THE RELATIONSHIP BETWEEN TECHNOLOGY TRAINING AND TECHNOLOGY INTEGRATION BY TECHNOLOGY EDUCATION TEACHERS IN WISCONSIN

By

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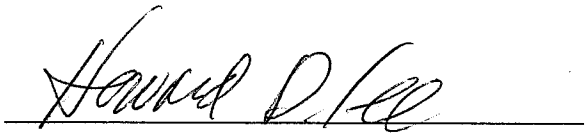

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ABSTRACT

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Technology has advanced to pervade almost all levels of work, and it has become necessary for secondary students to acquire technology literacy before they graduate. Therefore, state and national technology literacy standards have been developed to define goals for technology educations teachers to follow for integrating technology into their curriculum. Nonetheless, some studies report that teachers are lagging at incorporating these goals.

This study sought to determine relationships between technology integration and factors that may impede technology integration. The results were gathered using a self-reporting

questionnaire that was administered at the Stout Technology Conference on October, 15, 2004, at the University of Wisconsin-Stout. Significant relationships were found between the frequency of technology integration and; (1) proficiency with instructional software, (2) time to integrate technology, (3) technological abilities, (4) frequency of training, (5) participation in "Teaching with Technology" training, and (6) perceptions of technology.

Other factors that were found to have significant relationships with the frequency of technology training include school districts providing reasons to integrate, the frequency of integration, and participation "Teaching with Technology" training. The degree of integration was examined, and the significant relationships to this factor include assessment beliefs and practices, the ability to locate software, technological ability, and training related to "Teaching with Technology". The technology abilities that were found to be correlated with integration include the belief that technology integration helps students meet course objectives and proficiency with instructional software. None of the demographic elements explored in this study were found to be related to technology integration practices. These demographic factors are age, teaching experience, class size, number of Tech Ed teachers, and community size. Other factors that no significant relationship to technology integration was found include access to technology, technological support, computer location, and funding for technology equipment and training.

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CHAPTER 1

Introduction

There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in this success, than to take the lead in a new order of things.

B Machiavelli, 1513.

The Destiny of Change

Change is inevitable, and it will always play a part in our everyday lives. Heraclitus, a Greek philosopher circa 500 B.C.E., declared, "There is nothing permanent except change." This statement continues to be valid today and many believe that it is more pertinent considering the rapid pace at which technology is changing our world.

Technology and Change in the Workforce

It is common knowledge that technology pervades most aspects of our lives today, including work. The Digest of Educational Statistics (Snyder & Hoffmann, 2002) reported that in 1997, 50% of the workforce indicated using a computer on the job. It is within reason to presume that computers are more prevalent and important in the workplace today. Furthermore, as newer technologies become increasingly implemented by business and industry, the need for workers with technology skills has also become increasingly important.

Shortage of technology-skilled workers

Currently, concerns have been raised about the shortage of technology-skilled workers to fill the increasing number of jobs requiring technology know-how. A task force that reviewed

workforce needs in Wisconsin reported that the shortage of skilled workers is approaching a crisis level (Wisconsin Department of Workforce Development [DWD], 1999). It is difficult to locate information with specific details on the scope of the problem, but available information suggests that the supply of skilled workers is not meeting the demand. For instance, in attempts to fill openings requiring technical skills, employers have been importing skilled workers from outside of the country. Foreign workers in these positions are required to obtain an H-1B visa before they are permitted to work in the United States. Therefore, the number of requests for these visas can provide data on the extent of the shortage of skilled workers. According to the report in 2003 by the Wisconsin Department of Workforce Development [DWD], between 2000 and 2002, more than 3,000 H-1B visas were requested by Wisconsin firms. The shortage is not limited to Wisconsin. The Computing Technology Industry Association [CompTIA] reported that approximately 268,000 information technology jobs were still open nationwide (Jastrow, 2000). Furthermore, the shortage of technology skilled workers appears to be increasing. According to an article published by eWeek in September of 2000, between 1999 and 2000, the number of H-1B visas increased from 65,000 to 115,000 (Vaas, 2000). Thus, the shortage of workers in the technology fields is expected to increase.

Global Competition

It is apparent from the number of requests for H-1B visas that the available candidates for employment in the U.S. often do not have sufficient skills for the positions requiring advanced skills. Moreover, approximately half of the H-1B workers have PhD=s though only a bachelor=s degree is required (Vaas, 2000). Therefore, U.S. citizens are competing globally with candidates who have higher degrees and often have prior experience in the technology-related fields. As

technology advances increase the demand for technology-skilled workers, the shortage of skilled workers will further impact U.S. companies. According to an article in HR Focus ("Skills will be the secret," 2000), U.S. companies will need to move operations outside of the country to compete in the global economy if they are unable to acquire sufficient skilled workers in the United States. This would further reduce the employment opportunities for all Americans.

Impact of Technology Advancements for High School Graduates

The rapid change in technology advancements is also likely to impact high school graduates seeking employment. The technology skills that are necessary to acquire entry level jobs are increasing rapidly. As a result, technology skills are one of the most important skills for students to possess before graduating. In the past, a high school graduate with no skills, or limited skills, could find a job that provided a good living (Wagner, 2001). Nonetheless, times have changed and fewer jobs are open to persons with limited skills. Many of the jobs that were open to unskilled high graduates have declined rapidly or no longer exist. Furthermore, the global economy may reduce the number of opportunities for students to find work as positions are filled with skilled foreign labor or companies relocate to foreign countries where they are better able to find sufficient numbers of technology-skilled candidates. Therefore, it is important for students to acquire technology skills to allow them to compete in the technology-focused world of today.

Impact of Technology Advancements for Teachers

In order to produce successful and productive members of society, schools must adjust their curriculum to accommodate society's need for an increasingly technology-literate

workforce. Wagner (2001), who has worked in education for 30 years as a teacher, principal, teacher educator, and consultant, asserts that our educational system has become obsolete. In the past, students did not need to have the ability to work independently or possess technical problem-solving skills to be successful. However, it is now important for all students to develop advanced skills that are very different from those needed 25 years ago.

Technology as a Tool

It is the responsibility of teachers to teach the skills that are necessary for students to succeed after graduating from high school. Therefore, teachers will need to lead the way by adapting their curriculum and teaching strategies to accommodate changing skill requirements. Thus, it is necessary for teachers to become AAgents of Change@ as they lead their students to success beyond high school.

To become leaders of change, teachers will need to integrate technology into their curriculum. Margaret Mead, in an address at Harvard in 1951, stated that, as leaders, it is crucial for teachers to have the ability to change and adapt in order to help others do likewise in our ever-changing world (Lund, 1987). Nevertheless, there is a common belief that teachers, especially older teachers, are resistant to embrace and incorporate new technologies into their curriculum. Statistical data appears to support the notion that teachers are not keeping pace with technology at the same rate as their students. The National Center for Educational Statistics reported that in 1997, 79% of the students in grades 1-8, and 70% of high school students, had used computers at school (Snyder & Hoffmann, 2002). However, the same report shows that teachers of elementary and secondary schools were not as likely as their students to use computers, with 60% reporting computer use at work in 1997. In order to become leaders in

today=s technological world, it seems reasonable to expect the computer usage of teachers to be at least equivalent to that of students.

Technology Integration

Given the increasing importance of technology-related skills, it is important for teachers to incorporate technology into their curriculum. Integration of technology into classroom instruction is now mandated by state educational standards in Wisconsin (Wisconsin DPI, n.d.). Wisconsin's Technology Literacy Standards are divided into four categories. These four areas are media and technology, information and inquiry, independent learning, and learning community. The technology standards are designed to insure that students have the necessary skills to succeed beyond high school. However, in order for the technology literacy standards to succeed, they must be adopted into classroom instruction by teachers. Nonetheless, several barriers to technology integration prevent teachers from implementing the technology literacy standards into classroom instruction.

Barriers to Technology Integration - Resistance in Public Education

Before teachers can integrate technology into their curriculum, common sense says that they first need to know how to use the technology. Furthermore, teachers will likely need instruction or guidance on the proper ways to use technology as a tool for classroom instruction. Thus, if teachers do not learn how to use and integrate technology, their lack of knowledge will act as a barrier to technology integration. Other barriers impede technology integration as well.

Natural resistance to change

Another barrier to technology integration is the human tendency to resist change, and the field of education is not immune from this tendency (Wagner, 2001). Therefore, persuading veteran teachers to abandon old teaching methods for the new methods that require change may be like convincing a vegetarian to make an exception for hamburger. Therefore, as necessary as change is, it is also to be expected that there will be resistance to it by teachers.

Teacher Traits - Avoidance of risk-taking

Other studies have given additional reasons for teacher resistance to using technology for instructional purposes. Wagner (2001) has studied and facilitated the change processes in schools for 12 years relates three common factors to this resistance. The first factor is the avoidance of risk-taking, which is a common trait among teachers. According to Wagner, teachers have traditionally been drawn to their profession because it offers a stable and secure environment. It seems reasonable to assume that a stable and secure environment is one in which change either does not occur or, occurs at a very slow pace. Thus, it is within the nature of most teachers to avoid introducing material that requires changes in their teaching method.

Craft Expertise

The second factor is Acraft@ expertise. By this, Wagner (2001) means that teachers have developed a high degree of expertise in one specific area over many years. Therefore, as new technology affects change around them and their area of expertise becomes outdated, the veteran teachers are resistant to abandon the Acraft@ that they have spent many years refining.

Autonomy to Isolation

The third factor is the autonomy to isolation associated with teaching. Wagner (2001) says Ateachers are isolated from the fast-changing world of globalization and business innovation.@ As a result, most teachers are not aware of the current skills their students need to thrive beyond high school.

Necessity of Technology Support

Like their students, teachers need training, support, and time to develop and refine their technology skills in order to remain successfully in their profession. In addition to the factors of resistance mentioned previously, other barriers exist to technology integration, including limited funding, training and technical support (Wagner, 2001). Thus, as teachers help students develop new skills in technology, they must also learn how to use the new technology as an instructional tool, and do so with limited training or support.

Lack of Funding/Difficulty Acquiring Software

Teachers report that the lack of time to locate and learn new software as another reason for avoiding the use computers for instruction (Fatemi, 1999). Moreover, it is often difficult for teachers to find software that meets curriculum standards, and many teachers do not know where to locate software that is appropriate for classroom use. Furthermore, about 20% of the teachers report purchasing software using money from their own pockets, and that the cost is prohibitive.

Lack of Training

The lack of training was given as one of the most important reasons why teachers are not integrating technology into instruction (Fatemi, 1999). Conversely, the teachers who receive

training in technology feel better about using technology integration methods. Teachers need to have training to effectively integrate technology into their curriculum. Thus, an effective way to increase teachers' infusion of technology is to provide adequate training.

Evolution of Technology Education

Technology Education courses are geared towards providing the skills that will help students to thrive beyond high school. Over time, the skills which are important for students to possess beyond high school change. As these skills that are desired in industry have changed, so has the format and titles of vocational courses in public education. Technology Education evolved from Vocational Education which evolved from Industrial Arts. The earlier programs focused on skills for manual trades, such as woodworking and metalworking. The current Technology Education courses represent skills that are important at this time for students to possess, and are generally broken into four categories, which are communication, transportation, construction, and manufacturing. Nonetheless, the range of skills covered under these categories can vary substantially, from woodworking to video production. Thus, the Technology Education curriculum can vary drastically from one school to the next, and there is no assurance that the newer technology skills will be sufficiently integrated into instruction. Furthermore, as mentioned previously, the barriers and resistance to change will likely inhibit any changes in course content if the instructor has limited training and support for integrating technology, and is very much at ease with teaching the "old-fashioned" way. Thus, changing the name of a program from Vocational Education to Technology Education does not necessarily lead to automatic changes in course content and instruction. Therefore, it will be necessary for school districts to

help teachers successful integrate technology into their curriculum by providing adequate training and support.

Statement of the Problem

The influence that technology has had on society continues to change the skills that are necessary for students to succeed beyond secondary education. Therefore, it has become necessary for teachers to adapt to changes and modify their instruction to implement these new skills. Nevertheless, the data from various studies shows that teachers are lagging with respect to the infusion of technological skills into classroom instruction. While teacher reluctance to integrate technology into their curriculum can be contributed to many factors, this paper will concentrate on one of them - the relationship that exists between technology integration in the classroom by technology education teachers and the technology training that they receive. Other factors that may also be critical to the integration of technology that this paper explores includes perceptions of technology as an instructional tool and barriers to integration.

Purpose of the Study

The intent of this study is to identify correlations between the technology-related training and the use of technology as an instructional tool by technology education teachers, and to identify barriers from the perspective of the teacher. Specifically, the study was designed to determine if a lack of training in technology integration, perceived or real, in the profession may be related to the integration of technology, such as computers and the Internet, into classroom instruction. This study sought to answer the following questions to discover relationships related to technology integration in the classrooms of Wisconsin technology education teachers.

Research Questions

Note: The research questions below focus on Wisconsin technology education teachers.

1. What is the relationship between technology training and integration practices?
2. What is the relationship between perceptions of technology and integration practices?
3. What is the relationship between the integration of technology and the barriers of time, access, and support?

Significance of the Study

The results of this study will be significant in determining if technology education teachers receive adequate training and support for them to successfully integrate technology into their curriculum. School districts will be able to use this information to conduct their own studies for identifying deficits and barriers that may exist regarding the integration of computer and Internet skills into classroom instruction. Finally, this study may draw attention to the need for further research into technology integration issues in public education as technology skills become increasingly important for students.

Limitations of the Study

1. Teachers' perceptions of technology training and support can be subjective.
2. The selection of survey participants was not entirely random.
3. Constraints of time for completing this study.
4. Limited resources and studies have been done previously on this topic.
5. The sample return rate limits the reliability of the results.

6. The level of integration by teachers cannot be accurately measured by the instrument used in the research.
7. The level of technology integration that is necessary for student success beyond high school goes beyond the scope of this paper.
8. The type and quality of technology training teachers received will not be known.
9. Various interpretations of technology by teachers may reduce the accuracy of the findings.
10. Only technology education teachers in Wisconsin were used for this study.

Assumptions of the Study

1. Technology literacy is important for high school graduates. The emphasis on technological know-how for persons entering the workforce today is increasing as technology continues to pervade all aspects of work. Thus, it is important for graduating students to possess technological skills in order for them to compete successfully for rewarding careers.
2. The degree of technology integration in the classroom is the key to accomplishing item 1. Technology skills are not acquired automatically; they must be learned through exposure and practice. Furthermore, these skills are constantly changing as technology continues to advance. Therefore, it is imperative that students acquire sufficient technology knowledge before leaving high school to enter the workforce or seek advanced degrees.
3. Technology integration is likely insufficient to date, therefore there is a need to improve. Industries are complaining about the lack of candidates with technology

skills within the United States to fill positions requiring these skills. Therefore, foreign workers with technology knowledge are being imported to help meet the demand. Furthermore, there is speculation that manufacturers may be forced to relocate outside of the U.S. if they cannot fill positions with qualified candidates from within the country. Thus, it appears that U.S. students are not acquiring adequate technology proficiency while candidates from outside of the United States are. As companies hire foreign workers or move operations out of the country, fewer jobs will be available to people within the United States. Therefore, it is important for schools to integrate technology into the curriculum to empower the future workforce with the skills that are becoming increasing necessary to compete in the global markets.

4. The purpose of the survey is to identify barriers to the adoption of technology literacy objectives. Before teachers can impart technology knowledge to their students, the teachers must first overcome barriers that inhibit the integration of technology into their curriculum. Several potential barriers are assumed to come into play that will prevent teachers from integrating technology into instruction. First, many technology education teachers will not believe that technology integration can enhance their learning objectives. Second, other technology education teachers will feel that technology know-how is not an important skill for students to possess. Third, it is likely that teachers are not provided with adequate time for developing technology integrated units. Fourth, the access to computers or the Internet may not be sufficient for incorporating technology into instruction. Fifth, before teachers can be expected to use technology in their instruction they must also be technology literate. Therefore,

teachers must be offered sufficient training on how to use and integrate technology into classroom instruction. Finally, teachers will be reluctant to use technology if the support they have is lacking or non-existent. Teachers are more likely to use technology in instruction if they know that help will be readily available when a problem occurs.

Definition of Terms

1. Internet - The World Wide Web used to connect computers from around the world to numerous informational sites.
2. Outsourcing - Work that is done by people other than the original company=s employees.
3. Skilled Worker – A person who is able to apply an extensive array of skills and know-how to non-repetitive work with limited direction and supervision.
4. Technology - For the purposes of this study, technology will be defined as any electronic device or media that is used to achieve instructional goals and objectives, such as computers, software, and the Internet.
5. Technology Integration - Learning with, not about, technology to achieve course objectives.
6. Technology Literacy - The ability of an individual, working independently or with others, to use tools, resources, processes, and systems responsibly to access and evaluate information in any medium, and to use that information in any medium, and to use that information to solve problems, communicate clearly, make

informed decisions, and construct new knowledge, products, or systems (Wisconsin DPI, n.d.).

7. Unskilled Work - Work that can be learned in a short time and requires little or no independent judgment (French & Saward, 1975).
8. World Wide Web – A global network that interconnects computers and websites.

Introduction to Methodology

The participants in this study were technology education teachers attending the Stout Technology Education conference in Menomonie, Wisconsin. A questionnaire was completed by each participant to collect information about their technology integration practices, technology integration training, and perceptions of technology as an instructional tool. Data was then analyzed to determine relationships between technology integration practices and the technology integration training and support that teachers receive. Survey items allowed for comparison of other variables such as age, gender and community size. The survey was conducted on October 15, 2004 at the Stout Technology Conference in Menomonie, Wisconsin.

CHAPTER 2

Review of Literature

Introduction

This study sought to identify the relationship that exists between the technology-related training that technology education teachers receive and how it impacts their use of technology as an instructional tool. In addition, research was conducted to determine the barriers that may exist towards the integration of technology into classroom instruction. This segment of the report reviews previous studies that are related to the use of technology in the classroom. These studies explore the perceptions and practices of technology integration by teachers and identify barriers that impede the integration of technology into classroom instruction.

Attitudes Towards Technology

In the spring of 2001, the International Technology Education Association [ITEA] commissioned a Gallop poll to measure Americans' opinions regarding their knowledge of, and attitudes toward, technology (Rose & Dugger, 2002). The results showed that Americans strongly supported including technology literacy as part of the educational curriculum. Approximately half of the respondents (51%) felt that technology should be a required subject in public education. Moreover, two-thirds of the study participants felt that technology should be integrated into other subjects. In fact, the support is growing worldwide to include the study of technology in all grades (Dugger, 2001). Furthermore, many believe that technology literacy should be evaluated as a part of high school graduation requirements (Rose & Dugger).

Currently, the U.S. is facing a shortage of technology-literate workers and industries are importing foreign labor to offset these shortages (Vaas, 2000). Wisconsin businesses are included in the shortage. Between 2000 and 2002, more than 3000 Wisconsin companies applied for H-1B visas to import foreign labor (Wisconsin Department of Workforce Development, 2003). According to the ITEA study, most people (92%) felt that increasing technology literacy through schools is preferable to importing foreign labor (Dugger, 2001). This study provides clear evidence that there is a need to improve the technology literacy of Americans and that the public strongly supports doing this by integrating technology into public education.

Technology Education

Courses in Technology Education have the potential to improve the technology literacy rate. Technology Education encompasses a broad range of technology skills that are incorporated into many courses, which include woodworking, welding, computers, aviation, construction, photography, computer-aided drafting, and graphic communications. Nonetheless, the knowledge and skills that are taught can vary extensively from one school to the next depending on the courses that each one offers. This broad range of skills encompassed by Technology Education along with the variance of offerings between schools can lead to inconsistent goals and expectations regarding the Technology Education curriculum. These factors along with the effects of the varying definitions applied to technology integration can influence the frequency and level of technology integration in the Technology Education curriculum.

Defining Technology Integration

Various definitions and views of technology exist at this time. Approximately 75% of Americans believe that they are able to understand and use technology (Rose & Dugger, 2002). Nevertheless, this interpretation of technology is based on the general population's definition of technology, which is limited to thinking merely about computers and the Internet. The definition generally accepted by experts is that "technology is the knowledge and processes that people use to extend human abilities to satisfy our wants and needs" (Dugger, 2001). The researchers of the ITEA study define technology as "one's ability to use, manage, assess, and understand technology" (Rose & Dugger). As stated previously, the general public's definition of technology is limited to computer and Internet use. Thus, research experts and the general population define technology differently. The lack of a clear definition that is widely accepted for technology integration is a potential limitation to achieving technology literacy.

Moreover, the definition of technology integration varies between teachers. In a study conducted in 1999 by Ertmer, Addison, Lane, Ross, and Woods, teachers were asked to report their individual definitions of technology integration, which resulted in a variety of definitions. Some teachers felt that simply having students use computers was sufficient to be considered as technology integration. Others believed that integrating technology involved using computers to supplement instruction, and a few responded with the accepted definition, which is defining technology integration as infusing computers and the Internet into the existing curriculum.

National Technology Literacy Standards

National and state standards have been developed to more clearly define technology education. The International Technology Education Association [ITEA] developed technology literacy standards in 1999 to provide consistency for teaching technology literacy objectives.

They are called Standards for Technological Literacy: Content for the Study of Technology (Dugger, 2000). The standards define what kindergarten through high school students need to know to be considered technologically literate. A technologically literate student is one who understands what technology is, how it was created, and how it has been shaped, as well as how it shapes society (Dugger, 2001).

The ITEA also developed the Technology for All Americans Project to create content standards for technology education for grades K-12 (Dugger, 2000). The project consisted of three phases. The first phase, Technology for All, stresses the importance for all Americans to understand that technology is more than just computers and the Internet, but also includes the nature, behavior, power, and consequences of technology. In the next phase, Standards for Technological Literacy: Content for the Study of Technology, 20 technology content standards were developed and divided into grade levels of K-2, 3-5, 6-8, and 9-12. The standards cover five areas: the Nature of Technology, Technology and Society, Design, Abilities for a Technological World, and The Designed World. These standards define content relationships for students to discover and understand, including; the characteristics and principles of technology; cultural, social, economic and political effects; troubleshooting; research and development; invention and innovation; experimentation; use and maintenance; and the vocational areas of technology, such as construction and manufacturing.

Wisconsin's Technology Literacy Standards

In addition to the national standards, the Wisconsin Department of Public Instruction [Wisconsin DPI] has developed Wisconsin's Model Academic Standards for Information and Technology Literacy, which set expectations for students in the areas of designing, developing,

and utilizing technological systems. The standards promote open-ended, problem-based design activities for learning to apply technological knowledge and processes to real world experiences using up-to-date resources.

Wisconsin also has developed technology literacy standards for technology education courses. The Wisconsin Department of Public Instruction states that technology education must go beyond constructing physical objects and that students must develop an understanding in the categories of the nature of technology, technological systems, design and ingenuity, and the impact of technology (Wisconsin DPI, n.d.). These content standards have been written to provide clear expectations for the curriculum content of technology education courses so that all students have the opportunity to develop sufficient technological skills.

Technology Standards Implementation /Adoption

Technology standards are only effective if they are adopted by the school districts and incorporated into instruction by teachers. This was the premise of a study that was designed to measure the extent to which schools implemented the national standards for technology literacy into instructional practices. The survey instrument was divided into six categories (1) basic operations and concepts, (2) social, ethical, and human issues, (3) technology productivity tools, (4) technology communication tools, (5) technology research tools, and (6) technology problem-solving and decision-making tools (Barron, Kemker, Harmes, & Kalaydjian, 2003). The results showed that elementary teachers were twice as likely to use computers for problem-solving or communication as high school teachers. The researchers concluded that many teachers were integrating technology for advanced research and problem-solving skills, but the goal to have teachers across all grade levels and subject areas integrate technology has not yet been attained.

Furthermore, elementary teachers appear to be better than high school teachers at incorporating higher-level technology skills, such as using technology-related activities for research and problem-solving activities.

In another survey, teachers, administrators, and guidance counselors were asked to prioritize 40 statements pertaining to technology education. Overall, the importance of the statement, "Technology education is guided by technological literacy needs" ranked near the bottom, placing 30th out of the forty items on the questionnaire (Hill, Wicklien, & Daugherty, 1996). Furthermore, the results for principals and technology education teachers both ranked this statement 28th. The results indicate that teachers, administrators, and guidance counselors do not assign a high priority towards incorporating technology literacy into technology education. The low importance given to technology literacy by key personnel may inhibit technology integration in technology education.

Frequency of Integration

According to studies, many teachers have not adequately introduced technology skills to their students. In a study conducted by The National Center for Educational Statistics [NCES] in 1999, the frequency and use of computers and the Internet for instruction by teachers was measured (Smerdon & Cronen, 2000). Nearly all teachers in public education (99%) reported that they had access to computers in their schools, but only half with access to computers or the Internet used those resources for instruction. Of these teachers, about half used computers for the following activities: Internet research, drill and practice, analyzing data or problem-solving. Sixty-one percent of the teachers reported using spreadsheets and word processing software for student assignments. This study also found that teachers are more likely to use computers if they

are located in the classroom. Furthermore, elementary teachers are more likely to use computers with their students, but high school teachers are more likely to use the Internet when compared to elementary teachers. Overall, teachers with fewer years of teaching experience are more likely to use computers or the Internet for instruction.

The results of this study show that some of the national content standards for technology literacy are being put into practice, but the implementation varies in degree across grade levels and subject areas, and only a few of the measured items reached much beyond 50% (Smerdon & Cronen, 2000). This further illustrates that technology literacy for all students is not being met. This study did not include vocational education teachers.

Perceptions of Technology

Five assertions were developed from a study regarding how teachers learn about and view technology as a tool for instruction (Pierson, 2001). The first assertion is that teachers determine how to use technology based on their perceptions of technology. A few teachers identify technology by what it is, and not by how the technology may compliment the curriculum. In this case, the technology component is treated as separate from the regular course content. Therefore, some teachers believe that students surfing the Internet is integration. Other teachers will organize classroom activities around a software that is somewhat connected to course objectives, but not clearly enough tie the two together to meet the lesson's goals. Therefore, the technology component is not viewed by teachers as being equal to other instructional tools. The optimum is to view technology as a tool to be incorporated into instruction when it is appropriate and beneficial.

Teachers who successfully integrate technology into their curriculum will first review the content objectives and then determine how computers, or other technology, can be used to cover the content (Pierson, 2001). Thus, technology does not serve as a supplemental or separate part of instruction. Moreover, if a teacher determines that the content could be covered more effectively through other means, the computer is not used. To use technology effectively, teachers must view technology as an integral part of instruction. They must also know when technology will benefit instruction or when other means will be more effective.

Teaching Experience / Technology Experience

The second assertion of the Pierson (2001) study is that teachers with limited teaching or technology skill will either avoid using technology, or change their lesson planning strategy when technology is incorporated into a lesson. Expert teachers are not necessarily experts at using computers for classroom instruction. If a teacher is unfamiliar with the technology to be used for instruction, he or she is likely to present the information in ordered and sequential steps. Therefore, instruction does not flow as smoothly as it would if the same teacher used familiar methods. Next, a teacher with limited technology integration experience will tend to follow the scope and sequence outlined in books or other sources that are not designed for use with technology. Therefore, the teacher is not able to accurately judge how well learning objectives will be met with the technology-integrated lesson.

Findings reveal that teachers who are adept at integrating technology not only spent a good deal of personal time working with computers but also have more extensive computer training, teaching experience, and higher levels of creativity and confidence (Pierson, 2001). These teachers are also surrounded by colleagues who use computers for practical activities,

enjoy school, have sufficient staff development opportunities, and district-level support for using technology. Therefore, it is important to promote opportunities that will increase the level of training and support that teachers receive towards using technology.

Teachers who successfully use computers for instruction also share other common traits, such as planning for frequent computer use and consistently using technology as a tool for a variety of instructional goals (Pierson, 2001). They also maintain higher expectations for student learning and believe that they can address individual learning needs with computers. Finally, these teachers deliberately revise existing curriculum using their professional judgment to mentor students in learning and group activities.

Preferred Style of Learning / Teaching

The third assertion of this study is that teachers will teach about, and with, technology using their preferred style of learning (Pierson, 2001). If a teacher likes to learn by exploring with no structure or planning, then they are more apt to teach in this manner. On the other hand, if the teacher prefers to learn using structure and a series of organized steps, then they are more likely to present information in a structured and sequential manner. Finally, the teacher who prefers to learn through a variety of methods to gain a better understanding of technology at the conceptual level is unlikely to focus instruction on a series of steps for students to follow. Instead, the teacher will gear instruction to allow students to develop an understanding of technology through a variety of strategies, including independent study, teacher assistance, textbooks, and classmate assistance.

Technology Integration Management

The fourth assertion is that the various interpretations teachers attach to technology integration will influence how they manage students' use of computers (Pierson, 2001). Teachers who view computer use as a supplement or reward will generally only allow students to use computers outside of regularly class instruction and for limited periods of time. Thus, time spent on computers will be outside of normal lesson activities and integration will not occur. On the other hand, the teachers who view technology as a learning tool will incorporate computers into regular instruction, but only when they can effectively be used to meet course objectives.

Technology Assessment

The fifth assertion of this study is that teachers with limited teaching or technology integration skills will modify how they assess students when technology tools are used for instruction (Pierson, 2001). First, if the teacher does not view computers as a teaching tool, they are not as likely to use the computers for instruction, nor will they evaluate the students' computer use. Second, if the teacher has expertise with technology, but limited teaching experience, he or she may not be able to accurately assess learning that has occurred with the technology integrated lesson. Third, an experienced teacher with limited technology skills may not recognize how technology can be used along with other teaching tools to meet instructional goals, and view technology as a separate component or activity. Therefore, the evaluation of the students' work may be based on use of the technology, but not the content of the work completed using the technology. Finally, experienced teachers with proficient technology integration skills will view technology as an instructional tool and assess the students' work based on the course content and not on their computer skills.

This study found that the success of incorporating technology into instruction is largely determined by teaching experience and attitudes towards technology, as well as how the teacher defines technology (Pierson, 2001). Technology literate teachers will not automatically know how to integrate technology into their instruction successfully if they are lacking in teaching experience, or if they view technology as a supplement or reward to regular course work. In contrast, teachers who are experienced with teaching and technology tools, and believe that technology can enhance course objectives, will likely be able to decide when and how to use technology to improve instruction. Teachers may understand the importance and relevance of incorporating technology into instruction, but they may not have the experience or understanding about how to do it. Like their students, teachers cannot be expected to make giant leaps within a short timeframe towards technology integration.

Technology Training

The pre-service training that future teachers receive has the potential to help them integrate technology if they have exposure to technology tools during training. A nationwide study that examined the exposure to technology received by vocational teachers discovered that the traditional computer tools, especially word processing, are receiving regular use in the teacher training programs (Miller, 1997). Nevertheless, newer technologies such as authoring software and multimedia applications are not yet integrated into the pre-service curriculum on a regular basis. The results of this study appear to show that teachers in training are not adequately trained or prepared for integrating technology before they begin their teaching assignments.

The greatest barrier to technology integration reported by one study was lack of training (Fatemi, 1999). Teachers cannot be expected to know how to integrate technology without

training. The more training that teachers receive, the more likely they are able to incorporate technology into classroom instruction. Another study reported that about one-third of teachers felt that they were prepared for integrating computers or the Internet into instruction (Smerdon & Cronen, 2000). The years of teaching experience does not appear to be a factor with technology integration. However, the more experienced teachers attended technology-related professional development more frequently than the less experienced teachers, and professional develop attendance has shown to increase technology integration (Smerdon & Cronen). Nevertheless, the less experienced teachers reported that they felt better prepared to use technology. In any case, it is reasonable to presume that the teachers who feel better prepared to use technology are more likely to use it. Fatemi (1999) reports that teachers who have received technology-related training are much more likely to integrate technology into instruction. Most teachers reported that they prepared for using technology through independent learning. Professional development training was the second most common training format followed by help from colleagues. Half of the teachers reported that college or graduate studies provided sufficient training, with the less experienced teachers being more likely to report that post-secondary education prepared them for integrating technology.

Wisconsin Technology Education Certification Courses

In Wisconsin, two public universities' offer certification programs to train and certify technology education teachers, the University of Wisconsin - Stout [UW-Stout] (http://www.uwstout.edu/ug/bulletin/ug_teced.html) and the University of Wisconsin-Platteville [UW-Platteville] (http://uwplatt.edu/ind_studies/wite.html). Additionally, the private Viterbo University (http://www.viterbo.edu/ug/education/programs.html) offers a program for

Technology Education certification. Each of the Technology education curriculums of the universities certification programs in Wisconsin currently stresses technology literacy. The technical emphases of courses at Viterbo University are in the areas of Manufacturing/Engineering, Construction/Woods, Graphics/Communication, and Power/Energy, along with courses in computer information systems or digital media. At UW-Stout, the technical emphasis for the Technology Education certification program includes courses in the categories of Design & Engineering, Graphic Communications, General Technology, Architecture & Construction, Telecommunications, Energy & Power Mechanics, Automation & Manufacturing, and Electronics & Computers. UW-Platteville states that their primary goal is to promote technology literacy. The coursework taken by Technology Education majors at UW-Platteville includes the areas of Graphic Communication, Material Processing, Computer Aided Drafting and Design, Power Systems and Controls, Construction Materials and Processes, and Educational Theory and Practice.

The present curriculum for Technology Education at UW-Stout, UW-Platteville, and Viterbo University emphasizes technology literacy. Nevertheless, it is not known how long the emphasis in technology literacy has been influencing their curriculum. Furthermore, many of the current technology education teachers in Wisconsin received their college degrees and certifications before the current technological skills were considered essential skills to possess. Therefore, it is reasonable to assume that the veteran technology education teachers did not have access to, or gain skills with, the technology tools that are considered essential today. Since, the skills acquired during their college experience are now outdated, an important factor to consider is ongoing training to keep teaching skills current.

A search of the Education Communication Board (http://www.ecb.org/ttt/conferen.htm) website shows that numerous workshops are available to teachers throughout Wisconsin. These workshops include the Wisconsin Educational Media Association Spring Conference [WEMA], Wisconsin Technology Education Association conference [WTEA], and the Governor's Educational Technology Conference [GWETC]. A review of the technology-related workshops offered at the GWETC conference includes sessions for videoconferencing, spreadsheets, hand-held computers (PDA), PowerPoint, ePortfolios, Kidspiration software, multimedia applications, and Internet-based enrichment activities. In addition, the Wisconsin Department of Public Instruction (http:www.dpi.state.wi.us) sponsors various technology-related workshops each year. For example, in 2004, the DPI sponsored a combined Information (Library Media) and Technology Plan to Support Student Learning workshop. Another program, TEACH Wisconsin (http://www.teachwi.state.wi.us/), provides training and financial support for telecommunications access, although teacher training grants are no longer a part of the TEACH program. Overall, many technology-related workshops and training opportunities are available to teachers each year in Wisconsin. As stated previously, research has discovered that pre-service training received by teachers was not adequately exposing them to technology (Miller, 1997). Nonetheless, it appears that current university curricula for technology education certification programs do expose pre-service teachers sufficiently to technology, and many technology workshops are available to provide training to keep skills current.

Barriers to Technology Integration

In addition to the lack of exposure with technology that veteran teachers may have experienced during pre-service training, other obstacles have been reported that have either

slowed or prevented technology content standards from being integrated into the curriculum. These barriers include lack of time, limited access, costs, lack of rationale for technology use, and lack of training and support (Miller, 1997). A separate study conducted by Ertmer et al. (1999) supported the same barriers, but also included lack of relevance, mismatch to management style, and lack of confidence. This study was limited to a small group of elementary teachers and compared the beliefs and practices that teachers maintain for integrating instruction as opposed to the Miller study, which was a nationwide study of vocational educators' practices with technology. The teachers in the Ertmer et al. study were in the same building, taught the same grade level, and had the same access to technology. The researchers used observation and interviews to gather information on teachers' attitudes, beliefs, and practices with regard to their use of technology in the classroom. The survey asked questions about the teacher's use of technology and their comfort level with word processing and instructional software.

Demographic information about the teacher's computer use and comfort was compared to their actual use in the classroom, and interviews with the teachers about their beliefs of technology integration were compared to actual technology use in the classroom (Ertmer et al., 1999). Additional demographic data was collected regarding years of teaching experience, computer experience, and goals for technology use in the classroom, as well as requesting teachers to supply their personal definition of technology integration. The length of the study was six weeks and the subjects of the study were seven K-2 teachers, all female.

Interestingly, the barriers identified in this study did not consistently result in identical outcomes for the teachers who were affected by the same barriers. Though teachers may have perceived the same barriers, their reaction to these barriers varied in regards to how they defined technology. The Ertmer et al. (1999) researchers proposed that the difference in integration by

teachers facing the same barriers rested in the individual teacher's belief about how well technology fit into their curriculum. Therefore, the individual teacher's attitude towards technology can affect how technology is used as a tool for instruction.

Lack of Time

As in other studies, the Ertmer et al. (1999) researchers reported that teachers indicated time as a barrier, but with different reasons depending on classroom practices. The teachers who used computers as an instructional tool did not perceive a lack of time. But those who used computers to supplement existing curriculum did indicate a lack of time. A different study reported that teachers complained about a lack of time for learning how to use computers or the Internet and for scheduling class time for computer use (Smerdon & Cronen, 2000). Teachers also reported that they often do not have the time to test or prepare instructional software (Fatemi, 1999). Consideration ought to be noted for teachers who have no intention of using computers for instruction, as they are not apt to indicate time as a barrier. Thus, it is important to recognize that there may be more than one reason why a teacher may not report time as barrier for technology integration.

Lack of Equipment / Access

The Ertmer et al. (1999) study found that most teachers complained about a lack of equipment. However, the reasons given for wanting more equipment varied from wanting individual computers for each student to work independently to having groups of students working on the same program. Most teachers wanted more computers, but their reasons varied based on how they structured computer work in their classrooms. Other studies study also

reported the lack of computers to be a major barrier (Fatemi, 1999; Smerdon & Cronen, 2000). The type of access to computers will affect the frequency of integration as well. Fatemi reported that most teachers have access to computers, but they are more likely to use them if they are located in the classroom. Teachers with six or more computers in the classroom reported much more frequent instruction using computers than teachers who have only one or two computers in their classrooms. Therefore, instructional use of computers will be more frequent if sufficient numbers of computers are located in the classrooms.

Attitudes & Beliefs

The findings of several studies identified that the key to integrating technology into the classroom appears to lie within the teacher's perception of technology. The perception of technology has been reported as a significant barrier to integration, as discovered with the Ertmer et al. (1999) and Pierson (2001) studies. Therefore, to be successful at integrating technology into instruction, ways must be found to change teacher's perceptions that are preventing them from using technology when it can enhance learning objectives.

Summary

While most Americans believe that technology literacy is an important skill for students to develop, studies show that several barriers exist that inhibit the integration of technology into classroom instruction. The factors that impede integration include; insufficient time, lack of equipment, limited access to technology, and limited support. The findings also indicate that attitudes, beliefs, teaching style, classroom structure, teaching experience, and the level of expertise with technology, can affect the level and frequency of technology integration.

Moreover, studies show that how teachers define technology affects how they incorporate technology into their instruction, and these interpretations often vary. Therefore, state and federal technology literacy standards have been written to clarify the skills and objectives that need to be met before students are considered to be technologically literate.

Teachers also need ongoing training and support to maintain sufficient technological know-how to successfully integrate technology into classroom instruction. Previous studies indicate that pre-service training for developing technology skills was lacking. However, a recent review of training and workshops available in Wisconsin indicates that the current technology education certification programs stress technology literacy, and that several technology-related workshops are available for teachers to attend each year for teachers to acquire or enhance their technology literacy.

Finally, teaching experience has been identified as a factor that affects the level and frequency of technology integration with veteran teachers being more likely to have success towards incorporating technology into their curriculum. Time may be the only cure for the limited teaching experience in regards to successful integration of technology, but continuing to update and improve the support and in-service training that exposes new and old teachers to methods for teaching with technology can do no harm.

CHAPTER 3

Methodology

Introduction

This is a descriptive study of technology education teachers in the State of Wisconsin. The research has sought to identify the relationships that exist between the technology-related training that technology education teachers receive and the frequency and level of integration used by them for instruction. This study was also designed to rate the teachers' perceptions of technology as a tool for instruction.

The methods and procedures used in this study are explained in this chapter under the headings of (1) research design, (2) sample selection, (3) item-by-item rational, (4) instrumentation, (5) procedures followed, and (6) data analysis.

Research Design

This study was designed to analyze factors that were reported to affect technology integration in previous studies. The factors that were found to affect integration during the literature review included teachers', perceptions, training, access, funding, support, time, and technological ability. These factors were then divided into the categories of perceptions, training, and practices. These categories are explained in detail in the following paragraphs.

The first category of perceptions toward technology was developed based on information from another study that found teachers' use of technology is affected by their individual perception of technology integration (Pierson, 2001). The Pierson study reports that teachers who believe technology is best used to support the curriculum will use it as a supplement, whereas

teachers who view technology as an instructional tool will incorporate technology into instruction. These findings are incorporated into this study by developing statements to rate perceptions of technology-related issues, and then analyze these ratings for relationships with technology integration training and practices. This study did not attempt to gather teachers' various definitions of technology.

The Pierson (2001) study also reports that the teachers' views of technology can influence how they assess student work that has been completed by using technology. Teachers who view technology as a supplement may only assess the use of technology and not the content of the work completed. Other teachers, who view technology as an instructional tool, will assess only the work content and not the technology skill. This study seeks to verify that a relationship may be present between the teachers' integration practices and the assessment of student work.

The second category of technology training is included because of previous research by Fatemi (1999) that reports a lack of technology training is the greatest barrier to the incorporation of technology. Another study by Smerdon and Cronen (2000) reports that approximately one-third of the teachers believe that they have sufficient skill for integrating technology. Therefore, this research seeks to analyze the relationship between technology-related training and technology integration by technology education teachers.

The third category of integration practices was developed, in part, on information by the Smerdon and Cronen (2000) study that reports most teachers have access to computers but only half use them for instruction. This same study finds that teachers are more likely to use computers for instruction if they are located in the classroom. Therefore, this study also focuses attention on the relationship between access and the incorporation of technology into instruction.

Sample Selection

The participants in this study are Wisconsin technology education teachers who attended the 51st Annual Technology Education Conference at UW-Stout on October 15, 2004. This conference was selected for conducting the survey after the pilot study results (see pilot study section in this chapter) indicated that a mailed state-wide survey would result in a low response rate at a substantial cost. Furthermore, time constraints necessitated that the survey be administered as soon as possible, and the date of this conference allowed sufficient time for completing the research by the December 21, 2004 deadline. The participants at the conference provided a sample of technology education teachers from a variety of school districts around the state and allowed the researcher to remain within budget constraints for administering the survey. Since participation in this study was voluntary, each participant was given $1.00 for returning their completed survey to boost the response rate. Fifty-four of the one hundred and fifty-eight technology education teachers in attendance at the conference returned a completed survey, which is a response rate of 34%.

Instrumentation

The instrument used for this study was a self-reporting questionnaire created by the researcher for the basis of correlation analysis between perceptions, training and practices related to technology integration by technology education teachers in Wisconsin (Appendixes B and C). A cover letter was included that explained the purpose of the survey, along with the informed consent statement and instructions for completing and returning the survey. The survey instrument was included in the registration packet that conference attendees received during registration. Each section of the survey instrument is described in more detail below.

The first section of the survey instrument was designed to gather demographic information related to the respondents gender, age, teaching experience, class size, grade level, and community size, as well as the number of teachers who work together in the technology education department. This information was included to determine if any of these demographic factors are related to perceptions or practices of technology integration.

The second section of the survey instrument included 24 statements to rate teachers' perceptions of technology-related items, including technology integration, technology literacy standards, assessment method, and access to technology, training, funding, reliability, and support. The respondents rated each statement on a Likert scale of one (1) to five (5), using the following designations of [1] strongly disagree, [2] disagree, [3] neutral, [4] agree, and [5] strongly agree. The five-point scale was selected to detect statements that the respondents may have a strong level of agreement or disagreement towards. These perception ratings were then analyzed for correlations to other data in the demographic, training and practice sections of the survey instrument.

The third section of the survey instrument included six multiple choice questions related to technology training and practices. Respondents selected answers about the frequency and level of integration training they received and how they used technology integration with classroom instruction. Previous studies indicate that teachers have not received adequate training for introducing technology to their students (Miller, 1997; Fatemi, 1999; Smerdon & Cronen, 2000). Therefore, survey items regarding training and technology ability were also developed to determine the relationship between these items and technology integration.

An attempt was made to maintain the content validity of the questionnaire by adapting statements from previous technology-related survey instruments. Many survey questions were

developed based on the Miller (1997) and Ertmer, Addison, Lane, Ross, and Woods (1999) studies that researched barriers to integration. Other instruments adopted and adapted into this research were developed by R. Christensen and G. Knezek, researchers for the Texas Center for Educational Technology at the University of North Texas. The titles and links to these instruments are listed below.

1. Social Distance Questions
   (http://www.tcet.unt.edu/research/online/views.htm)
2. Taking Technology=s Temperature
   (http://www.tcet.unt.edu/research/online/snapshot.htm)
3. StaR Chart Self Diagnostic Tool (http://www.tcet.unt.edu/research/online/schart.htm)
4. Teachers= Attitude Toward Computers 5.1
   (http://www.tcet.unt.edu/research/online/tac51.htm)
5. Teachers= Views of Technology in Teaching
   (http://www.tcet.unt.edu/research/online/views.htm)

Selected items from another survey instrument used to measure technology integration practices were also incorporated into the instrument used with this study. The StEPs Consortium, which consisted of the Stoughton, Evansville, and Parkview school districts, developed the instrument. This researcher was a member of the consortium and participated in the development of the instrument. A copy of this instrument is included in this report (Appendix D).

Pilot Study

After approval from the UW-Stout Investigation Review Board (IRB), a pilot test of the survey instrument was conducted using the Zoomerang (http://www.zoomerang.com) online

survey service. The pilot survey was administered during the second week of September in 2004. Using the list of certified high school technology education teachers provided by the Wisconsin Department of Public Instruction, 12 teachers were selected and asked to participate in the online survey. Only three of the 12 responded indicating that they would be willing to participate. The non-respondents were dropped from the sample, and another random sample of 9 teachers was drawn from the list. Each teacher was sent a link to the online survey and asked to complete the questionnaire. A reminder was also sent after four days asking teachers to complete the survey if they had not already done so. The response rate to the online pilot study was low with only three teachers completing the survey. Item number 25 in the survey was reworded for clarity after collecting and analyzing responses from the pilot study. A copy of the survey instrument is included with this report (Appendices B, C, and D).

Research / Survey Question Matrix

The matrix shown below provides a list of the three research questions along with their corresponding survey questions. Other questions that were included in the survey instrument are based on factors found to influence technology integration by previous studies reported in the literature review. These survey questions are listed in the matrix with their corresponding category. Each survey question is listed with the number that corresponds to it in the survey instrument.

Research Questions / Category	Survey Questions
1. What is the relationship between technology training and integration	29. In the past year, how many technology-related in-services, workshops or training

practices?	sessions did you attend?
2. What is the relationship between perceptions of technology and integration practices?	6. Technology integration helps students achieve course objectives
3. What is the relationship between the integration of technology and the barriers of time, access, and support?	22. I have sufficient time for integrating technology into my curriculum 23. A fair and equitable system for computer use is in place and enforced 24. When I need help with a computer problem, it is readily available
Perceptions of Technology – Incentives Supporting Integration	1. My district has provided convincing reasons for integrating technology 5. Technology integration increases student interest in course content 7. Technology devices improve the achievement of special needs students 14. I am provided sufficient incentives for attending technology-related training 15. Sufficient technology training is offered relevant to my content area
Perceptions of Technology – Incentives Supporting Integration (Continued)	16. Attendance at technology-related workshops or seminars is required of me 17. Funding for purchasing software and

	technology equipment is adequate 18. Funding for participating in technology-related training is adequate
Perceptions of Technology – Technological Knowledge	2. I am familiar with Wisconsin's Technology Literacy Standards 3. I am familiar with the national standards for technology literacy 21. I currently possess sufficient technical knowledge for integrating technology
Perceptions of Technology – Integration & Assessment	4. I always incorporate the technology literacy standards into my curriculum 8. I do not assess my students' use of technology – it is only a tool for learning
Perceptions of Technology – Technological Ability	9. I am proficient in productivity software 10. I am proficient in graphics applications 11. I am proficient in interactive technologies 12. I am proficient in Telecommunications 13. I am able to locate and acquire software that is appropriate for instruction 28. Rate you ability level for using technology, such as computers, for classroom instruction.
Perceptions – Dependability of Technology	19. The speed and convenience of our computers is satisfactory for instruction

	20. Computer equipment and software has been reliable and trouble-free
Training & Practices with Technology - Frequency of Integration	25. On average, how often do you incorporate technology-related activities into your lessons?
Training & Practices with Technology - Level of Integration	26. How do you use technology, such as computers or the Internet, with your classroom instruction?
Training & Practices with Technology - Location of Instruction	27. Where do you typically conduct instruction that involves computer use or the Internet?
Training & Practices with Technology - Technology Training	30. In the past two years, which technology-related offerings have you attended?

Item-by-Item Rational

Below is an item-by-item rationale for each question in the questionnaire is given. Items numbered 1 to 24 relate to teacher's perception of technology-related items. Item numbers 25 to 30 are related to teachers' technology-related training and practices.

1 "My district has provided convincing reasons for integrating technology." This question was included to determine if school districts have made successful attempts to convince teachers to adopt technology integration methods.

2 "I am familiar with Wisconsin's Technology Literacy Standards." This item was added to learn if teachers are familiar with state academic standards that have been developed that define technology literacy.

3 "I am familiar with the national standards for technology literacy." This item was added to learn if teachers are familiar with national academic standards that have been developed that define technology literacy.

4 "I always incorporate the technology literacy standards into my curriculum." Item 4 was included to determine the frequency that teachers believe they incorporate technology standards into their curriculum.

5 "Technology integration increases student interest in course content." Item 5 was included to determine if teachers' view of technology relates to integration practices.

6 "Technology integration helps students achieve course objectives." This statement determines the correlation between teachers' perceptions of technology with the frequency and level of integration used with instruction.

7 "Technology devices improve the achievement of special needs students." Item 7 determines whether teachers believe that technology is beneficial for students with special needs.

8 "I do not assess my students' use of technology – it is only a tool for learning." Item 8 determines if the technological ability of technology education teachers is related to their assessment methods used to evaluate work completed using technology.

9 "I am proficient in productivity software." (Word Processing, Spreadsheet). Item 9 was included to determine the technological ability of the respondents regarding productivity software

10 "I am proficient in graphics applications." (PowerPoint, HyperStudio). Item 10 was included to determine the technological ability of the respondents regarding graphics software.

11 "I am proficient in interactive technologies." (CD-Rom, Multimedia). The reason this item was included is to determine the technological ability of the respondents regarding interactive instructional software.

12 "I am proficient in Telecommunications." (Internet, E-mail)

Item 12 was included to determine the level of proficiency that teachers generally have regarding telecommunications applications.

13 "I am able to locate and acquire software that is appropriate for instruction." Item 13 was added to determine whether the inability to access software may be a significant barrier to integration.

14 "I am provided sufficient incentives for attending technology-related training." Item 14 was included to learn if teachers' frequency of training is related to incentives to do so.

15 "Sufficient technology training is offered relevant to my content area." Item 15 was added to determine whether the technology training available is compatible with the technology education curriculum.

16 "Attendance at technology-related workshops or seminars is required of me." This statement was included to determine how frequently districts have policies in place requiring teachers to maintain or improve their technology skills.

17 "Funding for purchasing software and technology equipment is adequate." Item 17 was included to determine if a lack of funding for software and equipment acts as barriers towards technology integration.

18 "Funding for participating in technology-related training is adequate." Item 18 was included to determine if funding for training is a significant barrier to technology integration.

19 "The speed and convenience of our computers is satisfactory for instruction." Item 19 was added to determine if location and speed of computers is conducive for instructional purposes and related to the level and frequency of integration.

20 "Computer equipment and software has been reliable and trouble-free." Item 20 was included in the survey to determine whether the reliability of software and computers is satisfactory for instructional purposes and related to the level and frequency of technology integration.

21 "I currently possess sufficient technical knowledge for integrating technology." This item was included to determine if technology integration is related to the technology literacy of teachers.

22 "I have sufficient time for integrating technology into my curriculum." This item was included because several previous studies report time as a barrier towards technology integration. Therefore, this question seeks to determine whether time is related to the frequency and level of technology integration.

23 "A fair and equitable system for computer use is in place and enforced." This item was included to determine if access to computers is related to the level and frequency of integration.

24 "When I need help with a computer problem, it is readily available." Item 24 was included to determine whether concerns regarding problems with technology may be related to the frequency and level of integration.

25 "On average, how often do you incorporate technology-related activities into your lessons?" This question was included to determine if the frequency of integration relates to the level and practices of technology integration.

26 "How do you use technology, such as computers or the Internet, with your classroom instruction?" This question was included to determine the correlation between integration and training.

27 "Where do you typically conduct instruction that involves computer use or the Internet?" This question was included to determine whether teachers often have computers in their classrooms and if this factor is related to the frequency and level of technology integration.

28 "Rate your ability level for using technology, such as computers, for classroom instruction." Item 28 was included to determine if training, integration and perceptions of technology were related to the perceived technological ability level of the teachers.

29 "In the past year, how many technology-related in-services, workshops or training sessions did you attend?" Item 29 was included to determine if the type of technology-related training is related to the frequency and level of integration.

30 "In the past two years, which technology-related offerings have you attended?" Item 30 was included to determine if frequency of attendance at technology-related training sessions may be related to the frequency and level of integration practices by teachers.

Procedures Followed

The survey was administered on October 15, 2004, at the UW-Stout Technology Education Conference in Menomonie, Wisconsin. Surveys were included in the 150 registration packets that teachers received while registering for the conference. Additional surveys were supplied by the researcher to accommodate shortages, or to replace lost, or missing, surveys. No effort was made to pressure any teacher to complete the survey. The researcher was located at a table located near the registration area during the conference to collect completed surveys and to answer questions that the teachers may have had while completing the questionnaire. Participants who returned their completed surveys were given $1.00. Participants were also provided with the mailing address for the researcher if they were unable to return their survey during the conference.

Data Analysis

Data from this survey instrument was compiled using the following procedures. The completed surveys were taken to Amy Gillett, professor at UW-Stout, for data analysis using SPSS software to perform a Pearson 2-tailed correlation on the data. All items on the questionnaire were included in the correlation analysis. The results were used to determine relationships between training and technology integration by technology education teachers.

Research questions checked for relationships between (1) integration frequency and level vs. technology-related training, (2) perceptions vs. frequency and levels of integration, and (3) frequency and level of integration vs. time, access, and support. Relationships were tested using Pearson's 2-tailed correlation analysis.

CHAPTER 4

Findings and Analysis

Introduction

The purpose of this study was to determine if technology-related training was a factor in teachers' perceptions and practices of technology integration. Data was analyzed for correlations using the Statistical Package for the Social Sciences (SPSS) software. The results of the descriptive survey are presented below under the headings of (1) rate of response, (2) results, (3) demographics, (4) technology perceptions, (5) technology training & practices, and (6) evidence.

Rate of Response

The Stout Technology Conference at UW-Stout in Menomonie, Wisconsin, was selected for conducting the survey after the pilot study results (see pilot study section in chapter 3) indicated that a mailed state-wide survey would result in a low response rate at a substantial cost. Furthermore, time constraints necessitated that the survey be administered as soon as possible, and the October 15, 2004, date of the technology conference allowed sufficient time for completing the research by the December 22, 2004 deadline. Surveys were handed out to 158 technology education teachers attending the conference. Fifty-four complete surveys were returned for a response rate of 34%.

Results

The data listed in the following tables provides an item-by-item report of the survey findings. The tables show each question along with the frequency and percentage calculations of

the responses. The valid response rate, which is calculated by excluding missing or invalid responses, is included in the tables with missing responses.

Demographics

Respondents were asked to supply demographic data indicating gender, age, teaching experience, class size, grade level, number of technology education teachers and community size. The demographic data was calculated using multiple choice selections to yield data on a nominal scale of measurement. Demographic results are shown in Tables 1 through 8.

The results of Table 1 show that the majority of attendees (82%) at the Stout Technology Conference were graduates of UW-Stout. Two other respondents indicated that they will be graduating from UW-Stout in the near future. The remaining respondents results are as follows: One respondent graduated from the University of Concordia, two from the University of Minnesota, another from Winona State University, one from St. Cloud State University, and one response was illegible. This survey question was included to help determine the profile of the respondents.

Table 1: Stout Grad?

Stout Grad?	Frequency	Percent	Cumulative Percent
[0] Yes	45	81.8	81.8
[1] No	10	18.2	100.0
Total	55	100.0	

Table 2 shows the return rate comparison by gender. This item was included to help with developing a profile of the survey participants. The vast majority (94%) of respondents in this study are males. Only three (6%) of the respondents in this study indicated that they are female.

Table 2: Gender

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
[0] Male	49	89.1	94.2	94.2
[1] Female	3	5.5	5.7	100.0
Missing	3	5.5	---	
Total	55	100.0		

There is a common belief that teachers, especially older teachers, are resistant to incorporating new technologies into their curriculum. The purpose of this question was to determine if age was a factor in the perceptions and practices of technology integration. Table 3 shows that there is close to an even spread in the age categories of the respondents.

Table 3: Age

Age	Frequency	Percent	Cumulative Percent
20-29	12	21.8	21.8
30-39	13	23.6	45.5
40-49	15	27.3	72.7
50 or more	15	27.3	100.0
Total	55	100.0	

The teaching experience of the study participants is listed in Table 4. A study by Smerdon and Cronen (2000) reported that teachers with fewer years of teaching experience are more likely to use computers with instruction. However, another study reported that teachers with limited experience are less likely to use computers with instruction (Pierson, 2001). This item was included to analyze the relationships between teaching experience and technology integration practices.

Table 4: Teaching Experience

Experience	Frequency	Percent	Valid Percent	Cumulative Percent
0-3	11	20.0	20.4	20.4
4-12	21	38.2	38.9	59.3
13-22	14	25.5	25.9	85.3
23 or more	8	14.6	14.8	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

The typical class size reported by the respondents is listed in Table 5. The class size of zero was included to filter out any returns from non-teachers or retired teachers at the conference. Nonetheless, all respondents are actively teaching. The most common class size has 16 to 20 students. No previous studies were found that analyzed the impact that class size has on the incorporation of technology into instruction. This item was included to analyze the relationship between class size and technology integration practices.

Table 5: Average Class Size

Class Size	Frequency	Percent	Cumulative Percent
[0] 0	0	0.0	0.0
[1] 1-10	3	5.5	5.5
[2] 11-15	5	9.1	14.5
[3] 16-20	20	36.4	50.9
[4] 21-25	16	29.1	80.0
[5] 26 or more	11	20.0	100.0
Total	55	100.0	

Table 6 lists the frequency and percent of the grade levels that are taught by the respondents in this study. Most respondents reported that they are teaching high school. The purpose of this question was to help understand the characteristics of the respondents in this study. Several of the respondents reported teaching at more than one grade level, which causes the number of responses in the frequency column to be greater than the number of respondents and the percentage to equal more than 100%.

Table 6: Grade Level Taught

Grade Level	Frequency	Percent
Middle School	27	49.1
High School	45	81.8
Post High School	5	9.1
Total (N = 55)	77	---

Table 7 provides information on how many technology education teachers the respondents work with in their building or department. This item was included to determine if the size of the technology education department is related to the frequency or level of technology integration due to support that colleagues may provide to each other.

Table 7: Number of Tech Ed Teachers

Tech Ed Teachers	Frequency	Percent	Valid Percent	Cumulative Percent
[0] 1	16	29.1	30.2	30.2
[1] 2-3	13	23.6	24.5	54.7
[2] 4-5	15	27.3	28.3	83.0
[3] 6 or more	9	16.4	17.0	100.0
Missing	2	3.6	---	
Total	55	100.0	100.0	

The results of the community size where the respondents serve are shown in Table 8, which is shown at the top of the next page. The results indicate that slightly more than half (56%) of the respondents teach in rural-urban or smaller communities. This question was designed to develop a profile of the respondents, and to check for a relationship between community type and technology integration.

Table 8: Community Type

Community Size	Frequency	Percent	Valid Percent	Cumulative Percent
[0] Large Metro	3	5.5	5.6	5.6
[1] Medium Metro	1	1.8	1.9	7.4
[2] Small Metro	15	27.3	27.8	35.2
[3] Urban-Metro	5	9.1	9.3	44.4
[4] Rural-Urban	17	30.9	31.5	75.9
[5] Rural Area	13	23.6	24.1	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Technology Perceptions

The following data in Tables 9 through 32 shows the survey respondents' perceptions toward several factors related to technology, as well as their ratings of the training, funding, access, time, and support towards technology integration. Perceptions of technology were rated using a five-point Likert scale of agreement, with five [5] being strongly agree and one [1] being strongly disagree, creating data at the interval scale of measurement. The five-point Likert scale was used to determine the degree of agreement, or disagreement, that the respondents felt towards each statement.

The data shown in the Table 9 below indicates that most respondents (67%) believe that their school districts have provided convincing reasons for them to incorporate technology into their curriculum. However, the percentage of respondents who report frequently incorporating

technology literacy standards into their instruction is slightly lower at 56% (See Table 12). This question was included to determine if school districts have made successful attempts to convince teachers to adopt technology integration methods, and to analyze the relationship between perceptions and practices of technology integration. The standard deviation of 1.27 may be due to a significant number of respondents have not been convinced that it is necessary to technology education to incorporate technology while most agree or have been provided adequate reasons for doing so.

Table 9: Survey Item 1

My district has provided convincing reasons for integrating technology				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	10	18.2	18.5	18.5
[4] Agree	26	47.3	48.2	66.7
[3] Neutral	6	10.9	11.1	77.8
[2] Disagree	5	9.1	9.3	87.0
[1] Strongly Disagree	7	12.7	13.0	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 3.50 Std. Dev. = 1.27

The results listed in Table 10 show that most respondents (76%) are familiar with the technology literacy standards that have been developed by the State of Wisconsin. These standards were developed by the Wisconsin Department of Public Instruction (Wisconsin DPI, n.d.) to provide a set of expectations for students to meet before they can be considered technologically literate. This survey item was included to determine how familiar the respondents are with technology literacy standards since teachers who are unaware of the standards may not successfully incorporate them into instruction. The standard deviation of 1.11 may be due to significant number of respondents who have not been exposed to the technology literacy standards in the State of Wisconsin while most of their colleagues have.

Table 10: Survey Item 2

I am familiar with Wisconsin's Technology Literacy Standards				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	19	34.5	35.2	35.2
[4] Agree	22	40.0	40.7	75.9
[3] Neutral	7	12.7	13.0	88.9
[2] Disagree	3	5.5	5.6	94.5
[1] Strongly Disagree	3	5.5	5.6	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 3.94 Std. Dev. = 1.11

The results shown in Table 11 indicate that most respondents (65%) are familiar with national standards that have been established for technology literacy. This survey item was included to determine how familiar the respondents are with the national technology literacy standards. The national standards were developed to help maintain clear and consistent objectives for technology integration (Dugger, 2000). Teachers might not incorporate technology objectives that are consistent with state and national standards if they are not familiar with the standards. The respondents of this study indicated that they are more familiar with the technology literacy standards that were developed by the Wisconsin DPI (See Table 10).

Table 11: Survey Item 3

I am familiar with the national standards for technology literacy				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	13	23.6	24.1	24.1
[4] Agree	22	40.0	40.7	64.8
[3] Neutral	12	21.8	22.2	87.0
[2] Disagree	6	10.9	11.1	98.1
[1] Strongly Disagree	1	1.8	1.9	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 3.74 Std. Dev. = 1.01

The results shown in Table 12 reveal that 30 of the respondents (56%) indicate that they frequently incorporate technology literacy standards into their curriculum. The purpose of this question was to determine how frequently the respondents integrate technology into classroom instruction. Teachers are unlikely to integrate technology literacy objectives consistently if they are not familiar or do not agree with them. When comparing survey items 1, 2, 3 and 4 (See Tables 9, 10, 11 and 12), approximately 67% of the respondents agree that their districts have provided convincing reasons to integrate technology, 75% are familiar with state technology literacy standards, and 65% are familiar with federal technology literacy standards, while 56% report incorporating technology frequently. Therefore, the difference between the respondents who report that they are incorporating technology frequently is about 9% less than those who report that they have received adequate reasons for integrating technology.

Table 12: Survey Item 4

I always incorporate the technology literacy standards into my curriculum				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	6	10.9	11.1	11.1
[4] Agree	24	43.6	44.4	55.6
[3] Neutral	17	30.9	31.5	87.0
[2] Disagree	4	7.3	7.4	94.4
[1] Strongly Disagree	3	5.5	5.6	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 3.48 Std. Dev. = 0.99

Table 13 shows that almost 80% of the respondents agree that integrating technology increases student interest in the course content. No respondent strongly disagreed with this statement. This item was included as a perception item to be analyzed with the respondents' technology integration practices.

Table 13: Survey Item 5

Technology integration increases student interest in course content				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	16	29.1	29.6	29.6
[4] Agree	27	49.1	50.0	79.6
[3] Neutral	9	16.4	16.7	96.3
[2] Disagree	2	3.6	3.7	100.0
[1] Strongly Disagree	0	0.0	0.0	
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 4.1 Std. Dev. = 0.79

Several potential barriers exist that can inhibit or impede the integration of technology into instruction. One potential barrier asserted by the Pierson (2001) study is the perception that teachers have toward using technology as a teaching tool affects how teacher use technology with instruction. If a teacher believes that technology devices are effective as an instructional tool, then they are more likely to incorporate technology into their instruction. The results in Table 14 indicate that 48 respondents (89%) believe that technology integration helps students achieve course objectives. Two respondents (4%) disagreed. This item was included to analyze the perceptions of technology with the frequency and level of integration the respondents use with instruction.

Table 14: Survey Item 6

Technology integration helps students achieve course objectives				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	17	30.9	31.5	31.5
[4] Agree	31	56.4	57.4	88.9
[3] Neutral	4	7.3	7.4	96.3
[2] Disagree	1	1.8	1.9	98.2
[1] Strongly Disagree	1	1.8	1.9	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 4.15 Std. Dev. = 0.79

Table 15 shows that most respondents (56%) believe that technology devices can help special needs students achieve academic success and 13% disagree. The purpose of this question was to determine if the respondents believed that technology is beneficial for students with special needs. Table 15 is located at the top of the next page.

Table 15: Survey Item 7

Technology devices improve the achievement of special needs students				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	8	14.5	14.8	14.8
[4] Agree	22	40.0	40.7	55.6
[3] Neutral	17	30.9	31.5	87.0
[2] Disagree	5	9.1	9.3	96.3
[1] Strongly Disagree	2	3.6	3.7	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 3.54 Std. Dev. = 0.99

During the literature review, an assertion brought forward by the Pierson (2001) study states that the assessment methods used by teachers are based on their technology and teaching experience. Veteran teachers with proficient technology skills consider technology to be a teaching tool and do not access their students' use of technology. Conversely, teachers who have limited teaching or technology experience may only assess the students' use of technology. The data in Table 16 shows a split among the respondents over how they assess their students' use of technology. Most respondents (32%) were neutral in their reporting. This item was included to analyze the relationships between their teaching experience, technology ability and assessment practices. The standard deviation of 1.26 may be due to a significant variance in the respondents' beliefs about how instruction that incorporates technology should be assessed.

Table 16: Survey Item 8

I do not assess my students' use of technology – it is only a tool for learning				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	6	10.9	11.3	11.3
[4] Agree	10	18.2	18.9	30.2
[3] Neutral	17	30.9	32.1	62.3
[2] Disagree	10	18.2	18.9	81.1
[1] Strongly Disagree	10	18.2	18.9	100.0
Missing	2	3.6	---	
Total	55	100.0	100.0	

Mean = 2.85 Std. Dev. = 1.26

It is reasonable to expect teachers to be proficient for software applications that are often used when technology is incorporated into instruction. In 1999, a study by Fatemi reported that teachers indicate a lack of time to locate and learn new software, and this impedes their ability to incorporate computer software into instruction. Tables 17 through 20 show the results of the respondents' ratings regarding their ability level with various software applications.

Table 17 indicates that most respondents (87%) are familiar with word processing and spreadsheet software such as Microsoft Word and Excel. The purpose of this item was to determine if the technological ability of the respondents regarding productivity software is related to their technology integration practices.

Table 17: Survey Item 9

I am proficient in productivity software (Word Processing, Spreadsheet)				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	26	47.3	48.2	48.2
[4] Agree	21	38.2	38.9	87.0
[3] Neutral	6	10.9	11.1	98.2
[2] Disagree	1	1.8	1.9	100.0
[1] Strongly Disagree	0	0.0	0.0	
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 4.33 Std. Dev. = 0.75

Table 18 indicates that most respondents (80%) are proficient with graphics application software. Graphics applications can be used by teachers and students to present work using graphs, tables, images and animation. The purpose of this item was to determine if the technological ability of the respondents regarding graphics software is related to their technology integration practices.

Table 18: Survey Item 10

I am proficient in graphics applications (PowerPoint, HyperStudio)				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	24	43.6	44.4	44.4
[4] Agree	19	34.5	35.2	79.6
[3] Neutral	8	14.5	14.8	94.4
[2] Disagree	1	1.8	1.9	96.3
[1] Strongly Disagree	2	3.6	3.7	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 4.15 Std. Dev. = 1.00

The data in Table 19 shows that most respondents (82%) are able to operate CD-ROM and multimedia software. Only three (6%) of the respondents in this sample indicated that they were not proficient. The purpose of this item was to determine if the technological ability of the respondents regarding interactive instructional software is related to their technology integration practices.

Table 19: Survey Item 11

I am proficient in interactive technologies (CD-Rom, Multimedia)				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	24	43.6	44.4	44.4
[4] Agree	20	36.4	37.0	81.5
[3] Neutral	7	12.7	13.0	94.4
[2] Disagree	3	5.5	5.6	100.0
[1] Strongly Disagree	0	0.0	0.0	
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 4.20 Std. Dev. = 0.88

The results shown in Table 20 indicate that most teachers (87%) are proficient with Internet and e-mail applications. Only one person in this sample indicated that they were not proficient. The purpose of this item was to determine if the technological ability of the respondents regarding instructional applications is related to their technology integration practices.

Table 20: Survey Item 12

I am proficient in Telecommunications (Internet, E-mail)				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	31	56.4	57.4	57.4
[4] Agree	16	29.1	29.6	87.0
[3] Neutral	6	10.9	11.1	98.15
[2] Disagree	1	1.8	1.9	100.0
[1] Strongly Disagree	0	0.0	0.0	
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 4.43 Std. Dev. = 0.77

According to the Fatemi (1999) study, teachers reported that it is often difficult for them to locate software that is appropriate for instruction. However, when asked to rate the difficulty in finding software that is appropriate for instruction, the respondents in this study report few difficulties. The results shown in Table 21 indicate that most respondents (83%) are able to obtain instructional software. This survey item was included to determine if difficulty in obtaining software was a significant barrier to technology integration.

Table 21: Survey Item 13

I am able to locate and acquire software that is appropriate for instruction				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	18	32.7	33.3	33.3
[4] Agree	27	49.1	50.0	83.3
[3] Neutral	8	14.5	14.8	98.1
[2] Disagree	1	1.8	1.9	100.0
[1] Strongly Disagree	0	0.0	0.0	
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 4.15 Std. Dev. = 0.74

Factors that may impede the integration of technology include the lack of incentives for attending technology-related training. The results of the data in Table 22 indicate that more than half (57%) of the respondents believe that they are provided with sufficient reasons for attending technology-related training and 43% were neutral or did not agree. The purpose of the question was to determine if school districts have provided sufficient reasons or incentives for the respondents to participate in technology-related training. The standard deviation of 1.18 may be due to an inconsistent effort between school districts to provide support or opportunities for technology education teachers for attending technological training. Many districts apparently do provide significant support while others districts may provide little or none.

Table 22: Survey Item 14

I am provided sufficient incentives for attending technology-related training				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	9	16.4	16.7	19.7
[4] Agree	22	40.0	40.7	57.4
[3] Neutral	10	18.2	18.5	75.9
[2] Disagree	9	16.4	16.7	92.6
[1] Strongly Disagree	4	7.3	7.4	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 3.43 Std. Dev. = 1.18

The lack of training was pointed out by several studies as a factor which could limit the incorporation of technology into instruction (Miller, 1997; Fatemi, 1999; Smerdon & Cronen, 2000). The data from this study, shown in Table 23, indicates that about half (48%) of the respondents believe that the technology-related training that they receive is appropriate for their curricular area and thirteen (24%) of the respondents disagree. This item was included to determine if the respondents believe that sufficient technology-related training is being offered that is useful in their classrooms. The standard deviation of 1.12 appears to be due to a considerable variance between the relevance of technology training that is offered to the respondents of this study. It is possible that those who feel that training is irrelevant to their content area attend only staff development training that is not related specifically to technology education curricular area.

Table 23: Survey Item 15

Sufficient technology training is offered relevant to my content area				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	8	14.5	14.8	14.8
[4] Agree	18	32.7	33.3	48.1
[3] Neutral	15	27.3	27.8	75.9
[2] Disagree	10	18.2	18.5	94.4
[1] Strongly Disagree	3	5.5	5.6	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 3.33 Std. Dev. = 1.12

As mentioned previously, the lack of training that can impede the integration of technology. This barrier could be reduced or eliminated if school districts required teachers to attend technology-related training. The results shown in Table 24 indicate that most school districts (69%) do not require teachers to attend technology-related training. This item was included to determine if any of the respondents are required by the school districts to attend technology-related training. The standard deviation of 1.37 is likely from a few districts having policies that require teachers to attend a specific number or amount of technology-related training while most districts have no such policy in place or enforced.

Table 24: Survey Item 16

Attendance at technology-related workshops or seminars is required of me				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	5	9.1	9.3	9.3
[4] Agree	6	10.9	11.1	20.4
[3] Neutral	6	10.9	11.1	31.5
[2] Disagree	12	21.8	22.2	53.7
[1] Strongly Disagree	25	45.5	46.3	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 2.15 Std. Dev. = 1.37

A previous study reported that 20% teachers of the teachers surveyed indicated that they often pay for software out of their own pocket, and that the cost is prohibitive (Fatemi, 1999). The data from this study regarding funding for software is represented by Table 25, and shows that many respondents (48%) believe that funding is insufficient for software purchases. Twenty-seven percent indicate that funding is adequate. This item was included to determine if a lack of funding for purchasing computer or other technological equipment may impede the integration of technology. The standard deviation of 1.24 is likely due to the wide variance of funding that is provided to the respondents for purchase technology equipment. The difference in opinion regarding funding can also be from the variation is cost of the equipment that individual respondents are seeking.

Table 25: Survey Item 17

Funding for purchasing software and technology equipment is adequate				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	5	9.1	9.3	9.3
[4] Agree	10	18.2	18.5	27.8
[3] Neutral	13	23.6	24.1	51.9
[2] Disagree	16	29.1	29.6	81.5
[1] Strongly Disagree	10	18.2	18.5	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 2.70 Std. Dev. = 1.24

Funding issues can also restrict the incorporation of technology if teachers have difficulty obtaining instruction on how to incorporate technology into their instruction. In fact, the lack of technology training was given as one of the most important reasons why teachers are not integrating technology (Fatemi, 1999). This study found that 41% of the respondents indicate that funding for attending technology-related offerings is sufficient while 32% believe funding was insufficient. See Table 26 for the results. This survey item was included to determine if the lack of funding for participating in technology-related training created a barrier to technology integration. The standard deviation of 1.16 may be due to a wide variation that school districts have in regard to the availability of, or differing priorities towards, funding for technology-related training.

Table 26: Survey Item 18

Funding for participating in technology-related training is adequate				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	5	9.1	9.3	9.3
[4] Agree	17	30.9	31.5	40.7
[3] Neutral	15	27.3	27.8	68.5
[2] Disagree	11	20.0	20.4	88.9
[1] Strongly Disagree	6	10.9	11.1	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 3.07 Std. Dev. = 1.16

If computers are slow or difficult to use, teachers are likely to avoid or limit the use of computers for instructional purposes. The data in Table 27 indicates that slightly more than half of the respondents (55%) are satisfied with the speed and convenience of their computers and 32% are not satisfied. The purpose of this survey item was to determine if a lack of speed or function of computers may impede the integration of technology. The standard deviation of 1.27 is likely due to a significant disparity between the age and quality of computer equipment that is available for instructional use.

Table 27: Survey Item 19

The speed and convenience of our computers is satisfactory for instruction				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	7	12.7	13.2	13.2
[4] Agree	22	40.0	41.5	54.7
[3] Neutral	7	12.7	13.2	67.9
[2] Disagree	11	20.0	20.8	88.7
[1] Strongly Disagree	6	10.9	11.3	100.0
Missing	2	3.6	---	
Total	55	100.0	100.0	

Mean = 3.24 Std. Dev. = 1.25

The results given in Table 28 indicate that many respondents (44%) experience problems with computers and software, while 32% indicated that they have few problems. This survey item was included to determine if problems with the reliability of computers or software created a barrier to technology integration. The standard deviation of 1.23 is likely due to a significant difference in the age and quality of the computer equipment that is available to the respondents. It may also be that the technological abilities for trouble shooting common and frequent computer problems varies significantly among the respondents.

Table 28: Survey Item 20

Computer equipment and software has been reliable and trouble-free				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	4	7.3	7.4	7.4
[4] Agree	13	23.6	24.1	31.5
[3] Neutral	13	23.6	24.1	55.6
[2] Disagree	14	25.5	25.9	81.5
[1] Strongly Disagree	10	18.2	18.5	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 2.76 Std. Dev. = 1.23

A lack of technological knowledge could impede the use of technology for instruction. The Ertmer, Addison, Lane, Ross and Woods (1999) study found that a lack of confidence with using technology creates a barrier towards integration. The results from this study found that most of the respondents (78%) believe they have sufficient technical knowledge for integrating technology and 9% indicate that they do not. This survey item was included to determine if the lack of technical knowledge acts as a barrier to technology integration.

Table 29: Survey Item 21

I currently possess sufficient technical knowledge for integrating technology				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	13	23.6	24.1	24.1
[4] Agree	29	52.7	53.7	77.8
[3] Neutral	7	12.7	13.0	90.7
[2] Disagree	4	7.3	7.4	98.1
[1] Strongly Disagree	1	1.8	1.9	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 3.91 Std. Dev. = 0.92

Two previous studies reported that the lack of time creates a barrier for the incorporation of technology into instruction (Miller, 1997; Ertmer et al., 1999). The findings of this study regarding the time barrier given in Table 30 shows that 20 respondents (37%) believe that they have enough time to incorporate technology but 22 respondents (41%) indicated that they do not. The purpose of this question was to determine if a lack of time prevents teachers from integrating technology into their instruction. The standard deviation of 1.19 may be due to the variation in the frequency and opportunities that the respondents have been provided by their districts for creating and implementing technology into their curriculum.

Table 30: Survey Item 22

I have sufficient time for integrating technology into my curriculum				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	6	10.9	11.1	11.1
[4] Agree	14	25.5	25.9	37.0
[3] Neutral	12	21.8	22.2	59.3
[2] Disagree	17	30.9	31.5	90.7
[1] Strongly Disagree	5	9.1	9.3	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 2.98 Std. Dev. = 1.19

Teachers must have adequate computer access to be able to use them for instruction. This is the premise of survey item 23 shown in Table 31. Previous studies from the Review of Literature state that limited access to computers creates a barrier to technology integration (Miller, 1997; Ertmer et al., 1999). The results of this study indicate that most respondents (60%) believe that a fair system for computer use has been created and is enforced but 15% disagree. This survey item was included to determine if a lack of access to computers may impede the use of computers for instruction. The standard deviation of 1.09 is likely a difference in the computer usage policies that each respondent has available. Some districts may have no policy while others may give priority to certain curricular areas, and other districts may have a policy for fair usage but do not enforce it.

Table 31: Survey Item 23

A fair and equitable system for computer use is in place and enforced				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	13	23.6	24.5	24.5
[4] Agree	19	34.5	35.9	60.4
[3] Neutral	13	23.6	24.5	84.9
[2] Disagree	6	10.9	11.3	96.2
[1] Strongly Disagree	2	3.6	3.8	100.0
Missing	2	3.6	---	
Total	55	100.0	100.0	

Mean = 3.66 Std. Dev. = 1.09

The Pierson (2001) study states that teachers who are successful with technology integration technology also enjoy a sufficient level of support. The data in Table 32 indicates that about one-third of the respondents (35%) indicate that help is readily available and 24% indicate that help it is not received promptly. This survey item was included to determine if a lack of support for computer problems may serve as a barrier to integration.

Table 32: Survey Item 24

When I need help with a computer problem, it is readily available				
Rating	Frequency	Percent	Valid Percent	Cumulative Percent
[5] Strongly Agree	7	12.7	13.0	13.0
[4] Agree	12	21.8	22.2	35.2
[3] Neutral	22	40.0	40.7	75.9
[2] Disagree	12	21.8	22.2	98.1
[1] Strongly Disagree	1	1.8	1.9	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 3.21 Std. Dev. = 0.94

Technology Training & Practices

The data represented by the Tables 33 through 38 represent the responses regarding technology training and practices. The multiple choice items required respondents to select answers to questions regarding technology integration training, practices, location of instructional computers, and their technological abilities.

The data shown in Table 33 indicates that 79% of the respondents always or frequently integrate technology into their instruction. None reported that they never integrate. This item was included to analyze the frequency of integration to other factors that have been found to enhance or impede technology integration, such as the relationship between the frequency of integration to the frequency of attendance at technology-related training.

Table 33: Survey Item 25

On average, how often do you incorporate technology-related activities into your lessons?				
Response Options	Frequency	Percent	Valid Percent	Cumulative Percent
[0] Never	0	0	0.0	0.0
[1] Occasionally	11	20.0	20.8	20.8
[2] Frequently	21	38.2	39.6	60.4
[3] Always	21	96.4	39.6	100.0
Missing	2	3.6	---	
Total	55	100.0	100.0	

Mean = 2.19 Std. Dev. = 0.76

A previous study reported that how teachers use technology is based on their view of technology (Pierson, 2001). Teachers who view computers as a supplement will generally use computers outside of regular instruction. Conversely, teachers who view computers as an instructional tool will incorporate computers into instruction when it is appropriate. The results listed in Table 34 show that 65% of the respondents incorporate technology into instruction. Approximately 1/3 of the respondents (33%) indicate that they use technology for locating, developing, or supplementing instruction. This item was included to analyze the level of integration to other factors that have been found to enhance or impede technology integration.

Table 34: Survey Item 26

How do you use technology, such as computers or the Internet, with your classroom instruction?				
Response Options	Frequency	Percent	Valid Percent	Cumulative Percent
[0] Non-user	1	1.8	1.9	1.9
[1] Supplement	17	30.9	31.5	33.3
[2] Incorporate	35	63.6	64.8	98.1
[3] Locate/develop mat'l	1	1.8	1.9	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 1.67 Std. Dev. = 0.55

A previous study by Smerdon and Cronen (2000) reported that teachers are more likely to use computers for instruction if they are located in the classroom. The data in Table 35 indicates that the majority of the respondents (72%) have computers located in their classroom while 26% indicated that instruction with technology is conducted in a computer lab. This question was included to analyze the relationship between computer location and technology integration practices. This item was included to determine if the location of computers in the classroom increases the frequency or level of technology integration.

Table 35: Survey Item 27

Where do you typically conduct instruction that involves computer use or the Internet?				
Response Options	Frequency	Percent	Valid Percent	Cumulative Percent
[0] Non-user	0	0.0	0.0	0.0
[1] Computer Lab	14	25.5	26.4	26.4
[2] Classrm w/computrs	38	69.1	71.7	98.1
[3] Library Media Ctr.	1	1.8	1.9	100.0
Missing	2	3.6	---	
Total	55	100.0	100.0	

Mean = 1.75 Std. Dev. = 0.48

It is reasonable to expect teachers to have technological skills in order to lead their students in acquiring and developing these skills. The results in Table 36 show that most respondents (83%) have proficient or advanced computer skills for using technology devices for instruction. The majority of respondents also report that they are proficient with productivity, graphics applications, interactive technologies, and telecommunications software (Tables 17-20). This item was included to analyze if technological ability is related to other factors that previous studies have found related to the frequency and level of technology integration.

Table 36: Survey Item 28

Rate your ability level for using technology, such as computers, for classroom instruction				
Response Options	Frequency	Percent	Valid Percent	Cumulative Percent
[0] Non-user	0	0.0	0.0	0.0
[1] Partially Proficient	9	16.4	16.7	16.7
[2] Proficient	30	54.5	55.6	72.2
[3] Advanced	15	27.3	27.8	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 2.11 Std. Dev. = 0.66

The Pierson (2001) study asserted that teachers who have a greater amount of technology training are more adept at incorporating technology into their instruction. The data in Table 37 shows that most respondents (80%) attended at least one technology-related training session in the past year, but 11 respondents (20%) did not attend any technology-related training. This item was included to determine if the frequency of attendance at technology-related training is related to the frequency and level of technology integration. The standard deviation of 1.09 is likely due to variance in the opportunities available for the respondents to attend training related to technology. The variation may also indicate the degree of disparity regarding the importance of incorporating technology into instruction.

Table 37: Survey Item 29

In the past year, how many technology-related in-services, workshops or training sessions did you attend?				
Response Options	Frequency	Percent	Valid Percent	Cumulative Percent
[0] None	11	20.0	20.4	20.4
[1] One	12	21.8	22.2	42.6
[2] Two	17	30.9	31.5	74.1
[3] Three or more	14	25.5	25.9	100.0
Missing	1	1.8	---	
Total	55	100.0	100.0	

Mean = 1.63 Std. Dev. = 1.09

The results presented in Table 38 shows how often the respondents attended various types of technology-related training during the past two years. Most respondents (56%) indicate that they received training in how to teach with technology. The second most frequent type of training attended is related to developing or improving computer skills, which 22 respondents (41%) reported that they attend. This survey item was included to determine if the frequency or type of technology-related training that teachers attend is related to the frequency and level of technology integration. Participants were asked to select all applicable responses – allowing the frequency total to add to more than the number of respondents, and the percentages to equal more than 100%.

Table 38: Survey Item 30

In the past two years, which technology-related offerings have you attended?			
Response Options	Frequency	Percent	Valid Percent
Dvlp/imprv cmptr skills	22	40.0	40.7
Teaching w/technology	30	54.5	55.6
Incorp. tech. lit. stds.	14	25.5	25.9
Lvls. of tech. integration	10	18.2	18.5
Missing	1	1.8	---
Total (N=55)	77	N/A	N/A

Correlation Analysis

Each of the following correlations have been analyzed to furnish evidence towards answering the questions brought forward in this study regarding relationships that affect the frequency and level of technology integration by technology education teachers. The frequency of integration is determined through the use of survey question 25, which asks, "On average, how often do you incorporate technology-related activities into you lesson?" The responses to this question are; (1) never, (2) occasionally, (3) frequently, and (4) always.

The level of integration is determined by the response to survey question 26, which asks, "How do you use technology, such as computers or the Internet, with your classroom instruction?" The choices to this question are; (1) non-user, (2) supplement existing curriculum, (3) incorporated into curriculum, and (4) only for locating or developing instructional material.

The perceptions of the survey questions 1 to 24 were rated using a five-point Likert scale of agreement, with five [5] being strongly agree and one [1] being strongly disagree. The result determined the degree of agreement, or disagreement, towards each perception statement. Relationships were then analyzed using Pearson's 2-tailed correlation analysis.

The correlations are rated on a scale from +1 to -1. A positive correlation indicates that as the value of one variable increases, so does the value of the second variable. Conversely, a negative correlation indicates that as the value of one variable increases, the value of the second variable decreases. The probability of level of significant is indicated with one or two asterisks. A single asterisk (*) indicates that the correlation is significant at the 0.05 level. If the value is denoted with two asterisks (**) the correlation is significant at the 0.01 level. Probability values that are greater than 0.05 are not denoted with asterisks, and are not statistically significant.

Frequency of Training vs. Frequency and Level of Integration

The results presented in Table 39 are related to the research question, "What is the relationship between technology training and integration practices?" According to previous studies, the lack of technology training could restrict the integration of technology (Miller, 1997; Fatemi, 1999; and Smerdon & Cronen, 2000). The survey question used to determine the frequency that the respondents attended technology-related training is Item 29, which asks, "In the past year, how many technology-related in-services, workshops, or training sessions did you attend?" The choices to this question are; (1) none, (2) one, (3) two, and (4) three or more. Survey Item 25 was used to analyze the frequency that respondents incorporate technology into their instruction and Item 26 was used to analyze the level of integration typically used for instruction.

A relationship was verified between the number of times the respondents attend technology-related training each year and the frequency that they incorporate technology-related activities into their instruction. However, no relationship was found to exist between the technology-related training and the level of integration that teachers use for classroom instruction. See Table 39 below for the results.

Table 39: Frequency of Training vs. Frequency & Level of Integration

Item 29. Average Annual Attendance for technology-related training			
Pearson Correlation (2-tailed)	Correlation (r)	Significance (p)	N =
Item 25: Frequency of Integration	0.314*	0.022	53
Item 26: Level of Integration	0.042	0.762	54

* Correlation is significant at the 0.05 level (2-tailed)

Perceptions of Technology vs. Frequency and Level of Integration

The next analysis seeks to answer the research question, "What is the relationship between perceptions of technology and integration practices?" The Ertmer et al. (1999) and Pierson (2001) studies found that teachers' perceptions of technology affect how they use technology with instruction. To measure this relationship, the results of survey Item 6, regarding the belief that technology integration helps students achieve course objectives, was analyzed for a relationship with Item 25, the frequency of integration. A correlation was found between the frequency of integration and teachers' perceptions regarding the benefit of technology toward helping students achieve course objectives. See the results in Table 40.

The next analysis checked for a relationship between teachers' perception of technology and the level of integration that they use with instruction. The survey question used in this analysis is Item 26, which determines the level of integration typically used for instruction. The correlation data found no relationship between the teachers' perception that technology integration helps students meet course objectives and the level of integration. See Table 40 below for the results.

Table 40: Perceptions of Technology vs. Frequency & Level of Integration

Item 6: Technology Integration helps students achieve course objectives			
Pearson Correlation (2-tailed)	Correlation (r)	Significance (p)	N =
Item 25: Frequency of Integration	0.427**	0.002	53
Item 26: Level of Integration	-.034	0.810	54

** Correlation is significant at the 0.01 level (2-tailed)

The next series of analyses seek to find correlations between technology integration barriers and the incorporation of technology into technology education instruction. Two separate studies reported several barriers to technology integration, including time, access, and support (Miller, 1997; Ertmer et al., 1999). This analysis answers the research question, "What is the relationship between the integration of technology and the barriers of time, access, and support?"

Time vs. Frequency and Level of Integration

The following analysis checks for a relationship between the barrier of time and the frequency and level of technology integration. Survey Item 22, which rates the respondents' belief about having sufficient time to incorporate technology into instruction, was analyzed for a correlation with Item 25, the frequency of integration, and Item 26, the level of integration. A significant relationship was found between the barrier of time and the frequency that teachers report incorporating technology-related activities into instruction. However, no relationship was found between time and the level of integration. See Table 41 below for the results.

Table 41: Time vs. Frequency & Level of Integration

Item 22. I have sufficient time for integration technology			
Pearson Correlation (2-tailed)	Correlation (r)	Significance (p)	N =
Item 25: Frequency of Integration	0.426**	0.002	53
Item 26: Level of Integration	0.236	0.089	54

** Correlation is significant at the 0.01 level (2-tailed)

Access vs. Frequency and Level of Integration

The following two analyses determine the relationship between the access that teachers have to technology and the frequency and level of integration that they incorporate into their instruction. Previous studies report that limited access to computers acts as a barrier to technology integration (Miller, 1997; Ertmer et al., 1999). The survey questions used to analyze the relationship between access and the frequency and level of integration included; Item 23, which rated the respondents responses about fair and equal access to computers; Item 25, the frequency that respondents incorporate technology into their instruction, and Item 26, which reported whether respondents supplement, incorporate, or use technology to develop instructional materials. The results of this study found that no relationship exists between the frequency of integration and the access to computers. This study also found that no significant relationship exists between the access to technology and the level of technology integration. See Table 42 below for the results.

Table 42: Access vs. Frequency & Level of Integration

Item 23. A fair and equitable system for computer use is in place and enforced			
Pearson Correlation (2-tailed)	Correlation (r)	Significance (p)	N =
Item 25: Frequency of Integration	0.158	0.269	53
Item 26: Level of Integration	0.223	0.112	54

Support vs. Frequency and Level of Integration

An analysis was done to find if a relationship exists between the support that teachers receive toward using computers or the Internet for classroom instruction and the frequency and

level of integration. To determine this relationship, Item 24, which respondents rated the support they received for computer problems, checked for a correlation with Item 25, the frequency of integration, and Item 26, the level of integration. No relationship was discovered between the support that the respondents reported and the frequency that technology is incorporated into instruction. Furthermore, no relationship was found between the level of computer support and the level of integration. See Table 43 below for the results.

Table 43: Support vs. Frequency & Level of Integration

Item 24. When I need help with a computer problem, it is readily available			
Pearson Correlation (2-tailed)	Correlation (r)	Significance (p)	N =
Item 25: Frequency of Integration	0.180	0.201	53
Item 26: Level of Integration	0.238	0.086	54

Frequency of Integration Relationships

The data that follows in Tables 44 to 47 represents correlations from survey questions that were designed to determine relationships with the frequency of integration. The frequency of integration is rated using survey question 25, which asks respondents to indicate how frequently they incorporate technology into their instruction. The choices are (1) never, (2) occasionally, (3) frequently, and (4) always. The survey questions 6, 22, 23, 24 and 29 were analyzed for a relationship to the frequency of integration previously in Tables 39 through 43, and are not included in this table.

Table 44 shows the relationships between Item 25, the frequency of integration, and the demographic data. Conflicting reports were found during the literature review regarding the affect of teaching experience on integration practices. The study by Smerdon and Cronen (2000) reports that teachers with limited teaching experience are more likely to integrate computers into instruction. Nonetheless, the Pierson (2001) study states that teachers with limited experience are not as likely to incorporate computers into instruction. This study analyzed the relationship between teaching experience and the frequency of technology integration. No correlation was found to exist. The correlation analysis between teaching experience, and other demographic factors, with the frequency of integration are shown below in Table 44.

Table 44: Demographics vs. Frequency of Integration

Relationships to the Frequency of Integration (Survey Item 25)			
Pearson Correlation (2-tailed)	Correlation (r)	Significance (p)	N =
Demographic: Age	.040	.778	53
Demographic: Teaching Experience	.026	.854	52
Demographic: Class Size	.221	.112	53
Demographic: Number of Tech Ed Teachers	.226	.110	51
Demographic: Community Size	-.119	.399	52

Perceptions of Technology vs. Frequency of Integration

Studies by Ertmer et al. (1999) and Pierson (2001) have found that teachers' perceptions of technology can affect the frequency of integration. This study found that the respondents' frequency of integration is related to their perceptions of technology. The survey question that

was found to have a significant relationship to the frequency of integration is Item 4, which asks respondents to rate the statement, "I always incorporate technology standards into my curriculum." The analysis of this question indicates that the respondents who believe that they always incorporate technology also report incorporating technology more frequently into their instruction. The results of the survey questions regarding perceptions of technology and their relationship to the frequency of integration are shown below in Table 45.

Table 45: Perceptions of Technology vs. Frequency of Integration

Relationships to the Frequency of Integration (Survey Item 25)			
Pearson Correlation (2-tailed)	Correlation (r)	Significance (p)	N =
Item 1: District provided reasons to integrate	.230	.105	51
Item 4: I always integrate technology	.396**	.004	52
Item 5: Technology increases student interest	.273	.050	53
Item 7: Tech. helps spcl. needs students	.215	.126	53
Item 14: Provided tech. training incentives	.246	.079	52
Item 17: Adequate funding for equipment	-.026	.858	52
Item 19: Satisfactory computer speed	.146	.308	51
Item 20: Cmptr equipmnt/sftwre are reliable	.209	.138	52
Item 21: Possess sufficient tech. knowledge	.251	.073	52
Item 27: Location of computer instruction	.133	.347	52
Item 13: I am able to locate software	.271	.052	52

* Correlation is significant at the 0.05 level (2-tailed)

Technology Ability vs. Frequency of Integration

Another assertion of the Pierson (2001) study is that teachers with limited technology experience will avoid or restrict their use of technology. This study found that the frequency of integration is related to the respondents' proficiency with software applications. Survey Item 9 through Item 12 shows that proficiency with software applications is related to the frequency of technology integration. Next, the respondents' technological ability (Item 28) is also related to the frequency of integration. Therefore, the respondents who report a higher level of technological ability also indicate integrating technology more frequently. Furthermore, the technological ability result has the highest correlation to the frequency of integration. The results of these analyses can be seen below in Table 46.

Table 46: Technological Ability vs. Frequency of Integration

Relationships to the Frequency of Integration (Survey Item 25)			
Pearson Correlation (2-tailed)	Correlation (r)	Significance (p)	N =
Item 9. Proficient with productivity software	.418**	.002	52
Item 10. Proficient in graphics applications	.352*	.010	52
Item 11. Proficient w/interactive technologies	.386**	.005	52
Item 12. Proficient in Telecommunications	.346*	.012	52
Item 28: Rate your technology ability	.486**	.000	53

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

Technology Training Factors vs. Frequency of Integration

This study found a significant relationship between the frequency of technology-related training (Item 29) and the frequency of technology integration. Lastly, a significant correlation was found between the training category of "Teaching with Technology" (Item 30B) and the frequency of integration (Item 25). These correlations indicate that the respondents who participated in training related to technology also incorporated technology more frequently into their instruction. The relationships found in the study between the training related survey items and the frequency of integration are shown below in Table 47.

Table 47: Technology Training Factors vs. Frequency of Integration

Relationships to the Frequency of Integration (Survey Item 25)			
Pearson Correlation (2-tailed)	Correlation (r)	Significance (p)	N =
Item 14: Provided tech. training incentives	.246	.079	52
Item 18: Adequate funding for training rcv'd.	.054	.702	52
Item 29: Frequency of technology training	.314*	.022	53
Item 30A: Trained: Computer skills	-.049	.726	53
Item 30B: Trained: Teaching w/Technology	.328*	.016	53
Item 30C: Trained: Tech. Lit. Standards	.247	.074	53
Item 30D: Trained: Lvl. of Tech. Integration	.199	.153	53

* Correlation is significant at the 0.05 level (2-tailed)

Level of Technology Integration Relationships

Table 48 represents survey items that were designed to determine relationships with the level of integration. The level of integration is rated using Item 26, which asks respondents to indicate how they incorporate technology into their instruction. The choices to this survey item are; (1) non-user, (2) supplement existing curriculum, (3) incorporated into curriculum, and (4) only for locating or developing instructional material. The survey items numbered 6, 22, 23, 24 and 29 were analyzed for a relationship to the level of integration previously in Tables 39 to 43, and are not included in this table.

The Pierson (2001) study states that the level of integration will be affected by the teachers' perceptions of technology. Teachers may believe that they are integrating when their students use computers as a supplement or reward outside of regular course work. For integration to occur, the computers must be incorporated as a teaching tool to meet instructional goals or objectives. Most of the respondents (65%) in this study report that they incorporate technology into their instruction (See Table 34).The level of integration were determined by Item 26.

The relationship between the respondents' teaching experience and level of integration was explored in this study. No significant correlations were found between teaching experience and the frequency or level of integration. See Table 48 below for the results.

The survey questions which were analyzed and found to have a significant correlation to the level of integration include questions number 8, 13, 28, and 30B. In the study by Pierson (2001) it is maintained that teachers with limited technology skills will modify how they assess student work that is completed with technology. The survey question from this study that analyzed the respondents' assessment methods is Item 8. This question asked the respondents to rate the statement, "I do not assess my students' use of technology – it is only a tool for

learning." Like all statements in the perception part of the questionnaire, the respondents rated this question on a Likert scale from one (1) strongly disagree to five (5) strongly agree. The results of this analysis show that how the respondents assess their students is related to the level of integration they use with instruction. The analysis indicates a negative correlation. This negative correlation indicates that as level of integration increases, so does the inclusion of technology as part of the assessment of student work. See the results in Table 48.

Another relationship was found in this study between the respondents' ability to locate software and the level of integration that they incorporate into instruction. Survey Item 13, which states, "I am able to locate and acquire software that is appropriate for instruction," was used to analyze this relationship. The results indicate that the level of integration practiced by the respondents is related to their ability to obtain instructional software. See the results listed in Table 48.

As mention previously, the Pierson (2001) study stated that teachers with limited technology experience will either avoid or restrict the use of technology. It is reasonable to conclude that the technology experience of teachers will affect the level of integration they use with instruction. The results of this study did find a correlation between technological ability and the level of integration. Survey Item 28, which asked respondents to rate their technological ability through the selections of non-user, partially proficient, proficient, and advanced, was used to determine if a relationship exists with the level of integration. The relationship was confirmed. See the results shown in Table 48.

Finally, this study found a significant relationship between the training category of "Teaching with Technology" (Item 30B) and the level of integration. This correlation indicates that participation in training about teaching with technology is related to the level of integration

that the respondents incorporate into their instruction. The results given in Table 48 show the relationships between the perceptions and practices of technology integration to the level of integration.

Table 48: Relationships to the Level of Integration

Relationships to the Level of Integration (Survey Item 26)			
Pearson Correlation (2-tailed)	Correlation (r)	Significance (p)	N =
Demographic: Teaching Experience	-.075	.595	53
Item 8: Technology is only a tool for learning	-.309*	.026	52
Item 13: I am able to locate software	.347*	.011	53
Item 21: Possess sufficient tech. knowledge	.119	.398	53
Item 27: Location of computer instruction	.116	.409	53
Item 28: Rate your technology ability	.414**	.002	54
Item 30A: Trained: Computer skills	.092	.507	54
Item 30B: Trained: Teaching w/technology	.274*	.045	54
Item 30C: Trained: Tech. Lit. Standards	-.026	.853	54
Item 30D: Trained: Lvl. of Tech. Integration	.204	.138	54

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

Technology Ability vs. Technology Proficiencies & Practices

The Pierson (2001) study maintains that teachers with limited technology experience might avoid using technology with instruction. The correlation data in Table 46 lists the survey items that are designed to check for relationships to technological ability. This study found that a correlation does exist between the computer ability levels and the frequency that the respondents incorporate technology into instruction. The technological ability was determined by Item 28, which asked the respondents to rate their technological ability by selecting; (1) non-user, (2) partially proficient, (3) proficient, or (4) advanced.

This study also found a significant correlation between technological ability and the perception ratings that the respondents reported toward the benefit of incorporating technology into instruction. Survey Item 6, regarding the benefit of technology integration to helping students meet course objectives, was rated on a Likert scale that has been described in detail earlier in this chapter (See Correlation Analysis or Technology Perceptions). The results of this analysis show that the beliefs the respondents have toward the benefits of technology is related to their technological ability. See Table 49 for the results.

Another significant relationship was found between the respondents' proficiency level with software applications and their technological ability. The surveys questions that were used to determine these relationships are questions 9, 10, 11, and 12, which were used by the respondents to rate their ability levels with common instructional software. Therefore, the results of this study show that the proficiency level for software applications are related to the technological abilities of the survey respondents. See Table 49 for the results.

Table 49: Technology Ability vs. Proficiencies

Technological Ability (Survey Item 28)			
Pearson Correlation (2-tailed)	Correlation (r)	Significance (p)	N =
Item 6: Tech. helps students meet objectives	.300*	.029	53
Item 8: I don't assess student technology use	-.050	.726	52
Item 9. Proficient with productivity software	.650**	.000	53
Item 10. Proficient in graphics applications	.630**	.000	53
Item 11. Proficient w/interactive technologies	.641**	.000	53
Item 12. Proficient in Telecommunications	.690**	.000	53
Item 30A: Trained: Computer skills	.204	.139	54
Item 30B: Trained: Teaching w/technology	.151	.275	54
Item 30C: Trained: Tech. Lit. Standards	.157	.256	54
Item 30D: Trained: Lvl. of Tech. Integration	.210	.128	54

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

Perceptions of Technology vs. Frequency of Training

In 1999, the Ertmer et al. study reported that one barrier to technology integration was a lack of relevance for incorporating technology into instruction. Another study by the Pierson (2001) asserts that teachers' perceptions of technology will affect how they learn about and use technology. To measure this assertion, survey questions 1, 5, 7, 14, 15, 16 and 18, which are related to perceptions of technology, were analyzed for a relationship to Item 29. Survey Item 29 asks the respondents, "In the past year, how many technology-related in-services, workshops or training sessions did you attend?" The choices to this questions are; (1) none, (2) one, (3) two, and (4) three or more. A significant correlation was discovered. See Table 50 for the results.

Respondents were asked to rate their level of agreement, or disagreement, with Item 1, which states, "My district has provided convincing reasons for integrating technology." A significant correlation was found between the beliefs that convincing reasons for integrating technology have been received and the frequency that technology is incorporated into instruction. Item 3, which asks the respondents to rate their familiarity with the national standards for technology literacy, was found to be correlated to the frequency of training. See Table 50 for the correlations that were analyzed.

Table 50: Perceptions of Technology vs. Frequency of Training

In the past year, how many technology-related in-services, workshops, or training sessions did you attend? (Survey Item 29)			
Pearson Correlation (2-tailed)	Correlation (r)	Significance (p)	N =
Item 1: District provided reasons to integrate	.283*	.042	53
Item 2: Familiarity with state tech. lit. standards	.184	.188	53
Item 3: Familiarity w/national tech. lit. standards	.325*	.018	53
Item 5: Technology increases student interest	.201	.149	53
Item 7: Technology helps spcl. needs students	.213	.125	53
Item 14: Provided incentives to attend training	.028	.842	53
Item 15: Sufficient technology training is relevant	.023	.872	53
Item 16: Required to attend technology training	.029	.839	53
Item 18: Funding to attend training is adequate	-.029	.837	53

* Correlation is significant at the 0.05 level (2-tailed)

This study was able to confirm some of the factors that previous studies found to be related to technology integration practices, but unable to confirm several others. Those factors that this study could not verify teaching experience, computer access, technological support, and funding for technology training and equipment. The demographic data analyzed for relationships to technology integration practices included gender, age, class size, grade level, community size, and the number of teachers in the technology education department. None of these demographic factors were found to be related to technology integration practices. Furthermore, no demographic factors were found to have a correlation to the respondents' perceptions of technology.

The primary focus of this research was to analyze relationships between technology integration and the technology training that technology education teachers receive. Significant relationships to technology-related training were found, including (1) frequency of technology-related training, (2) frequency of technology integration, (3) technological ability, and (4) perceptions of technology. Details of these findings are presented in the next chapter.

CHAPTER 5

Summary, Conclusions and Recommendations

Chapter five is divided into summary, conclusions and recommendations. In the conclusions section, each research question will be restated and answered.

Summary

Restatement of the Problem

Technology advancements continue to influence a change in the skills that are necessary for students to succeed beyond high school. Therefore, it has become necessary for teachers to incorporate technology into their instruction. Nevertheless, the data from various studies shows that teachers are lagging with respect to technology integration. While teacher reluctance to integrate technology can be contributed to many factors, this research concentrated on the relationship that exists between technology integration by technology education teachers and the technology-related training that they receive. Other factors that this research explored are the perceptions of technology as a teaching tool and barriers to technology integration.

Methods and Procedures

This was a descriptive study of technology education teachers in the State of Wisconsin. The study was designed to analyze for significant relationships between the training that technology educators receive and their technology integration practices. A self-reporting questionnaire was developed by the researcher to gather data about the respondents' perception, training, practices, and assessment methods that are related to technology integration. This study

also analyzed relationships between technology integration and the barriers that previous studies found impeded the incorporation of technology into instruction. These potential barriers included time, funding, access, and the reliability of technology equipment. The sample for this study was drawn from technology education teachers who attended the UW-Stout Technology Conference at UW-Stout on October 15, 2004. The collected data was taken to Dr. Amy Gillett of UW-Stout for the purpose of conducting correlation analysis.

Major Findings

The key findings of this study are presented in the section below under the headings of (1) frequency of technology integration, (2) frequency of technology training, (3) level of integration, (4) technological ability, (5) demographics, and (6) other factors.

Frequency of Technology Integration

Six factors were found in this study to be related to the frequency that technology is integrated into instruction. The frequency of integration was determined through the use of survey question 25, which asked the respondents to indicate how often they incorporate technology-related activities into their lessons. The respondents had the following choices; (1) never, (2) occasionally, (3) frequently, and (4) always. The factors that were found to have a significant relationship to the frequency of integration are listed below.

- Proficiency with instructional software
- Time to integrate technology
- Technological abilities
- Frequency of training

- Participation in training related to "Teaching with Technology"
- Perceptions of technology

Frequency of Technology Training

This study explored factors related to the perceptions and practices of technology integration to determine if any relationships existed between those factors and the frequency of technology-related training. The frequency of participation in technology-related training was determined by survey question 29, which asked the respondents to indicate how often they attended in-services, workshops or training sessions in the past year. The choices to this question were; (1) none, (2) one, (3) two, and (4) three or more. The significant relationships to the frequency of training are listed below.

- School district provided reasons to integrate
- Frequency of integration
- Participation in training related to "Teaching with Technology"

Level of Technology Integration

The degree of integration practiced by the respondents of this study was also examined during this study. These results are based on survey question 26, which asked the respondents to select how they used technology with classroom instruction. The choices to this question were; (1) non-user, (2) supplement existing curriculum, (3) incorporated into curriculum, and (4) only for locating or developing instructional material. Four factors were found to be related to the level of integration and are listed below.

- Assessment beliefs and practices

- Ability to locate software
- Technological ability
- Training related to "Teaching with Technology"

Technological Ability

Technology abilities were studied to determine if they could have an affect on technology integration practices. The technology skill of the respondents was determined by Survey Item 28, which asked respondents to rate their technological ability as non-user, partially proficient, proficient, or advanced. The factors that were found to be related to technological ability are listed below.

- Belief that technology integration helps students meet course objectives
- Proficiency with instructional software

Demographic Factors

None of the demographic elements that this study explored were found to be related to technology integration practices. These demographic factors are listed below.

- Age
- Teaching experience
- Class size
- Number of Tech Ed teachers
- Community size

Other Factors

Other factors that previous studies had reported as impacting the integration of technology that this study was unable to confirm are listed below.

- Access to technology
- Technological support
- Location of computers
- Funding for technology equipment
- Funding for technology-related training

Conclusions

The following conclusions of this study are limited to technology education teachers of Wisconsin. The results of this study show that relationships do exist between technology integration and factors related to technology training, perceptions of technology, and barriers to technology integration. The conclusions are presented with their respective research questions.

Research Question 1 - Training

What is the relationship between technology training and integration practices? First, the results of this study show that the frequency of integration increases with the frequency of technology training (See Table 39, Chapter 4). Therefore, it is reasonable to conclude that the more frequently that technology education teachers participate in technology training, the more frequently they will integrate technology into their instruction.

Second, the results of this study also show that school districts have the ability to increase attendance for technology training by providing convincing reasons to integrate (See Table 50,

Chapter 4). Thus, district administrators have the ability to increase participation in technology-related training by providing valid reasons for doing so to technology education teachers.

Third, the respondents of this study incorporated technology more frequently as they become more proficient with instructional software (See Table 46, Chapter 4). Thus, it is advantageous to offer training to technology education teachers that will help them to become proficient with instructional software.

Fourth, the level of integration is correlated to training related to teaching with technology (See Table 48, Chapter 4). Therefore, it is beneficial to provide training on the subject of how to teach with technology to technology education instructors.

Research Question 2 - Perceptions

What is the relationship between perceptions of technology and integration practices? The results of this study show that the frequency of technology integration increases as the belief about technology helping students to meet course objectives increases (See Table 40, Chapter 4). Therefore, the more evidence that can be provided to support the integration of technology, the more likely it is that technology will be included as part of instruction. Next, the results related to the respondent's assessment practices show that there is a negative correlation between their level of integration and assessment methods (See Table 48, Chapter 4). The desired and expected outcome would be for an increasing number of respondents to indicate that they do not assess computer use as their level of integration increases. However, the results of this study show the opposite is happening.

Research Question 3 - Barriers

What is the relationship between the integration of technology and the barriers of time, access, and support? First, the frequency of integration increased as the rating of time to integrate technology improved (See Table 41, Chapter 4). Therefore, the respondents' frequency of integration increases as their perception of having sufficient time to incorporate technology into their curriculum increases. Next, no significant correlation was found between access to computers and the frequency or level that technology was used with instruction (See Table 42, Chapter 4). Finally, no significant relationship was found between the level of support and technology integration practices in this study (See Table 43, Chapter 4). Therefore, time was the only barrier explored in this study that was found to impede the integration of technology.

Recommendations

The following section provides recommendations based on data gathered from this study. The recommendations are made regarding the results from this study, and also for future studies that attempt to replicate this study. The recommendations presented in this section are listed under the headings of; (1) recommendations based on this study, (2) recommendations for further study, and (3) recommended survey instrument modifications.

Recommendations -Based on This Study

The following recommendations pertain to the training that technology education receive and are meant to be applied only to the technology education teachers of Wisconsin. The recommendations are listed below.

- Provide sufficient time for teachers to learn about technology

- Provide opportunities for teachers to incorporate technology into their curriculum
- Offer sufficient training opportunities that develop or improve technological skills
- Support training that develops or improves skills with software applications
- Stress appropriate assessment practices for technology integrated curriculum
- Provide information or training about how to obtain instructional software
- Present evidence that the technology integrated curriculum helps students to meet instructional objectives or goals

It was also found that it is beneficial for district administrators to actively promote the incorporation of technology into the technology education curriculum.

Recommendations for Further Study

The suggestions that follow provide information that will enhance the results of future studies that may attempt to replicate this research. Replication might confirm the findings and serve as a benchmark for future studies on this topic.

It is recommended that more study be conducted that draws its sample from the entire population of technology education teachers within the State of Wisconsin. One of the limitations of this study was the cluster sample. Not all teachers had the opportunity to attend the Stout Technology Education Conference

Recommended Survey Instrument Modifications

It is recommended that the following items be added to the survey instrument of future studies related to this research.

- Add a question to determine the number of computers available for instruction

- Add items to determine the preferred types of technology-related training

Besides the additions listed above, it is recommended to add a survey question, or to modify Item 23, of the survey instrument to better determine access to computers for instruction. The current survey instrument can only find relationships to computer access based on the inclusion and enforcement of a fair and equitable system for computer use. Nonetheless, it is possible to have such a system in place, and enforced, but still have limited access due to an insufficient number of computers. Therefore, it is recommended to modify Item 23 or add other questions pertaining to the access to computers.

The following items listed below are provided with the reasons for excluding them or suggestions for modifications.

- Omit Survey Items 9-12 about proficiencies with various software applications, and create a new survey question about abilities with software applications.
- Modify Survey Item 19 – omit the word "convenience" from the statement to add clarity to this statement.
- Modify Survey Item 26 – change the selection order to (1) non-user, (2) only for locating or developing instructional material, (3) supplement existing curriculum, and (4) incorporated into curriculum.

Technological proficiency for persons entering the workforce today is becoming essential as technology continues to pervade nearly all aspects of work. Therefore, it is important for graduating students to acquire technological skills in order to compete for rewarding careers or further their education. Since technology skill is not acquired automatically, it is necessary for

student to develop this skill through experience and practical application in the classroom. Technology education courses provide a practical environment for students to learn these skills hands-on. Nonetheless, technology education teachers must be technologically literate before they can successfully incorporate technology tools into their instruction.

The results of this study indicate that great strides are being made toward the incorporation of technology into the technology education curriculum with 56% (Table 12, Chapter 4) of the respondent indicating that they frequently incorporate technology into their instruction. Nonetheless, there is room for improvement.

Training related to technology has been shown to increase the frequency that technology is incorporated into technology education instruction (Table 39, Chapter 4). Furthermore, when districts providing valid reasons for incorporating technology into instruction, the frequency of participation in technology-related training increases (Table 50, Chapter 4). Therefore, a key factor toward improving the integration of technology is simply for school administrators to provide convincing reasons to technology education teachers for incorporating technology into their curriculum. It is likely that more technology education teachers would integrate technology into their instruction if they were presented with convincing reasons regarding the benefit and need for them to do so.

Another factor that was found to be related to the frequency of integration is time, which always seems to be in short supply. Teachers need to be given ample time to learn how to teach effectively with technology when it is incorporated into instruction. In fact, the results of this study show that time is related to the frequency that technology is used with instruction (Table 41, Chapter 4). Moreover, forty-one percent of the respondents indicated that they do not have sufficient time to integrate technology into instruction (Table 30, Chapter 4). Therefore, it is

important for school districts to provide sufficient time and opportunities for the teachers to develop and implement technology into their curriculum.

Technology skills are becoming vital for students to acquire for them to become successful beyond high school. For this reason, it is essential for technology education teachers to incorporate technology literacy objectives into their curriculum. Nonetheless, teachers cannot be expected to successfully integrate technology if they are not technologically literate themselves, or experience barriers that impede or prevent them from learning about, or teaching with, technology. Therefore, it is very important for school districts to; (1) provide evidence supporting the need for incorporating technology literacy standards, (2) offer sufficient opportunities for teachers to attend technology-related training that is relevant to their curricular area, and (3) provide adequate time for the development and incorporation of technology into the technology education curriculum.

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APPENDICES

APPENDIX A: Survey Cover Letter

October 15, 2004

Dear *Research Participant:*

The purpose of this study is to investigate the current impact of technology training and support with respect to the integration of technology into the Technology Education curriculum by teachers in Wisconsin. Your participation is greatly appreciated and will aid in the success of this study. The questionnaire should take about 5 minutes of your time to complete.

Instructions for completing the survey
It is best to go with your first impression when responding to each statement. Instructions for completing each part are listed at the beginning of each section. Page 1 contains demographic data. The second page contains statements to be rated on a scale from [5] *Strongly Agree, to* [1] S*trongly Disagree.* Check the number that best matches your response. Mark only one rating number per statement and do not make selections in-between the numbers. The last page contains statements with multiple-choice responses. Please do not select more than one response per statement unless instructed to do so

Confidentiality
The information that you provide will remain confidential and no information from individual responses will be released and made public.

If you have any questions or concerns about the nature of this study, you may contact Robert J. France, the researcher, or Dr. Howard D. Lee, the research advisor, at the phone numbers listed in the note below. Please read the informed consent statement before completing the questionnaire.

To receive a summary of the survey results, please send a card along with your name and address to the researcher, Robert J. France, 229 5th Street, Prairie du Sac, WI 53578.

Thank you for your contribution towards this research.

Robert J. France

ENC:

Consent Statement
I understand that by returning this questionnaire, I am giving my informed consent as a participating volunteer in this study. I understand the basic nature of the study and agree that any potential risks are exceedingly small. I also recognize the potential benefits that might be realized from the successful completion of this study. I am aware that the information is being sought in a specific manner so that only minimal identifiers are necessary and to guarantee confidentiality. I realize that I am under no obligation to participate in this study.

Note
Questions or concerns about the research study should be addressed to Robert J. France, the researcher, at 229 5th Street, Prairie du Sac, WI 53578, Phone (608) 643-6682, or Dr. Howard D. Lee, the research advisor, at 225A Applied Arts Building, UW-Stout, Menomonie, WI 54751, Phone (715) 232-1251. Questions about the rights of research subjects can be addressed to Sue Foxwell, Human Protections Administrator, 11 Harvey Hall, UW-Stout, Menomonie, WI 54751, phone: (715) 232-1126.

To The Technology Education Instructor
This questionnaire is designed to assess your perceptions of, and experiences with, technology-related training, support and instruction. This questionnaire should take about 5 to 10 minutes of your time to complete. Thank you for participating in this research project.

Demographic Data

Instructions: To complete this section, place a check mark ☑ next to the correct response for each item listed below.

UW-Stout Tech Ed Graduate ☐ Yes ☐ No, Specify: _____

Gender ☐ Male ☐ Female

Age
☐ 20-24 ☐ 30-34 ☐ 40-44 ☐ 50-54
☐ 25-29 ☐ 35-39 ☐ 45-49 ☐ 55 or more

Years of Teaching Experience
☐ 0-1 ☐ 4-8 ☐ 13-17 ☐ 23-29
☐ 2-3 ☐ 9-12 ☐ 18-22 ☐ 30 or more

Average Class Size (select one)
☐ 0 ☐ 11-15 ☐ 21-25 ☐ 30-35
☐ 1-10 ☐ 16-20 ☐ 26-30 ☐ 36 or more

Grade Level Taught (check all that apply)
☐ Grade 6 ☐ Grade 7 ☐ Grade 8
☐ Grade 9 ☐ Grade 10 ☐ Grade 11 ☐ Grade 12
☐ University ☐ Technical College

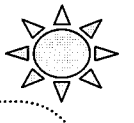
Number of Technology Education Teachers (in your building/department)
☐ 1 ☐ 2-3 ☐ 4-5 ☐ 6 or more

Community Type (select one)
☐ Large Metro ---------- Population of 1 million or more
☐ Medium Metro ---------- Population of 250,000 to 999,999
☐ Small Metro ---------- Population of 50,000 to 249,999
☐ Urban-Metro ---------- Population of 20,000 to 49,999
☐ Rural-Urban ---------- Population of 2,500 to 19,999
☐ Rural Area ---------- Population less than 2,500

✡ Thank you for completing this section
(Please continue with the following section located on the back of this sheet)

APPENDIX C: Technology Training and Integration Questionnaire

Technology Training and Integration Questionnaire



Instructions for completing this section – Part 1: Perceptions of Technology
Answer each of the following statements by checking □ the rating number [5] to [1] that best matches your feelings for each corresponding statement. It is best to go with your first impression when selecting. Answer as to how you perceive each statement at the present time.

✡ Please do not check more than one number or in-between the numbers (invalidates response)

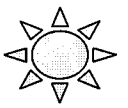
Rating Key: [5] Strongly Agree [4] Agree [3] Neutral [2] Disagree [1] Strongly Disagree

Definition of Technology
For the purposes of this study, technology will be defined as any electronic device or media, such as computer software and the Internet, which is used to achieve instructional goals and objectives.

Part 1: Perceptions of Technology	(refer to rating key above)
	SA A N D SD
My district has provided convincing reasons for integrating technology	[5] [4] [3] [2] [1]
I am familiar with Wisconsin's Technology Literacy Standards	[5] [4] [3] [2] [1]
I am familiar with the national standards for technology literacy	[5] [4] [3] [2] [1]
I always incorporate the technology literacy standards into my curriculum	[5] [4] [3] [2] [1]
Technology integration increases student interest in course content	[5] [4] [3] [2] [1]
Technology integration helps students achieve course objectives	[5] [4] [3] [2] [1]
Technology devices improve the achievement of special needs students	[5] [4] [3] [2] [1]
I do not assess my students' use of technology – it is only a tool for learning	[5] [4] [3] [2] [1]
I am proficient in productivity software (Word Processing, Spreadsheet)	[5] [4] [3] [2] [1]
I am proficient in graphics applications (PowerPoint, HyperStudio)	[5] [4] [3] [2] [1]
I am proficient in interactive technologies (CD-Rom, Multimedia)	[5] [4] [3] [2] [1]
I am proficient in Telecommunications (Internet, E-mail)	[5] [4] [3] [2] [1]
I am able to locate and acquire software that is appropriate for instruction	[5] [4] [3] [2] [1]
I am provided sufficient incentives for attending technology-related training	[5] [4] [3] [2] [1]
Sufficient technology training is offered relevant to my content area	[5] [4] [3] [2] [1]
Attendance at technology-related workshops or seminars is required of me	[5] [4] [3] [2] [1]
Funding for purchasing software and technology equipment is adequate	[5] [4] [3] [2] [1]
The speed and convenience of our computers is satisfactory for instruction	[5] [4] [3] [2] [1]
Computer equipment and software has been reliable and trouble-free	[5] [4] [3] [2] [1]
I currently possess sufficient technical knowledge for integrating technology	[5] [4] [3] [2] [1]
I have sufficient time for integrating technology into my curriculum	[5] [4] [3] [2] [1]
A fair and equitable system for computer use is in place and enforced	[5] [4] [3] [2] [1]
When I need help with a computer problem, it is readily available	[5] [4] [3] [2] [1]

✡ Thank you for completing this section
(Please complete the next section on the back of this sheet)

Technology Training and Integration Questionnaire



Part 2: Training & Practices

Instructions for completing this section - Part 2: Training & Practices

- **Answer each of the following questions by placing a check mark ☐ next to the correct response.**
- Please do not check more than one box per item unless instructed to do so. (invalidates response)

31 On average, how often do you incorporate technology-related activities into your lessons?
- ❑ Never
- ❑ Occasionally
- ❑ Frequently
- ❑ Always

32 How do you use technology, such as computers or the Internet, with your classroom instruction?
- ❑ Non-user
- ❑ Supplement existing curriculum
- ❑ Incorporated into curriculum
- ❑ Only for locating or developing instructional material

33 Where do you typically conduct instruction that involves computer use or the Internet?
- ❑ Non-user
- ❑ Computer Lab
- ❑ Classroom with computers
- ❑ Library Media Center

34 Rate your ability level for using technology, such as computers, for classroom instruction.
- ❑ Non-user
- ❑ Partially Proficient
- ❑ Proficient
- ❑ Advanced

35 In the past year, how many technology-related in-services, workshops or training sessions did you attend?
- ❑ None
- ❑ One
- ❑ Two
- ❑ Three or more

36 In the past two years, which technology-related offerings have you attended? (check all that apply)
- ❑ Developing or improving computer-related skills
- ❑ Teaching with technology
- ❑ Incorporating technology literacy standards into curriculum
- ❑ The levels of technology integration (i.e., non-use, awareness, exploration, infusion, integration)

Please return your completed survey during the conference registration period, or from 10 a.m. until noon - ☼ to the researcher, Rob France, who will be located near the registration area.
Each participant will receive $1 for returning their completed survey. If you are unable to return your survey during the conference, you can mail the survey by **October 20, 2004** to the researcher, Rob France, at the address listed in the note at the bottom of the cover letter. Include a return address if you wish to receive the $1 compensation. Thank you!

APPENDIX D: ISSAC Consortium TLCF Survey

Survey of Technology Integration into Current Instructional Practices
Based on TLCF Grant Objectives for the 2001-2002 Academic Year

Purpose of this survey (Please read)
This survey was developed to determine the level of technology integration currently practiced in the Evansville school district. The questions are based on the following TLCF grant objectives.

Objective 1.1: Staff will have on-site support for integrating technology into their curriculum and instructional practices.
Objective 1.2: The percent of Staff who routinely integrate technology into diverse teaching strategies, including inquiry-based teaching and authentic learning, to create integrated lessons, will double consortium wide.(LoTi Level 4b).
Objective 1.3: Staff will routinely integrate assistive technology into classroom activities to increase student learning and independence.
Objective 1.4: The train-the-trainer program will be expanded to a peer-mentoring program to provide ongoing and sustained support for the technology curriculum integration process.
Objective 1.5: Staff will use multi-dimensional forms of assessments to measure student achievement as a result of integrating technology into the curriculum.
Objective 2.1: Students, including those with special needs, will integrate technology into at least one additional curricular area.
Objective 2.2: All students will engage in at least one online research activity.
Objective 2.3: In order to enhance the learning of all students in the use of assistive technology students will participate in at least one lesson application using an assistive technology device or software.
Objective 2.4: In Partnership with CESA#2 and the Wisconsin School for the Deaf, a new education delivery model will be developed using distance education as assistive technology to enhance student achievement.

Identify the category that best describes your position in the district.
( ) Special Education ( ) Regular Teacher ( ) Educational Assistant
( ) Library Media Specialist ( ) Refuse / No Answer ( ) Other – List:

Grade Level
( ) Elementary ( ) Middle School ( ) High School ( ) Not Applicable

Is this the first year you participated in technology training?
( ) Yes ( ) No

Directions for the following section:
- Read each of the following statement below and select the one that best describes you.
- Some statements allow for more than one response to be checked.
- Use the "Comments" area to clarify your selection.

My students typically assess information form the Internet in the following way.
( ) Use information from the Internet for instructional purposes.
( ) Use one search engine to locate information, such as Yahoo.
( ) Use more than one search engine to locate information.
( ) Use search engines and online databases to locate information and resources.

Did you receive support from your technology integrator?

( ) Yes
( ) No

I have integrated technology into my classroom instruction in the following way:

( ) I have not integrated technology into classroom instruction.
( ) I use a computer to type my lesson plans or class materials.
( ) I use technology in a variety of ways for instruction.
( ) My students use technology in a variety of ways.

My integrated technology unit addressed the needs of special needs students.

( ) Yes
( ) No

After technology training, I have implemented what I have learned into my instruction within:

( ) I have not had any technology training at this time.
( ) I have not implemented technology into my curriculum yet.
( ) One month
( ) One week

I use, or will use, assistive technologies to aid in student achievement in the following way.

( ) I don't know what assistive technology is.
( ) I will use assistive devices only for special education / special needs students.
( ) I will use assistive devices for any student that requests them.
( ) I will not use assistive devices because I don't have access to them.

My assessment of student learning with the technology-integrated lesson differs from assessment of traditional lessons in the following way. (You may select more than one answer)

( ) I have not integrated a lesson at this time, so my assessment is no different.
( ) My assessment of the technology integrated lesson is no different.
( ) I have created at least one new tool for assessing student achievement.
( ) I now assess the students use of technological methods and devices.

Technology integration has impacted student learning in my classes by:

( ) diminishing student achievement.
( ) increasing student achievement.
( ) I have not integrated technology yet.
( ) Technology integration has had no impact on student learning.

What are the barriers to technology integration in your classroom / building? (Check all that apply)

( ) The are no barriers to technology integration.
( ) Lack of computer or Internet access.
( ) Lack of knowledge of computers and technological equipment.
( ) Lack of time to learn how to use the equipment.

How have you helped a colleague to integrate technology into the classroom instructional practices?

( ) I share technological strategies with colleagues.
( ) Fellow staff members have helped me with integrating technology.
( ) My department/team works together to implement technology into instruction.
( ) I have not helped anyone, or been helped myself, with technology integration.

How have you actively participated in technology staff development?

( ) I have been trained as a trainer.
( ) I have not been trained as a trainer, but am interested in it.
( ) I have been trained as a trainer, but have not done any training.
( ) I have not been trained as a trainer, but have done training.
( ) I am not interested in working as a trainer.

What is your opinion of the technology training opportunities offered this year?

( ) Good variety.
( ) Too much variety.
( ) Too few technological training opportunities.
( ) Good variety, but few or none of the topics met my needs.

Which statement best describes your interest in summer academy courses offered at Milton?

( ) I intend to take the course to move up the pay scale.
( )I am not interested in attending the summer academy.
( ) I am interested, but I don't want to commute.
( ) I am interested, but it happens during dates and times when I cannot attend.

Thank you for completing this survey. Please return the completed form to _____ by May 26th.