.48	.39
17e	.88	.33	.50
18a	.23	.43	.48
18b	.19	.39	.52
18c	.20	.40	.56
18d	.19	.39	.53
18e	.18	.38	.51
18f	.24	.43	.52

APPENDIX F – Continued

Item	M	SD	total-correlation
19a	.69	.47	.70
19b	.89	.31	.66
19c	.70	.46	.67
19d	.59	.49	.66
19e	.72	.45	.63
20a	.61	.49	.69
20b	.66	.48	.76
20c	.54	.50	.69
20d	.53	.50	.71
21a	.86	.34	.58
21b	.78	.41	.70
21c	.68	.47	.62
21d	.74	.44	.67
21e	.74	.44	.70
*21f	.24	.43	.32
Total			.96

*This item was not included in the scale construction because the item detracted from the internal consistency of the scale.

APPENDIX G

DAVIS CONVENTION FOR INTERPRETING

MEASURES OF ASSOCIATIONS

Coefficient Description	Association Description
.70 or higher	Very strong
.50 to .69	Substantial
.30 to .49	Moderate
.10 to .29	Low
.01 to .09	Negligible

APPENDIX H

NUMBER OF STUDENTS PARTICIPATING FROM EACH SCHOOL

School Number	Number of Student Respondents
2901001	45
3902001	60
8903001	14
9901001	25
14902001	23
20905002	67
22901001	13
25906001	16
34909001	9
39903001	18
39904001	13
43903001	37
51901001	13
57904001	63
57909003	19
58905001	9
61902002	62
62904001	22
65902001	14
72908001	6
75903001	22
82902001	12
83902001	5
90903001	15
91913001	44
91917001	22
92903001	64
92906002	26
95903001	12
99902001	11
101909002	10
101915001	64
101917003	18
107907001	9
108910001	40
109901001	12
109905001	19
109913001	14
109914001	12
111902001	21
252901001	31

APPENDIX H – Continued

School Number	Number of Student Respondents
116901001	32
118902001	14
126905001	92
128901001	27
128903001	9
130901001	25
137904001	27
138902001	9
138904001	9
149901001	24
153903001	28
161901001	26
161909001	36
163902001	19
167902001	13
171902001	26
177901001	11
178913001	25
183901001	11
186901001	9
187906001	11
188901005	74
194902001	17
194905001	20
196903001	26
200902001	7
201910002	22
201913001	13
203902001	10
212903001	51
220912001	15
224902001	6
226908001	17
229905001	16
229906001	13
230901001	19
230903001	24
230904001	20
230908001	20
242903001	12
244901001	10
244905001	13
246908001	40

APPENDIX I

VARIABLES PROVIDED BY THE TEXAS EDUCATION AGENCY ON STUDENTS

MONTH OF ADMINISTRATION
YEAR OF ADMINISTRATION
GRADE DESIGNATION
ESC REGION NUMBER
COUNTY DISTRICT NUMBER
COUNTY DISTRICT CAMPUS NUMBER
DISTRICT NAME
CAMPUS NAME
SEX OF STUDENT
ETHNIC CLASSIFICATION
PARTIC. IN FREE OR REDUCED MEALS
PARTICIP. IN TITLE I-PART A PROGRAM
IDENTIFIED & ASSIGN. MSRTS NUMBER
LIMITED ENGLISH PROFICIENT
PARTICIPATES IN BILINGUAL PROGRAM
PARTIC IN ENG AS SECOND LANG PROGRAM
PARTIC. IN SPECIAL EDUCATION
GIFTED_TALENTED PROGRAM STUDENTS
STUDENT IS AT RISK OF DROPPING OUT
PARTIC. IN CAREER & TECHNOLOGY PRG.
TEST VERSION: ENGLISH/SPANISH
NONSTANDARD ADMIN. IN MATH
WRITING SCORE CODE
READING SCORE CODE
MATHEMATICS SCORE CODE
WRIT. TST/RETST STATUS(1 OR R)
READ. TST/RETST STATUS(1 OR R)
MASTERY OF WRITING OBJECTIVE1
MASTERY OF WRITING OBJECTIVE2
MASTERY OF WRITING OBJECTIVE3
MET MIN. EXPECT. ON WRITING TEST
ALL OBJECTIVES MASTERED IN WRITING
MASTERY OF READING OBJECTIVE1
MASTERY OF READING OBJECTIVE2
MASTERY OF READING OBJECTIVE3
MASTERY OF READING OBJECTIVE4
MASTERY OF READING OBJECTIVE5
MASTERY OF READING OBJECTIVE6
MET MIN. EXPECT ON READING TEST
ALL OBJECTIVES MASTERED IN READING
MASTERY OF MATHEM. OBJECTIVE1
MASTERY OF MATHEM. OBJECTIVE2
MASTERY OF MATHEM. OBJECTIVE3
MASTERY OF MATHEM. OBJECTIVE4

APPENDIX I – Continued

MASTERY OF MATHEM. OBJECTIVE5
MASTERY OF MATHEM. OBJECTIVE6
MASTERY OF MATHEM. OBJECTIVE7
MASTERY OF MATHEM. OBJECTIVE8
MASTERY OF MATHEM. OBJECTIVE9
MASTERY OF MATHEM. OBJECTIVE10
MASTERY OF MATHEM. OBJECTIVE11
MASTERY OF MATHEM. OBJECTIVE12
MASTERY OF MATHEM. OBJECTIVE13
MET MIN. EXPECT ON MATHEM. TEST
ALL OBJECTIVES MASTERED IN MATHEM.
TAKES BRAILLE TEST-WRIT. A.D.
TAKES LARGE PRINT TEST-WRIT. A.D.
LEP DEFERRAL (GRADE 10 ONLY)
FOREIGN EXCH. DEFERRAL (EXIT ONLY)
ACADEMIC RECOGNITION-WRITING
ACADEMIC RECOGNITION-READING
ACADEMIC RECOGNITION-MATHEM.
YRE STUDENT TESTED IN MAY
CAMPUS ENROLLED IN FALL 2001
YRE STUDENT TESTED IN APRIL
TOTAL # OF WRITING MC ITEMS CORRECT
WRITTEN COMP.SCORE-FINAL SCORE
SCALE SCORE OF WRITING TEST
TOTAL # OF READING MC ITEMS CORRECT
TOTAL # OF MATHEM. MC ITEMS CORRECT
TEXAS LEARNING INDEX - READING
TEXAS LEARNING INDEX - MATHEM.
MET EOC REQ. FOR GRADUATION
ENGLISH II EOC STATUS
ALGEBRA EOC STATUS
BIOLOGY EOC STATUS
US HISTORY EOC STATUS
DST INDICATED MET EOC REQ

VITA

Jason B. Peake
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1404 Peake Hollow Road
Hodgenville, Kentucky 42748
jasonpeake@hotmail.com

Education

Ph.D.	**2003**	**Agricultural Education** *Specialization:* Teacher Preparation and Educational Technology Texas A&M University, College Station, Texas
M.A.	**2000**	**Educational Technology** *Specialization:* Media Instructional Design University of Central Florida, Orlando, Florida
B.S.	**1996**	**Agricultural Education** *Specialization:* Secondary Agricultural Education University of Kentucky, Lexington, Kentucky