

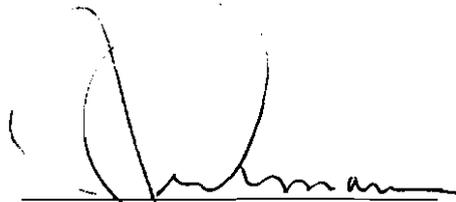
Using Technology Tools in the Public
School Classroom

by

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A handwritten signature in black ink, appearing to read "Jim Lehmann", written over a horizontal line.

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ABSTRACT

The purpose of this study was to determine the effect that computer technology use in the classroom had on students' grades, motivation, attitude and attendance. Teacher/student technology surveys were used to measure teacher use, student use, and overall use of technology in the classroom. The sample for this study consisted of teachers from the Kaiserslautern School District. Results of the study indicated that teachers' technology use, students' technology use, and overall technology use depended on how well the teacher used the technology in the classroom. For the most part, the use of technology was motivating for the students, but it had no significant positive effect on their grades and/or attendance, including "at risk" students. In addition, the study found that the continued use of technology was low among the teachers in the sample. These results suggest that for technology to be effective and make changes in students' grades, motivation, attitude, and attendance, schools must be prepared for technology use in the classroom. Leaders must develop a model of implementation that includes a shared vision among

teachers and leaders and includes entire school community involvement. They must also offer consistent and specific training for staff, time during the school day for the training, a full-time technology director, and time for the staff to communicate and share with peers for technology to be an effective tool in the classroom curriculum.

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Chapter I: Introduction

Technology is a part of nearly everything people do. But does it have a place in the classroom? In this study, teachers in the Kaiserslautern School District, which is located in the Pfaltzland area of Germany consisting of eight military bases, had just received new computers over the past 18 months, and some attended specific software training classes the past summer. Kaiserslautern is a district in Germany on military bases. The district encompasses four high schools, five middle schools and 10 elementary schools. The children that attend the schools are American children in military families. The teachers were ready to infuse their classroom lesson plans with a variety of technology and assigned students activities that involved creating brochures, creating PowerPoint presentations, and using video cameras. This rush of technology could be seen in almost all of the regular classes. However, as the school moved into the 2nd quarter, there was a slow return to traditional classroom instruction, leaving PowerPoint presentations, use of Publisher, and video production behind. Students are still using word processing programs and completing a few scattered technology projects, but the flurry of technology use is over. At-risk students' grades have dropped, along with students' attendance in some or, for a few, in all classes after use of technology was dropped.

The children who are now in grades K-12 will graduate high school over the next 12 years, and more jobs will be technology-based than in previous years. Even if a student decided to work at a fast food restaurant the rest of his/her life, he/she would have to learn to work the cash register, which is computerized. In addition, the rising use of the Internet has brought people together from all over the world. People in the United States are able to do business with people in Spain via the Internet, for example. According to Kleyn-Kennedy (2001), "The unprecedented, exponential growth of technology has changed the world as we know it, and its

impact on every aspect of society is, as of yet, impossible to measure" (as cited in Honey, 2005, p. 8). Smith (2002) offered these thoughts on the impact of technology on the workplace:

Clearly it is now possible for more people than ever to collaborate and compete in real time with more other people on more different kinds of work from more different corners of the planet and on a more equal footing than at any previous time in the history of the world-using computers, emails, networks, teleconferencing, and dynamic new software.
(p. 325)

Secretary of Education Margaret Spellings, in her 2006 testimony to the U.S. Senate Committee on Health, Education, Labor, and Pensions, spoke of the unprecedented pace of technological innovation and global competition taking place today. She concluded, "All Americans must be technically adept and numerically literate regardless of their chosen occupation so that they can make informed decisions and enjoy advancement in their careers" (Spellings, 2006, p. 3).

Therefore, it is imperative students have a positive attitude and a basic understanding about technology to be successful in their adult lives. If schools do not change along with society as far as technology is concerned, they will educate a group of students who do not have the technological skills to compete and succeed in higher education or in the job market, both nationally and internationally (Basset, 2005).

Today teachers have access to innovative tools with which to enhance their curriculum. One of these technology tools is the Internet, which has given students a new way to do research, allowed teachers to offer a wider topic range, and made available an endless amount of information. Additionally, email connects teachers and students from all over the world so they can work collaboratively with other teachers and students anywhere in the world. Interactive whiteboards also allow students to touch the screen and participate in thought provoking

activities prepared by teachers. Specifically, special education teachers have access to tools such as a scanner that will read aloud and software programs that emphasize reading skills. These tools could be helpful to a blind student listening to a book, learning-disabled students playing with reading software, and dyslexic students learning how to read with software.

In the field of education, the influence of technology is ever increasing as school districts and even state governments mandate its use more and more each year. The Kaiserslautern School District, the district where the researcher works, all 750 teachers in grades K-12 were given the opportunity to apply for new technology tools for their classroom. They were offered a SMART Board, an interactive whiteboard; a Liquid Crystal Display (LCD) projector, a projector that connects to a computer hard drive; and an Educators Workstation, a laptop computer with a docking station and a wireless keyboard and monitor. The district superintendent hoped, by offering these tools as well as training teachers to use the tools, student test scores and both teacher and student motivation would improve.

Students should benefit from the use of technology in the classroom. Research in this area has the potential to prove that when teachers use technology tools in the classroom, students become more motivated to learn the material and are more involved in the lesson. In addition, their attention spans may increase when a teacher uses technology tools. Some of these tools include an interactive whiteboard, email, the Internet, course specific software, and many other options available today.

If teachers understand the importance of integrating technology into their lessons and receive the professional development needed in their fields, they could become accustomed to using technology tools; therefore, student learning and motivation could increase. As Kleyn-Kennedy (2006) stated, "Even if teachers are not drawn to technology, they realize that

computers are here to stay, and inevitably, they must resign themselves to developing sufficient technology skills" (p. 43). This study attempted to show that teachers who use technology tools in their classrooms would improve student learning and motivation. "Today's education system faces irrelevance unless we bridge the gap between how students live and how they learn...Students will spend their adult lives in a multi-tasking, multifaceted, technology-driven, diverse, vibrant world-and they must arrive equipped to do so" (Transition in School, 2000, p. 48).

Statement of the Problem

The problem is although many new technology tools are available for teachers to use in their classrooms, training must be provided and continuously encouraged for implementation to be successful. Teachers should realize if they spend the initial time learning to use technology tools, such as an interactive whiteboard, email, or the Internet, the tools could benefit their students. With practice and a little extra planning time, teachers should be able to integrate technology into their classrooms and soon witness the benefits, such as improved student test scores and motivation.

Some teachers are anxious about change and, therefore, shy away from technology. However, the technology tools suggested in this research paper are user friendly and could possibly reap many rewards for students in the classroom. If training is provided to teachers and followed up with peer coaching, observation of other teachers using the tools, mentoring and co-teaching, teachers should have less anxiety about integrating technology tools into their classrooms.

Purpose of the Study

The purpose of this study was to prove the importance of adding technology tools into a teacher's instruction method. During the Information Age, technology tools should motivate students by making their lessons more real world experiences and bringing American education into the 21st century. When teachers add technology tools to proven instructional strategies in their curriculum, students could be more excited about learning, their attitudes could be positive about technology, they could be more engaged in the lesson, and their test scores could improve. Any teacher who can use a computer can integrate technology tools into his/her classroom. This study specifically hoped to show significant improvement in at-risk students' attendance and grades based on current research related to computers and students. The fact classrooms contain computers with an abundance of software does not mean teacher technology use and student technology use will have an immediate and sustained positive effect on student grades and attendance. For these benefits to occur, instructors must undergo professional development in combining use of the technology tools with effective instructional strategies.

Research Questions

Technology in education is a very broad topic, and many questions could have been asked of teachers and students to gather information for this study. The researcher narrowed down the topic by focusing on teachers and students' motivation, grades, attendance, and attitude. As a result, this study considered the following research questions:

1. What anxieties do teachers have about adding technology to their classrooms?
2. How does the attitude of students improve when technology is used in the classroom?
3. What benefits are there to students when technology is integrated into the classroom?

4. What levels of professional development are needed to help the teacher learn to use the new technology tools?
5. Specifically, is the interactive whiteboard easy to use and beneficial to students?
6. After professional development is provided, how many of the Kaiserslautern District's 261 teachers who received an interactive whiteboard said that they will continue to use the board and will add other technology tools into their curriculum?

Assumptions of the Study

The researcher assumed the teachers in the study use proven instructional strategies and are competent in their subject matter and their classroom management and teaching style are already high quality. Also, the researcher assumed the teachers in the study would try to the best of their ability to add technology tools into their already existing curriculum. The researcher also assumed the teachers would allow their students to use the interactive whiteboard interactively and provide honest feedback for the duration of this research project.

Definition of Terms

Technology. The branch of knowledge that deals with the creation and use of technical means and their interrelation with life, society, and the environment, drawing upon subjects as industrial arts, engineering, applied science, and pure science (Technology, 2006).

Technology tools. Tools such as, but not limited to, an interactive whiteboard, software, email, computers, and the Internet are considered technology tools.

Interactive whiteboard. An electronic device, which interfaces with a computer so that images, are displayed on the board where they can be used interactively (Weiser, 1996). Notes can be added, points of interest highlighted, and programs manipulated as one would a giant

touch pad. Resulting notes, drawings, etc., can then be printed out from the computer or saved for future reference.

SMART Board. An interactive whiteboard. The SMART Board is the brand name of an interactive whiteboard.

Educational software. Educational programs used to direct the operations of a computer. Educational software can include any software program used for any subject in the school curriculum for educational purposes.

Laptop. A portable computer that can be docked at a station or used with a wireless connection. These laptop computers can be taken home or to workshops and conferences.

Video presentation device. Device that places objects to be viewed on a surface such as a screen or board. A video presentation device can be connected to a computer, VCR, or other projection tool. Images may be displayed large enough for a group to view (Weiser, 1996).

Video projector. A device that can be connected to a computer, VCR, or laser disk player and project a bright, sharp image on a large surface such as a screen or wall (Weiser, 1996).

Computerized testing. Testing that is created, taken, and graded online. Computerized testing must be done in a lab that has enough computers for each student.

Interactive learning. Situations in which the learner is a participant in the process rather than a spectator (Bork, 1978).

Constructivism. Theory espousing that knowledge is not "about" the world but rather "constitutive" of the world (Sherman, 1995). According to constructivism, knowledge is not a fixed object; instead, an individual through his/her own experience of that object constructs it. The constructivist approach to learning emphasizes authentic, challenging projects that include students, teachers, and experts in the learning community. Its goal is to create learning

communities that are closely related to the collaborative practice of the real world (Dwyer, 1994).

Educational Technologist. A teacher who is a full-time, school-level computer coordinator and teacher of technology implementation to teachers. Each Department of Defense School has one Educational Technologist.

Limitations of the Study

Teachers' schedules are already filled to capacity with deadlines regarding extra requirements other than teaching, and time is limited for these teachers to learn to use new technology tools. Many teachers stay very late in the afternoon or take papers home to grade just to keep up with the day-to-day requirements of their jobs. Rarely is a teacher given enough time to work in the classroom or on lesson plans during the school day, so much of a teachers work is done during off duty hours. Additionally, the cost of technology requires expensive maintenance, so if any of the technology tools that are used break, the tool is not likely to be replaced, and repair takes a very long time. For instance, the last time the supply office of Ramstein Middle School on Ramstein Air Base in Germany purchased a light bulb on a LCD projector, the replacement bulb was approximately \$400. Most schools in the Kaiserslautern District do not have the funds to replace the bulb, leaving a technology tool unusable for the teacher. Limiting the study to only a few technology tools is necessary because of the many technology tools available to the teacher.

Methodology

The remainder of this paper will discuss the effects of technology tools that have been added into the classroom curriculum and the ways in which they can be beneficial to teachers

and students. The researcher investigated other studies of technology tools that have been integrated into the classrooms and the effects these tools have had on students.

The Teacher Technology Survey (See Appendix A) was used to gather information on how teachers and their students used the technology tools in the classroom during the course of school year 2007/2008. The Student Technology Survey (See Appendix B) was used to gather information on students' motivation; attitude toward school, attendance and grades before and after technology was added to their classes. The survey instrument was designed to identify teachers' proficiency on computer equipment and applications and the frequency with which teachers and students use tools/applications in the classroom. These surveys have been used numerous times with various teacher and student samples and have generated reliable results. Teachers who use the tools and the level of expertise and professional development available to them completed the teacher survey. Students who were in the classes of the teachers implementing technology completed the student survey.

Chapter II: Literature Review

Technology has been a growing force in education, business, and private life for quite some time. More and more people use email instead of writing letters and sending them through the postal service, and many times, ecards are sent for birthdays and other special occasions instead of paper greeting cards. *My Space*, an international site that offers email, social networking, communities, videos and weblogging on the Internet is where the students can communicate with friends, virtually designing and maintaining their own website for fun. In addition, more and more homes, schools, and business offices have computers and Internet access. A decade ago, access to technology was limited, and wiring schools was one of the nation's education priorities. Ten years of substantial investments and government interventions have vastly improved this picture. According to *The Secretary's Fourth Annual Report on Teacher Quality*, 90% of schools with computer access have Internet access compared with the 35% of schools with computers having access to the Internet in 1994 (Clopton, 1997, p. 98).

Many schools across the country use technology to enhance student learning: tools such as Internet access, digital cameras, email, interactive whiteboards, laptop computers, LCD projectors, and course specific software that support the curriculum. Most teachers should have a basic understanding of how to use word processing software, such as Microsoft Word, which is available on all school computers. Many teachers are allowing students to use the Internet as a source of information for research projects assignments. Honey (2005) stated that, according to the National Center for Education Statistics (NCES), public schools have made consistent progress in expanding Internet access in instructional rooms.

However, the technological tools themselves should not be the focus. Technology is not the teacher; it is a tool the teacher uses to widen the student's reach and should complement and

enhance what a teacher does naturally. Bassett (2005) acknowledged the digital age is not about technology; it is about what the teachers and the learners are doing with the technology to extend their capabilities (p. 77).

Furthermore, the question is not whether technology tools are available for teachers and students to use. Technology tools are more available to teachers and students than ever before. The question is this: Are technology tools improving education? Even though complex factors exist, such as the ways in which technology has been introduced to different schools in different schools systems around our nation and the amount of money that has been used to purchase technology at individual schools, ultimately, the schools will be held accountable for these investments.

Wilder (1997) discussed the fact most of the research has focused on the effect technology has on students, while more attention should be paid to the effects technology has on teachers and the way they teach. Wilder maintained students move on, but teachers remain to influence the next group of students (as cited in Coley, 1997). Even though this statement is presently 10 years old, it still rings true today.

Student-Centered Technology in the Classroom

Technology can help facilitate the knowledge-constructed classroom. Many researchers view computers as having a positive influence on the teaching and learning processes. These researchers such as Crowl, Becker, and Means have confirmed in their research with the use of computers in the classroom, schools can become more student-centered and offer more individualized learning than ever before. In some situations, such as distance learning, students may never actually meet the teacher since all of the work for the class is completed online. Student-centered classrooms can be challenging for educators because they must re-study their

teaching methods. Research completed by Roshelle, Pea, Hoadley, Gordin, and Means (2000) indicated that computers can be used in collaboration for all subject areas, but teachers must take into account the different styles of teaching and the students' different styles of learning in order to use them effectively (p. 82).

Children of the Technological Tools Revolution

Technological tools, especially personal computers, are often cited by educators and policymakers as magic-workers in literacy programs, providing great access to all students. Blamires (1999) claimed that technological tools could help overcome skill-level barriers to learning. He went on to say computers could make us smarter, if not wiser. Other researchers such as Baker, Gearheat, and Herman (1990) have dedicated pages to the motivational qualities of learning with technological tools. Students are very familiar with how to work computers, which means students are more engaged when using these technology tools.

Motivation and engagement are frequently identified as the major benefits of using technological tools to support literacy learning (Andrews, 2003). A common view is that in using computers, students are so engaged and motivated by a viewing text they hardly realize they are accessing, reading, decoding, and analyzing information. Why is it so engaging? As previously mentioned, technological tools are everywhere in society and are part of our everyday lives. Hence, the use of technological tools in teaching and learning experiences directly relates to the real lives of students. Van Kraayenoord (2002) declared, "Students with learning difficulties in particular will quickly become disengaged if classroom teaching does not connect with their lives, and if it does not engage them as learners with topics and issues that have interest and meaning for them" (p. 398). Reading information on a website advertised in a favorite skating magazine, downloading the latest hits from a radio website, and reading the latest gossip about

film stars are just some examples that connect with students' real lives yet require active practice and development of literacy skills.

Others have suggested using computers for literacy building and literacy practice also allows students to take more risks with their language because of less fear of embarrassing mistakes. The Read180 program that has been implemented in Department of Defense Education Activity schools is a good example. The Read180 software creates games for students while improving their reading skills. This point is similar to that made by Hardy (1999) in referring to the computer as a non-threatening center of attention. Perhaps the highest indication of motivation and engagement is that in studies comparing literacy classes that used technological tools to those that did not, researchers found that truancy levels were much lower in the technological tools-focused classes (Howell et al., 2000). This was especially significant when discussing students identified as "at risk" because one of the major focuses of the Systems Analysis Evaluation and Research (SAER) programs is reducing truancy rates.

At the same time, since technological tools, especially personal computers and Internet access, are becoming more and more a part of students' everyday lives, using a computer is often no longer motivational in itself, as Becker (2000) discovered. Since computers are everyday and ordinary, her students approach them as simply another tool, like a pen or pencil, and not an extrinsic motivational reward. This point can be true of all the new and innovative technology tools available today. Technology advances daily, and tools that are "new and improved" will always be a factor.

Student Learning with Technology

Computers are being used, in part, to enable teachers to improve the curriculum and enhance student learning. One potential target could be "at-risk" students. Recent findings show

that not being challenged and not being given the chance to use complex thinking skills are depriving "at-risk" students of a quality education. Means, Blando, Olson, Middleton, Morocco, and Remz (1993) suggested that technology in the classroom could provide authentic learning opportunities to "at-risk" students. Teachers can draw on technology applications to simulate real-world situations and create actual environments for experiments so students can carry out authentic tasks as real workers would, explore new terrains, meet people of different cultures, and use a variety of tools to gather information and solve problems (Means et al., p. 43). Most of these "at risk" students will be entering the work field after high school, and real world experiences could be helpful in fostering these students' success.

Several studies have suggested any student, including the "at-risk" student, who has technology integrated into the curriculum, could potentially see a positive change in classroom grades, GPA, and attendance. Technology brings about changes to the classroom roles and organization, especially as it allows students to become more self-reliant. Students may use peer coaching, and teachers may function more as facilitators rather than lecturers (Means, 1997). Students are allowed to work on their own, at their own pace, when working on computer projects. These students may not be afraid to fail when their failure is personal instead of in a large classroom discussion.

The study conducted by Sandholtz, Ringstaff, and Dwyer (1997) on the Apple Classrooms of Tomorrow (ACOT) over a 10-year period showed changes in teacher and student interactions. Teachers were observed more as guides or mentors and less as lecturers. The cooperative and task-related interactions among the ACOT students were spontaneous and more extensive than in traditional classrooms. Student interest in computers did not decline with routine use, and teacher peer sharing began to increase as students and teachers sought support

from one another. Other changes that were seen during this study were teachers began teaming and working across disciplines, and school schedules were made to accommodate unusually ambitious class projects by the administrators and the teachers. Teachers and students started to show mastery of technology and to integrate several kinds of media into lessons or projects. Classrooms were a mix of traditional and nontraditional learning, as teachers changed the physical layout of the classroom along with daily schedules to give students more time on projects (Sandholtz et al.). Both students and teachers were motivated to team with others while analyzing and solving real world problems with the use of carefully planned projects.

The ACOT study brought to light meaningful use of technology in schools goes beyond just putting computers in classrooms. Technology cannot be considered a change agent for education in and of itself. When used as an integrated tool with the curriculum, technology can make a difference in education (Sandholtz et al., 1997). Technology (a) must be used to support collaboration in the classroom or to access information, (b) should also be used to express and represent the thoughts and ideas of students, and (c) must be used with authentic forms of assessment to be a value to students and teachers in the classroom.

The Use of Technological Tools to Support Reading Skill Development

Many authors relate their experiences in researching the effectiveness of "talking books" as a specific example of a technological tool that supports reading skill development. When using "talking books," learners do not need to be able to read well in order to access a text. The text of the story is highlighted from left to right while a narrator reads expressively and animations aid understanding. Many student textbooks are very difficult to read because of long sentences and an extensive vocabulary, so a learning disabled student would not be able to read and understand the content of the book. Rusch, Conley, and McCaughrin (1993) found talking

books aided in developing children's skills in decoding print media in a similar way to traditional adult-print child interactions, with the talking book taking the place of the skilled reader. Becker (2000) suggested for children with learning difficulties, talking books stimulate because of sound, animation and the opportunity for children to be in control, a key issue for these authors. Students do not have to stumble over unknown words, which aids in content comprehension.

As well as examining how students interact individually with the support features provided on electronic texts, there is a need for further research into the incorporation of electronic texts into specific classroom contexts. Many of the studies on the effectiveness of talking books have been conducted outside of the classroom (e.g., in reading clinics) or without considering the influence of the wider context on students' learning. VanKraayenoord (2002) says many researchers working in this area had noted the importance of context, yet there is little literature available about "regular" classroom teachers in "regular" situations using technological tools to support reading. A regular classroom does not contain tools to accommodate students with special needs.

Writing and Technology Tools

Although research has shown talking books, other computer programs and Information Communication Technology (ICT) texts support learning of reading skills with positive results, both Dorman (1999) and Jaber (1997) suggested this is not enough. They explain a great number of technological tools are available to move students with learning difficulties from being mere consumers of predetermined reading packages to actual producers of texts. According to Dorman (1999), the introduction of simple multimedia authoring packages, such as Microsoft PowerPoint or Apple's Keynote, moved children from the passivity of readers and responders to the activity of writers and authors.

Use of a word processor may mean a student identified as being "at risk" of failing major literacy outcomes could be included in more high-level activities and could access and create texts they otherwise could not. Spell and grammar check capabilities included in computer software are helpful tools for these students. In terms of programming and assessment, students and teachers can focus on literacy tasks and not lack of literacy skills while using these and other technology tools. This is in line with the "writing to learn" model of literacy rather than "learning to write"; however, there are dangers. Dorman (1999) argued, "If teachers use word processors simply to facilitate repetitive tasks of copy-typing, it 'becomes an educationally dehydrated means of child control'" (p. 25). Teachers must use these tools to aid students in completing a project, not as the project itself. Again, tasks must be engaging, purposeful, and relative to the real lives of students because, as Roschelle et al (2000) related, sitting in front of a computer doing word processing is not necessarily more interesting or constructive than using pen and paper (p. 92).

Government Support and Standardized Testing

In his education proposal, President George W. Bush (2003) stated,

The quality of our public schools directly affects us all as parents, as students, and as citizens. Yet too many children in America are segregated by low expectations, illiteracy, and self-doubt. In a constantly changing world that is demanding increasingly complex skills for its workforce, children are literally being left behind. This Administration believes schools should use technology as a tool to improve academic achievement, and that using the latest technology in the classroom should not be an end unto itself. (p. 2, 24)

Although the No Child Left Behind (NCLB) Act of 2002 has forced teachers and administrators to change their curricula to focus on material in the standardized tests or face losing their jobs, President Bush began a process of improving the education system. However, the technology tools the NCLB encourages schools to use do not come cheap. According to the Department of Education in Washington D.C. schools across the United States have invested over \$66 billion in hardware, software, professional development, technology support services, and infrastructure over the past decade. As a result, the legislators and the public are watching for some improvements in the schools. The legislators will be asking for proof regarding the cost and time spent on technology in K-12 schools. They will want to know if all of the money spent has been worth the cost (Honey, 2005).

The passage of NCLB brought about an increasing focus on standardized testing results as the measure of student advancement and achievement and of school and teacher quality. According to Honey (2005), "Therefore, efforts to integrate technology into schools and classroom practices must not only acknowledge but also provide evidence that technology assists in meeting these accountability demands" (p. 15). School systems must prove the investments made in technology are improving student scores on standardized tests.

At the same time, test scores can be a flawed reflection of student learning, as standardized tests do not measure student motivation and excitement about learning. In fact, many students who do well in the classroom have a difficult time taking standardized tests, making tests results an inaccurate measure of achievement. Unfortunately, some school districts could also be teaching the test instead of the course content, which will also skew scores. Linda Roberts, Director of the U.S. Department of Education Office of Educational Technology, stated, "The [Bush] administration has a realistic vision of how the use of technology can enhance

teaching and learning to improve student achievement as well as provide access to valuable educational resources" (p. 3). She went on to say,

We are concerned about student achievement, and there are many ways to measure achievement and performance, and, yes the education community believes that our standardized achievement tests are only a partial measure of what students know. But even in that limited arena, there is research under controlled conditions that shows that students with access to good technology applications and good teaching learn more and learn faster than students who don't. (Clopton, 2006, p. 4)

Technology tools are not the teacher; the teacher must understand and use these tools to enhance the curriculum. According to Coley (1997), the results of implementing technology tools in the classroom "are highly dependent on the quality of the implementation of the instructional design." He went on to say, "Standardized achievement tests might not measure the types of changes in students that educational reformers are looking for" (p. 67-68). There must be other ways to test the knowledge students' gain by integrating technology into the classroom.

Performance based assessments focusing on issues students have solved or electronic portfolios that highlight the accomplishments of each student would be a much better indication of students' knowledge. Schools could also research attendance of students before and after technology was added into the curriculum.

Barriers to Teachers' Use of Computers

New and improved models of teaching are often considered the best way to teach students; however, they change regularly, just as technology does. Other barriers to using technology in education include lack of teacher time, training, and support; limited access; high costs of equipment; lack of vision or rationale for technology use; and assessment practices that

may not reflect what is learned with technology (U.S. Congress Office of Technology Assessment [OTA], 1995). In particular, the lack of teacher training and expertise is a major barrier to using the computer and related equipment.

However, with adequate training, technology tools can be quite effective in the classroom. With computer competence, teachers' anxiety decreases, and their attitudes toward computers improves with hands-on computer literacy courses. Adequate time allows teachers to experiment with new technologies, to share these experiences with other teachers, to prepare lessons using the technology, and to attend technology courses or meetings (Barron & Goldman, 1994). Learning how to use new technology includes the time the teacher needs to become competent with the computer as a personal tool and as an instructional tool. Teachers need to develop their skills outside of the regular school day so they can concentrate on instruction and training objectives during the school day. After teachers become knowledgeable about using technology tools, they need time to transfer the skills learned into the curriculum. Training could come in many forms, such as in-services, professional development, collaborative learning, and peer coaching. Whatever methods are pursued, teachers need the time to learn at their own speed and with their own learning styles (Brand, 1998).

A major problem with technology in schools is many schools cannot afford to have full-time school-level computer coordinators, even though this is an important step in having technology work in schools. Training and support within a school district may not always be planned or may not meet the needs of the teachers. Many times, the training may focus on how to use equipment but misses the importance of how to integrate the technology into the curriculum, and school-level computer coordinators help to bridge that gap. These school-level computer coordinators collaborate with the classroom teacher using the technology tools available, even at

times teaching the class. They also conduct after-school classes for teachers on specifics designated by the teachers themselves.

Admittedly, technology can be difficult to integrate into the curriculum. However, when teachers see how technology can benefit their students, they might be willing to become part of the technology plan. Schools and districts need to meet the vision of the new technologies with planning and leadership. Teachers must be included in this process of understanding the curriculum uses and ways of incorporating technology into the lessons. Many times, the need for keeping abreast with new technology changes is not communicated to teachers. The fact is to be effective, technology must be ingrained into the broader education reform movement that includes teacher training, curriculum, student assessment, and a school's capacity for change (Roschelle et al., 2000). Teachers have the unwieldy task of keeping up with new styles of learning, new program changes and new technology, and they need to prepare themselves and their students for those changes. Schools need to aid in this preparation by addressing these changes through professional development programs.

Technology Assessment

At home, computer skills are necessary to do many common tasks, such as pay bills online; email friends, family or business associates; and book reservations for vacations. Employers and university professors demand certain skills and modes of thinking appropriate for the challenges of the 21st century, and almost all jobs now require some basic understanding of computer hardware and software, especially word processing, spreadsheets, and email. Schools must change to meet the demands of higher education communities and the job market to prepare students for a successful adult life after they finish high school and to enable them to compete internationally (Bassett, 2005). Time and flexibility are needed to make changes in school

systems. Courage and funding are also integral parts of making quality changes in a school district.

Much research has been done on using technology in the classrooms, but few studies have uncovered ways to assess student learning through the use of technology besides the obvious standardized testing. According to Honey (2005),

Sivin-Kachala and Bialo (2000) reviewed 311 research studies on the effectiveness of technology on student achievement. Their findings revealed positive and consistent patterns when students were engaged in technology-rich environments, including significant gains and achievement in all subject areas, increased achievement in preschool through high school for both regular and special needs students, and improved attitudes toward learning and increased self-esteem. (p. 23)

Evaluators of educational technology do not have an easy job and could be disadvantaged by the fact technology is constantly changing and improving. Legislators and the public are interested in the results of the money they spend for a particular technology in the school systems. However, by the time researchers collect, analyze, and publish data regarding that particular technology, it is probably obsolete.

Research studies reviewed in the article by Honey (2005) found many examples of improvements in student learning with regular use of technology in the classroom. Specifically, these studies examined improvements made by fourth grade English/Language Arts students who took the Massachusetts Comprehensive Assessment System test and improvements in the reading proficiency scores of students who took the Michigan Education Assessment Program test. In addition, Honey cites Schater who, in 1999, found that students with access to any

number of technologies showed positive gains in achievement on researcher constructed tests, standardized tests, and national tests.

Teachers and students also have various opinions about using technology in the classroom. One teacher from the Kaiserslautern School District stated, "There are so many changes and updates in technology. How am I supposed to keep up?" A 2007 student survey at the University of Ohio addressed students' views on how technology was being used in their classrooms and how it affected them. More than half of the students surveyed said they have had assignments using technology, including the use of a webpage, online assignments and syllabi, regular contact with the teacher through email, PowerPoint use for lectures, and Internet discussion groups. Results suggested students have a good attitude about using technology. Approximately 31.2% of the students said technology should be used in all of their classes, and 62.5% said technology should be used in some of their classes. According to Young (2004), "Students find technology use particularly helpful when it relates directly to course topic areas or when learning about abstract concepts" (p. A31).

All responses were not positive, however. The complaints from the students were professors tended to cover complex content too quickly when using technology to teach, professors waste too much time trying to get the technology to work, the lectures seem impersonal, and faculty use the technology to distance themselves from students. Of the students surveyed, 6.3% said technology allows "bad teachers to become worse" (Young, 2004, p. A31). According to Wrienne T. Mitchell, a senior at the University of Ohio, "It becomes a distraction when you're sitting in a class for an hour, and for 15 minutes of that class the professor mutters as they try to get something to work or try to track down somebody to make it work" (Young, p.

A31). Fortunately, the problems described by students can be addressed and even eliminated with proper training and practice and with improvements to the technology tools themselves.

Researchers have also investigated the effectiveness of specific technology tools and software. The researcher for this project found that the most common software used in middle and high school classrooms seems to be the Microsoft programs Word, Excel, PowerPoint, and Access. These programs are readily available on most school computers, and students and teachers have most likely been exposed to these programs for years. According to Julia Keller (2003), PowerPoint is especially popular: "In less than a decade, it has revolutionized the worlds of business, education, science and communications, swiftly becoming the standard for just about anybody who wants to explain just about anything to just about anybody else" (p. 30). PowerPoint can also be a wonderful tool for students and teachers to give out information, if used properly. A PowerPoint presentation used on an interactive whiteboard can be especially interesting since students and teachers can manipulate information with a simple touch to the screen.

However, PowerPoint is not without its disadvantages. According to Young (2004), "PowerPoint is one of the most common technologies used amongst teachers and also the most criticized software programs used by teachers" (p. 29). One of the problems with using PowerPoint for a presentation of information is having the slides actually take over the presentation instead of keeping the speaker on topic, supporting key ideas through image, and enhancing the overall presentation (Young). Keller (2003) also reported a problem with PowerPoint presentations: "There's the old axiom in design that said, 'less is more.' "They should have that printed on the outside of the PowerPoint box. It needs a warning label" (p. 30).

PowerPoint is not the only software program to be highlighted in the research. Tuttle (2006) posted his research of student improvement on a blog at wordpress.com in December 2006. Tuttle used an Excel spreadsheet weekly in his English classroom and reported that the class' journal writing improved overall from 80 words to 180 words in less than 10 weeks. In addition, Coley (1997) studied examples of student improvement through the use of technology in an analyzed study by Kulik and concluded, "Students usually learn more in less time when they receive computer based instruction, students like their classes more and develop more positive attitudes towards computers when their classes include computer-based instruction" (p. 56). The report goes on to say that the effects of computers were not always positive: "In 34 studies that examined students' attitudes toward subject matter, for instance, the average effect of computer-based instruction was near zero" (Coley, p. 57).

Technology cannot be expected to improve all areas of teaching and learning. Teachers' styles of teaching differ as greatly as students' styles of learning. A meta-analysis report by the Software Publishers Associations analyzed 176 studies completed on the use of technology in schools and concluded, "The use of technology as a learning tool can make a measurable difference in student achievement, attitudes, and interactions with teachers and other students" (Coley, 1997, p. 62). However, technology used along with the constructivist approach has proven to be effective. Constructivism position is when students are engaged in choosing the content of the subject, learning is more effective. In 2002 Means and Olsen of the U.S. Department of Education's Office of Educational Research and Improvement specifically investigated the influence of technology on constructivist teaching in classrooms. Overall, increased technology use affected schools positively, specifically in the areas of student motivation and academic performance. Specifically, seven out of eight districts reported lower

teacher turnover in their district, six out of eight reported higher student attendance rates, five out of eight reported higher test scores, and eight out of eight reported fewer disciplinary incidents (Coley, p. 65).

Teacher Training

After the educational goals and visions of learning through technology have been determined, it is important to provide professional development to teachers to help them choose the most appropriate technologies and instructional strategies to meet their goals. Students cannot be expected to benefit from technology and teachers cannot be expected to use it if they are neither familiar nor comfortable with its use. Wenglinsky (as cited in Crowl, 1993) found that teachers who had received professional development with computers during the last five years were more likely to use computers in effective ways than those who had not participated in such training.

Yet teacher training too often focuses on helping new teachers survive the first year of technology use without equipping teachers to use the technology long-term (Fulton, Yoon, & Lee, 2005, as cited in Honey, 2005). One teacher told the publication *Education World*, "Many trainings are too focused on tools and not strategies of how to use them" (Baver et al., 2006, p. 22). Another teacher told the same publication that faculty should be compensated for completing training and using technology (Baver et al., p. 22).

The fact is that it takes much longer than a year to incorporate and understand the effects of technology added in the classroom, and teachers often complain about the lack of training available for them to learn new technologies. Young (2007) stated,

Colleges have spent millions on "smart classrooms" packed with the latest gadgets to assist teaching—computerized projection systems, Internet ports at every seat, even video

cameras with motion detectors that can track the movements of a lecturer. But colleges have spent far less time and money giving professors the skills to use even the simplest technology effectively. (p. A31)

If teachers are not properly trained, technology might actually impair their effectiveness. This would mean they would be more effective using something they are skilled at using such as chalk on a chalkboard. Another problem could be the fact many of the technology tools districts buy go un-used in some classrooms, while teachers who are interested in teaching with technology and enhancing their curriculum do not have the tools needed. In other words, some have it and do not use it, while some want it and do not have it.

Summary

According to Postman (1993), "Technology is ideology. To be unaware that a technology comes equipped with a program for social change, to maintain that technology is neutral, to make the assumption that technology is always a friend to culture, at this late hour, stupidly plain and simple" (p. 135). While some changes brought by technology have been positive, some issues remain unresolved. For example, students often complain of PowerPoint abuse by teachers, wasted time fumbling with projectors or software, unmediated chat rooms, and wasted time teachers spend teaching web tools and not content. However, these same tools can be highly beneficial to students if they are used along with a sound instructional method. Teacher complaints toward integrating technology tools into the classroom include no training, no compensation for completing training, long hours learning new technology tools, and poor distribution of technology tools among teachers. The government is interested in assessing student achievements after adding technology tools into the curriculum and has offered grants to

help school districts obtain technology. However, even the government admits more than a standardized test must assess the success of technology use in the classroom.

Chapter III: Methodology

Technology is entwined in the social lives of students today. They carry cell phones and MP3 players in their pockets, play video games during their free time, and use computers to chat with friends. Therefore, when technology tools are added into the classroom, it would stand to reason that these students should be more engaged in the learning process. Technology tools used in the classroom are valuable because they can motivate students to become involved in the lesson. As a result, it is very important for teachers to understand how technology tools can improve their teaching skills and their students' learning skills and test scores. Teachers who have an open mind are more likely to add these tools to their curriculum with basic staff development and a little extra time to practice the new skills.

The purpose of this study was to demonstrate to teachers the possible value of integrating technology tools into their classroom curriculum. The method used to gather relevant data was surveys for students and teachers to complete and studies of test scores before and after technology tools had been introduced in their classrooms.

Subject Selection and Description

The Kaiserslautern School District is located in the Pfaltzland area of Germany. There are eight military bases in this area. Ramstein Middle School on Ramstein Air Base in Germany has 450 eighth grade students divided into three teams. The sample for this study consisted of one team of 150 eighth grade students who share the same teachers. This sample included inclusion, Advancement via Individual Determination, and gifted students, allowing a good representation of the population.

The testing using the technology survey and the technology infused in the classroom was completed during students' science class. Students' range from 11 to 13 years old, and all either

come from families whose parents are in the military or are working as civilians with the military.

This convenience sampling method was chosen because the study used students who share the same science teacher, making the results more accurate. The science teacher agreed to teach one of his five classes in the traditional manner he has used for the last 10 years: with a book, a whiteboard, and paper and pencil. He taught his other four classes incorporating technology tools into the classroom. Specifically, these tools consisted of an interactive whiteboard, Internet access, an LCD projector, laptop computers, and online testing.

This sampling yielded reliable, valid results because the same teacher provided instruction for all the students in the sample population. The science teacher taught all 150 students within 2 days using a block schedule, and all students in the five classes had the same amount of instruction time. The variety of students used in the study represents the population: special education students, regular education students, gifted students, and Advancement via Individual Determination students. Because of this wide representation of students in this study, the research was true of the population.

Instrumentation

The instrument used for this study was a survey with a series of questions designed specifically for this study. Students answered user-specific questions before the testing period and then again after the testing period. In the first section, the survey asked students questions about their attitude toward school. Questions included, "Do you like school? Are you motivated to learn the subject matter? What is your favorite subject and why? Do you care about your grades? What is your grade point average?" The next section asked questions about the grades

these students made the previous semester in their science classes, and finally, the last section concentrated on the technology these students were using.

The researcher administered this instrument to students during the first science class of a new semester. The teachers were surveyed during the first faculty meeting of the new school year. Students and teachers were asked to remain silent during and after completion of the survey until all participants were finished. The student instrument was intended to assess student motivation and excitement toward learning, improvement of students test scores, and attitude toward technology in the classroom. The teacher instrument was intended to be more motivated to continue use of the technology tools in the class curriculum.

Data Collection and Analysis Procedures

The researcher administered the surveys (See Appendix A and Appendix B) and collected the student and teacher data. The data consist of answers from the questions of the pre and post activity, compared and analyzed by the researcher. Data collection began at the start of a new semester and concluded at the end of the same semester. The data collection dates were selected because an entire semester gave the researcher enough time to collect ample data. In addition, the collection date at the end of the first semester was chosen because the information and experience were fresh in the minds of the sample groups. The researcher compared and analyzed the data, and data analysis indicated whether students' motivation improves when a teacher adds technology tools into the classroom curriculum, regardless of whether the students are average, inclusion, or gifted students. Answers to the instruments were placed on an Excel spreadsheet and then compared by the researcher who then published the results to the students and teachers who took the survey. Discussion of the results (See Appendix C) with these students and teachers was also recorded and added to the original data. This method of analysis was very useful

because the students and teachers who completed the surveys remained the same before and after the testing period.

Limitations

A limitation of this study is the time and cooperation it took to administer the instrument to the students during class. Teachers are given many extra duties to be completed outside the classroom hours, and recently in the Kaiserslautern School District, the teachers were given mandates to complete standardized testing, keyboarding, and reading testing, just to name a few, without any other duties being taken away. "How are we supposed to get everything done and still have time to teach the students?" one teacher complained. In addition, technology tools such as the interactive whiteboards are expensive and many districts in the Department of Defense Dependent School Systems might not have the money to buy the new technology. Furthermore, teachers who do not feel comfortable using a computer might fear the idea of adding technology tools to the classroom curriculum.

This study was designed to prove whether technology tools added to the classroom improved students' motivation and test scores, and made it easier and more beneficial for teachers to teach the subject matter. The amount of time it takes a teacher to learn a new concept could be a problem in the classroom, but adding the technology tools could be a more efficient method of teaching. Administrators must be aware that to be successful in integrating technology into the classroom, teachers should have training and extra time to practice the training and develop lessons that incorporate the technology tools.

Chapter IV: Discussion

The purpose of this study was to decide if the integration of technology tools increased motivation, student attendance, and grades in the Kaiserslautern School district by administering a survey to students and teachers. Dwyer (1994) stated to fully integrate technology; the educator typically experiences five stages. The first stage is entry, which is characterized by teachers having doubts about technology as their classrooms begin to change. The adoption stage is second and is identified by teachers using technology to support traditional text-based drill and practice; student achievement shows no significant decline or improvement, self-esteem and motivation are strong, and student attendance is up with few discipline problems. The survey suggested that when the teacher had integrated technology effectively into the curriculum student attendance increased. The third stage is adaptation and is represented by teachers thoroughly integrating technology into traditional classroom practice; student productivity increases; students produce more work faster; and students are more actively engaged in learning. The appropriation stage is fourth and is described by teachers' and students' use of appropriate technology. Teachers gain a perspective on how profoundly they can change the learning experience; students have highly evolved technology skills and can learn on their own; and student work patterns and communication become collaborative rather than competitive. The survey confirmed that only a hand full of the teachers polled had reached this stage. The last stage is invention, which is pictured by teachers being prepared to develop all new learning environments utilizing technology as a flexible tool. Teachers view learning as an active, creative, and socially interactive process and view knowledge as something students construct rather than something that can be transferred.

The teachers in the current study were in two stages of technology integration with the exception of four teachers who had reached stage four. Since technology use is low among the teachers in the study, the majority are in the entry stage where there were doubts about integrating technology. The technology survey showed teachers were motivated to use the technology when first received, however, with lack of proper training and time to practice new technology skills, motivation decreased quickly and the teachers returned to original teaching routines. During informal talks between the researcher and the teachers, some teachers stated they were using technology to support traditional drill and practice worksheets, and students' achievement had shown no significant decline or improvement, which placed them in the adoption stage. Other teachers stated that they needed to learn how to use the software available to them, but very little training had been offered. This placed those teachers in the entry stage where there is uncertainty about how to use technology. These teachers never reached the stage needed to improve student motivation and learning in the classroom. Only when teachers have reached the stage at which they view learning as active and ever changing and are comfortable with the technology tools available to them will these tools increase student learning. The student survey showed the effect of the teachers' knowledge of technology usage greatly affected the improvement seen in students' motivation.

Training of Teachers

This research indicated that computers, the Internet, and SMART boards could be used in collaboration for all subject areas, but teachers have to take into account the different styles of teaching and the students involved in learning. This type of teaching requires a change in the teacher's method of teaching, time needed to learn how to use the technology, and models that work with technology (Sheingold & Hadley, 1990). Any student, including the "at-risk" student,

who had technology integrated into the curriculum, could see a positive change in classroom grades, motivation, and attendance. The student survey verified a positive increase in student's grades when the teacher integrated technology into the curriculum with suitable planning and proper training.

Training is time consuming, but when teachers are shown technology can be a useful tool in the classroom and can benefit students, most are willing to take the time to learn (Byrom, 1997). When technology works, teachers who integrate it directly into the subject matter and develop ways to use it as a tool see its impact on that subject area. The classroom atmosphere changes, discipline problems are fewer, and the teacher-student barriers change into interactive learning. As the student survey established, interactive learning between students and teachers using technology was beneficial in student motivation.

At the time of this study, the middle school being studied had begun its second year of technology use in the classroom. The middle school teachers of the present study were slowly learning how to incorporate technology into their administrative use: creating course worksheets, keeping student grades, and creating course syllabi. Not only did teachers need time to learn the new technology, but they also needed time to feel comfortable using the new technology as a learning tool. This research illustrated when trained teachers began to use technology as a tool to accomplish personal tasks, the technology was being integrated into their lives, and they were more prepared to use the same technology in the classroom.

Technology implementation at educational institutions requires careful planning that outlines the framework in which technology will be used. Dwyer, Ringstaff, and Sandholtz (1991) stated, "Over time, technology use changes the way teachers teach. As they grow in their use of technology, they become more willing to experiment, their teaching becomes more

student-focused, and they tend to establish collaborative working relationships with other teachers" (p. 48). Obviously, the studied school was in early stages of technology planning and implementation. The research illustrated success of increase motivation and attendance on students depended on the comfort level of the teacher with the new technology tools.

Advantages and Disadvantages of Using Technology Tools in Learning

The most obvious advantage of using information technology in teaching and learning is the flexibility it creates for learners to get access to computers. Now that computers have become common, learners can get access to the Internet and engage in study at any time, at any place, and at their own pace. This is one of the reasons distance learning has become so common in schools.

Another advantage of information technology is its versatility. Other than just sounds, computers can produce colorful graphics, which can greatly enhance learning outcomes as learners retain the majority of what is taught through sights rather than sounds. Compared to humans, computers have absolute superiority in generating attractive graphics. In a nutshell, a picture is worth more than a thousand words. Also, computers can provide instant feedback to learners when they are doing exercises or practicing skills learned in the classroom. Learners do not have to wait for teachers to mark their answers or give comments. Immediate feedback will sustain learners' interest. Finally, through the Internet, learners have access to a huge variety of knowledge that is from various sources and is constantly updated.

Despite its many advantages, using technology tools does have its drawbacks and obstacles. First and foremost, the teachers' knowledge of information technology is the most crucial factor in determining the success of such technology in the classroom. The student and teacher survey suggested the degree of comfort the teacher had with the use of technology the

more the students benefited from its use. Generally, the younger the age of the teacher, the more information technology skills he/she had and the more willing and comfortable he/she is in using such technology in teaching. Conversely, many older teachers find it very hard to grasp the concepts of technology and develop the skills required to use technology tools, especially when training has not been consistently available to them. The government has laid down the policy of requiring all teachers to learn to use technology tools and use them in their classrooms. The problem was that many teachers find it hard to find time in their overloaded work schedules to attend courses and to practice the new skills. It is difficult for a teacher to monitor the performance or progress of students during a lesson at the computer. Supervising more than 40 students' activities through a central monitoring system is not as easy as it sounds. There are always a few students in class who will not follow the instructions of teachers. Also, teachers may have to be forced to walk around the classroom to supervise students, which makes it difficult to monitor everyone's computer screen. The teacher must plan for this issue when setting up the computer workspace.

Next is the problem of interactions and the need for a teacher still in the classroom. Teaching and learning involve a lot of human interactions, especially in language teaching and learning. One can hardly imagine learners picking up a language entirely through interactions with computers. Also, human interactions do not rely solely on the uttering of sounds. Other factors include subtle variations in facial expressions, gestures, postures, eye contacts, the number and type of people involved, the setting, and so on. A machine can never cope with all these, whereas an experienced teacher can do so with ease. There is no doubt that computers can provide instant feedback to learners; however, the type of feedback is limited to simple answers and pre-set comments. Computers are useful only for low-level questions and cannot handle

questions that ask for complex skills from students like note-taking, summarizing, giving comments, and so on. Finally, information technology can aid teachers in producing desirable-learning outcomes, but teachers are always the key to productive learning.

Chapter V: Summary and Recommendations

The current study results indicated the extremely low technology use among most of the teachers who were part of this study. Technology was introduced, and the school population was very excited about the idea of technology use in the classroom. However, as the school year progressed, the use of technology tools decreased. The research questions in chapter one were addressed individually with the use of the surveys and discussions held with students and teachers. The first research question, (What anxieties do teachers have about adding technology to their classroom curriculums?) seemed to be much concern about the necessary time it takes to learn a new technology skill and the lack of time the teachers possessed, and the training or lack there of the teacher received for this skill. Technology training is needed for the teachers to apply technology as a curriculum tool. Although technology is not a panacea for all educational ills, it is an essential tool for teaching (U.S. Congress OTA, 1995). To use technology as an effective instructional tool, teachers need training and time to infuse technology into their curricula.

This research considered how technology use (low/high) affected students' classroom grades. It showed some positive affect on "at-risk" student grades for any of the independent variables: teacher use, student use, or overall technology use. However, that trend did not continue into second quarter for any of the independent variables. Students used technology as a tool to collect, organize, and analyze data; to enhance presentations; to conduct simulations; and to solve complex problems. The research addressed the attitude of the students before and after technology was introduced into the classroom and found interactive learning with technology increased student participation and improved their attitude toward the class, however teacher centered learning while using technology did not improve the attitude of students.

One of the changes seen over the year's study was the change in the lower-achieving students, the ones teachers could not reach with teacher-centered learning. These students began to respond positively, given the alternate ways of expressing their knowledge, which not only raised their self-esteem but also their status with the teachers and their peers. Therefore, it seems likely that "at-risk" students will show improvement in academic achievement when technology is used in the classroom appropriately. Less improvement in students who already had developed good study skills was evident. These students tended to do well regardless of teaching method used.

The level of knowledge the teacher gained through use of training and collaboration was important in the positive affects seen on students' behavior. Teachers, who received more training and had more time to work on lesson designs and skills, felt more comfortable with the technology tools and did a better job using them in the classroom. The study also verified professional development is needed continuously throughout the school year to maintain focus and effort when dealing with technology. The survey suggested collaboration with other teachers using technology improved teacher motivation and comfort with lesson design.

A question in Chapter One referred to the ease of use of the interactive whiteboards given to many teachers in the Kaiserslautern school district. The survey showed the interactive whiteboard was fairly easy for the students to use but the teachers had difficulty with the lights shining directly in their eyes as well as trying to write lessons on the board with the correct pens. Students were able to use the interactive whiteboard when presenting projects without difficulty but had the same problem as the teachers had writing on the board.

After professional development was provided and the teachers were polled about the future and continued use of the interactive whiteboards, 178 of the 261 teachers that were

provided an interactive whiteboard said they would continue to use the board if more training was available to them. These teachers were excited about the improvement in student motivation and were ready to slowly incorporate more technology into their classrooms, including software programs designed especially for education and student development. The other teachers stated they did not feel comfortable enough using the interactive whiteboard and would prefer the normal whiteboard and erasable markers, or even the chalkboard. These teachers did not have any plans of adding more technology into their curriculum at this time.

The research suggests technology could potentially change education in a beneficial way if used appropriately. The conditions needed for improvements to education through technology tools are (a) teachers who will face their beliefs about learning and the efficacy of different instructional activities; (b) teachers who view technology as one possible tool that must be used in the curricula and instruction framework with meaning; (c) teachers who are risk takers, experiment with technology, and help and share with peers; and (d) methods for meeting the long-term challenges that integrating technology presents to teachers.

Conclusions

Technology tools can provide another way for children to learn and make sense of their world. They can be used in developmentally appropriate ways that are beneficial to children, or they can be misused, just as any other materials can be misused. Furthermore, just as pencils do not replace crayons but, rather, provide additional means of expression, technology tools do not replace other methods of learning but add to the tools available to children to explore, create, and communicate. When used appropriately by skilled teachers, technology tools can support and extend learning in valuable ways and can increase educational opportunities for all students. The

key is knowing how to align the elements of sound teaching practices with the unique capabilities technology offers.

Schools have a vital role to play in helping today's children understand how existing values, policies, and laws apply to a rapidly changing, technology-dependent world. To be effective in this role, educational policymakers must understand the dilemmas and legal issues raised by the technologies used in schools. They must set realistic policies that comply with the law and that model ethical behavior for all involved. They must also educate teachers about important technology ethics issues and must clearly communicate related school policies to both faculty and students. Equally important, by incorporating the study of technology ethics into the standard curriculum, schools can ensure the leaders and decision makers of tomorrow will be equipped to make the difficult ethical decisions they will undoubtedly face.

There is no denying literacy is one of the most important outcomes of schooling. By the end of their compulsory education, students must be sufficiently literate to function and communicate in everyday society. Lack of literacy skills seriously diminishes opportunities and life chances, so it is essential that all stake holders are prepared to support literacy learning for students, especially those with learning difficulties. There is great hope for technological tools to be used effectively to add value to the learning experiences of all students, especially in the area of literacy. They can lend motivation and encourage engagement; offer avenues for explicit learning, development, and practice of skills; enable communication and collaborative learning in different environments; facilitate inclusive and equitable learning; and become powerful tools in supporting the achievement of literacy outcomes.

However, technological tools are not "miracle machines," and effective teacher pedagogy and support are critical for success in creating inclusive and equitable learning experiences. No

doubt new literature will soon reveal even more questions, themes, and issues about the use of technological tools to support literacy, especially for students with learning difficulties. Perhaps it will even get to the stage where literacy is synonymous with technology programs and the use of technological tools to support literacy development is as obvious as using a pen or pencil to practice handwriting.

This study concluded that the impact of technology in schools is somewhere between the "only" way to make a positive change in schools and a new fad. Technology can be a strong tool for positive change if it is used in the right way. As a result, steps must be taken for technology to make a positive difference. School leaders must plan for technology and include everyone at the *beginning* of the plan, not after technology is implemented. Teachers must change the way they teach and must on occasion become facilitators. Classrooms must take on student-centered learning methods. Students must be allowed to use technology as a tool that enables them to collect, analyze, and create major projects. The quality, not quantity, of the time allowed for technology integration into the curriculum is the key to student learning. Technology is not the entire solution for keeping "at-risk" students in the classroom, but it is a start in the right direction.

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Appendix A

Survey for Technology Tools for Teachers

Name:

Grade:

Date:

1. What is your schedule for this semester?
2. What technology do you use everyday?
3. What technology do you use in your classroom?
4. Do you have a SMARTBoard?
5. How often do you use the SMARTBoard?
6. Do you have an Infocus projector?
7. Do you use the Infocus projector?
8. Do you use the Internet in your classroom activities?
9. Please name the subjects you teach where you use the SMARTBoard.
10. Please name the subjects you teach where you use the Infocus projector.
11. Please name the subjects you teach where you use the Internet.
12. Do you think the SMARTBoard increases student interest in the topic when you use it as a teaching tool?

13. Do you think the Infocus Projector increases student interest in the topic when you use it as a teaching tool?
14. Do you think the use of the Internet increases student interest when you use it as a teaching tool?
15. Do you think student grades are better when you use technology tools such as the SMARTBoard, Infocus projector or the Internet?
16. Why/Why not?
17. What can you do to increase student motivation in your classes?
18. What do you need to be successful when adding technology tools into the classroom?
19. Do you think an Educational Technologists in your school would increase the likeliness of your using technology in the classroom?
20. Besides training and professional development opportunities, what else do you need to improve your chances of success adding technology into the classroom?
21. Do you think adding interactive technology tools in your curricula would increase student motivation, attitude, attendance and grades?

Appendix B

Student Technology Survey
Spring 2008

Name: _____

Grade in school: _____

Ethnicity: _____

1. Are you motivated to learn in your classrooms?
 2. What is your favorite subject and Why?
 3. Do you care about your grades?
 4. Do you have a home computer?
 5. Is it a PC or a MAC?
 6. Do you have Internet Access?
 7. How comfortable are you with technology?
 - a. Very comfortable
 - b. Comfortable
 - c. Somewhat Comfortable
 - d. Uncomfortable

 8. Rate your ability at creating Microsoft word documents.
 - a. Very Strong
 - b. Strong
 - c. Average
 - d. Weak

 9. Rate your ability at creating PowerPoint Presentations.
 - a. Very Strong
 - b. Strong
 - c. Average
 - d. Weak

 10. Rate your ability to create tables.
 - a. Very Strong
 - b. Strong
 - c. Average
 - d. Weak

 11. Rate your ability to create simple Excel Spreadsheets.
 - a. Very Strong
 - b. Strong
 - c. Average
-

d. Weak

12. How often do you use technology to complete classroom assignments?

- a. Frequently
- b. Occasionally
- c. Seldom
- d. Never

13. List technology areas that you would like to know more about or receive help developing knowledge.

14. Do you have sufficient access to the school's technology?

- a. Yes before the classes begin
- b. During seminar
- c. After school
- d. No I do not have sufficient access

15. What changes would you like to see in the schools technology program?

School and Class Specific

16. Do you like school?

17. What were your last quarter's grades?

18. Do you think that the use of an Interactive whiteboard would motivate you to listen to the lesson?

- a. Absolutely
- b. Probably
- c. No

19. Do you know how to present projects using the SMARTBoard?

20. Have you ever presented a project on the SMARTBoard using the Microsoft software programs? Which software did you use?

21. Do you think viewing professional science research labs online using the LCD projector would help you improve as a science student?
- Absolutely
 - Probably
 - No

22. Please write your opinion of using technology in a science class.

23. Would you like to learn to research science topics online?
- Absolutely
 - Probably
 - No

Appendix C

August 2008*DISCUSSION AND SUMMARY OF USING TECHNOLOGY TOOLS AND STUDENT SURVEY*

The researcher and teachers involved in the research sat down at the beginning of school year 2008 to discuss the results of adding technology in the classroom.

The teachers agreed the students were computer savvy and did not have difficulties using the technology tools introduced whether they were software programs or external tools such as the interactive whiteboard.

Teachers also agreed the students were frustrated when the technology was not working properly or the teacher themselves were having a difficult time using the technology. Teachers agreed this was a deterrent when designing lesson plans.

The teachers also agreed training and practice must be incorporated in the school day for the teachers to learn and introduce lessons with new technology tools. The teachers stated it was easier to continue using lessons without technology they have used before than adding the technology tools into the lesson. A few believed adding the interactive whiteboard improved student attention on the teacher.

Approximately one half of the teachers at Ramstein Middle School (75) stated they would only continue using the new technology tools if more training occurred. The other half of the teachers were already familiar and comfortable with technology, which improved their chances of continued use.

On the survey questions about the use of technology tools the students were already familiar with the technology tools questioned in the survey. The Microsoft software programs are

something these students have been using in school and at home since they began school in kindergarten.

Students were pleased with the availability of technology in the school. They said they were regularly exposed to some type of technology in every classroom. They also said there were several labs in the school to work on projects when needed.

A small majority of the students believed adding technology in the classroom motivates them to listen and understand the topic presented during class. However, they agreed that if the teacher spends more time trying to work the technology tools then these tools themselves become more of a distraction than a valid educational tool. The students did not like the use of technology for repetitive practice or worksheets and showed no improvement when these techniques were used.

About half the students said their grades and motivation improved because of the addition of technology tools in the classroom. The other half claimed the tools did not make a difference in their grades or motivation. The attendance of the students only improved a small amount when technology was used in the classroom effectively.

The opinions of the students who did not like school did not change with the use of technology nor did the opinions of the students who liked school.

Comments referring to the question, "What would you like to see with technology in the schools?" were mostly about more "hands on" activities such as presenting with the interactive whiteboard, Internet use, and software programs rather than teachers lecturing while using the technology. There were also comments stating if the teachers were not good at using the technology tools to wait until they had more classes before they used them.