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Technology Implementation In K-12 Schools: A Research Study Of Perceptions And Practice

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TECHNOLOGY IMPLEMENTATION IN K-12 SCHOOLS: A RESEARCH STUDY OF PERCEPTIONS AND PRACTICE

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ABSTRACT

According to the National Center for Education Statistics, even though 97% of classrooms have at least one instructional computer available, only 40% of teachers in public schools (including elementary and secondary) report using computers in the classroom often. My project aims to illustrate the barriers that are keeping K-12 teachers from integrating technology in their classrooms, such as the lack of availability for training, teacher's lack of knowledge or schooling, or a lack of IT support. It also discusses possible solutions to the problem, such as teacher training and better resources. By assessing the Level of Technology Integration, or LoTi, we can learn how much or how often a teacher is using technology in a classroom. My project consists of conducting a research study that will aim to reinforce the hypothesis that the LoTi in K-12 schools is lower than expected, considering the availability of computers and technology. By learning the severity of the obstacles teachers face, we can work on possible solutions.

The findings of this study were that teachers face barriers that inhibit them from implementing technology no matter what type of school environment they are in. These barriers come from lack of time, access, but most strongly from the self-efficacy of the teachers. Teachers need professional development and training to develop their skills and confidence, which will positively impact students, the school, and the overall education system.

I would like to dedicate this to Kevin. Thanks for everything babe.

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CHAPTER 1 INTRODUCTION

"Tell me and I forget. Teach me and I remember. Involve me and I learn" – Benjamin Franklin

According to a study done by *Newsweek*, the United States is 26th in the world in education. Kazakhstan, a country ranked sixty spots behind the U.S. on the list of World's Best Countries, is ranked twelve spots ahead of us in the individual category of education. What is the U.S. educational system, a basic function of society, lacking which other countries seem to possess? Considering we are in the top ten as regards to the highest quality of life, the "United States has yet to tap the power and potential of design and technology education for engaging students in critical and creative thinking" (Todd 363). Although public education has made an effort to incorporate technology into the curriculum, there are many barriers that have slowed this progress.

In recent years, the focus in education has been on preparing students for "the global economy by equipping them with 21st century skills, such as information and communication technology skills and problem-solving skills" (Ottenbriet-Leftwich et al. 1331). Using technology in K-12 public education will make a school more competitive and help the students learn better. However, there is a lack of innovation in education and there are barriers that block many of the teachers who are trying to make a difference. While society tends to focus on the students when considering education and blame teachers for low test scores and failing students, it is undeniable that through teachers we can help to improve the quality of education. In this thesis, I aim to determine whether the teachers at a technical high school in Florida are facing the same

barriers at the same level as teachers on the national scale. I will conduct a survey that gathers data from the sample of teachers and analyzes the results to see if successful integration has been achieved. Whether or not the teachers have been successful, I will propose causes and possible solutions of how to raise the level of technology integration in K-12 education. Since technology integration provides a gateway for students to transition into their future careers and lives, it is important to research methods to increase their level of technology use.

1.1 **The Paradox**

With the advent of computers and technology, educators, parents, and politicians immediately saw the implications it had for improving the quality of education students receive. When trying to introduce technology into the classroom, however, there were several problems. Initially, the problem with technology in K-12 education was a lack of access and funding. Most schools could not afford the computers, devices, and networking that would connect them to the Internet and other technology. In the early 1990's, computers were just becoming affordable for the average American. As we approached 2000 and the Millennium bug, efforts were made in schools, businesses, and universities to rapidly develop a network infrastructure, and many people saw that these new technologies had the capability to reform our schools (Aust et al. 169). There were government initiatives at the federal, state, and local level to invest more money in technology and expand those budgets. Computer labs started appearing in schools and students had homework online. Then after several decades of "intense promotion of information technologies by business leaders, policy makers, and parents, most teachers

and students now have far more access to machines and software both in school and at home than ever before" (Cuban, Kirkpatrick, and Peck 815). Yet despite the access provided to teachers and students, technology use in K-12 classrooms is still alarmingly low. Data gathered by the National Center for Education Statistics shows that only 40% of teachers report using computers in their classroom often. Fewer than half of teachers in the United States are using computers often in the classroom, and there is not an accurate description of what often is. Often could be anywhere from every day to only two or three times a week. There are no standards for what technology integration is or how to achieve it effectively.

To counteract low integration and other educational problems, the government has passed many laws including the Carl D. Perkins Vocational and Technical Education Act, the Improving America's Schools Act, and most famously, the No Child Left Behind Act. All these initiatives dealt with the technology integration problem by increasing regulations and moving around funding, but nothing seemed to make a significant difference. Researchers had investigated this paradox by focusing on the students for many years; they found that no matter how much time and effort they put into making technology easier and more available to the students, it did not affect the level of technology integration. Eventually the researchers looked to the other user of technology: the teacher. Teachers were the thread that connected the students to the technology.

Teachers are the implementers of any changes in the classroom. Whether it is changes in procedures or information, teachers are the individuals who affect the daily

lives and activities of the students. If we can reach teachers in a meaningful way that allows them to integrate technology more, the students will feel the benefits. In K-12 education, Cadeiero-Kaplan found that "when teachers begin to engage students in technology learning that is critically student centered, it has an impact on how technology is considered within our culture" (464). Technologically capable students are more valuable in the workplace. In order to create a level playing field, "we must engage all learners, both teachers and students alike, and forge new pathways of learning together into the future" (Cadeiero-Kaplan 464).

1.2 **Significance**

The significance a teacher can have on a student's learning is profound. Thus, we need to focus on the significant changes we can provide for teachers that will allow them to better integrate technology. Studies that focus on teacher's barriers and technology integration solutions are needed to identify pathways to overcome the obstacles. My research will attempt to identify whether teachers are facing barriers in a technical school, and whether those teachers have different opinions about technology use or strategies for incorporating technology than teachers around the country. The goal of my research is to contribute to the understanding of barriers affects on teacher's use of technology, and ultimately outline how this relates to technical communication.

By working together, educators and technical communicators could help to improve the quality of education students receive and the unmet promise of support that teachers expect. If technical communicators applied their skills and knowledge to the aid of teachers, the level of technology integration could drastically improve, as well

as the overall standard of education throughout the country. I will conduct a survey gathering data about teachers technology use from a select sample and compare that data to national statistics. In the course of my thesis project, I will provide a review of the related literature, an overview of the methodology of my study, and an analysis of the data.

CHAPTER 2 REVIEW OF LITERATURE

During the 2012 Democratic National Convention, while addressing all the pressing issues of the economy, jobs, and opportunity in America, San Antonio mayor Julian Castro said: “It starts with education.” This sentiment is one that many parents, students, and teachers in America share. The progress of any country starts with its educational standards. And in this time of technology and innovation, the American education system is having trouble adapting to these new technologies. In choosing my thesis topic, I wanted to research something that could help me to make a difference in some way, and it is my strong belief is that education is the key to all future progress. I see from personal experience that K-12 education is the same as when I was a child, even though the world is vastly different. Computers, the Internet, and other technological innovations have greatly changed the way we work, communicate, and learn. Despite these advancements, however, research shows that most classrooms still are not integrating technology.

This literature review is meant to show how important technology use is in K-12 education, that teachers are an important part of the integration process, and that helping teachers overcome these barriers is the key to successful integration. In the first section, I show that because technology has a positive impact on learning, we need to focus on making sure that technology is used more efficiently and frequently in K-12 education. In the second section, I address the impact that teachers have on technology use to show how they are an essential part of the integration of technology into the

curriculum. In the third section, I address the problems that teachers are facing; they are faced with many barriers that inhibit them from integrating technology into the curriculum. Finally, I add some information about solutions such as preservice education and self-efficacy, and why I am contributing to this research with my own study.

2.1 **The Impact of Technology in the Classroom**

Most educational researchers will agree that using technology in the classroom is the future of learning. The degree of computer use and technology in the workforce and daily life makes it undeniable that students will need to learn how to use computers in their future careers. The "wide use of technology can enrich classroom environments" for both the students and the teachers (Bitter, Thomas, and Knezek 53). Technology in the classroom, when used properly, has far-reaching positive effects. The National Education Technology Standards (NETS) Project outlines the learning goals of parents, students, and educators; it shows how administrators and officials are working on incorporating guidelines and milestones into the curriculum for each K-12 grade (Bitter, Thomas, and Knezek 54). The NETS project's goal is to "enable stakeholders in PreK-12 education to develop national standards for educational uses of technology that facilitate school improvement in the U.S." (*National Educational Technology* xi).

Schools and teachers will have a place to look to create specific goals and standards for their own institution after standards are drafted at a national level. The new learning strategies that incorporate technology move traditional learning environments to new learning environments, such as from teacher-centered instruction to student-centered;

single media to multimedia; isolated work to collaborative work; information delivery to information exchange; passive learning to active/exploratory/inquiry-based learning; and factual, knowledge-based learning to critical thinking and informed decision-making (*National Educational Technology* 5). Skills like critical thinking and collaborative work will propel these students to successful futures. Almost all careers and professions today employ computers and technology, so the students receive lifelong skills when taught using technology.

British professor David Johnson conducted research across a variety of classes and observed that when students used computers and other technology:

- They were more motivated, which increased their interest and enjoyment, thus having a positive effect on the perception of the subject;
- They concentrated better on the work which seemed to improved the quality of the work, from both the perspective of the students and teachers;
- They were given more "open-ended" work, which allowed them to experience more complex and demanding learning environments. (Johnson 79)

Although there is not always hard evidence to show the positive impact technology has on the people in the classroom, most researchers agree that the overall affects are positive, and can be even more so with more effective integration. In "Case Studies of Multidisciplinary Approaches to Integrating Mathematics, Science and Technology Education," Wicklein and Schell observed several pilot programs aimed at creating a

multidisciplinary technological curriculum. The found that when implemented successfully, the lessons “help students learn, apply, and transfer learning beyond the classroom environment” (Wicklien and Schell). The positive impact technology has is multidimensional, and cannot be measured with numbers. We cannot see the greatly positive impact, however, because technology use is so low that we cannot measure its affects.

One of the biggest sources of evidence that integration is below expectations is the 2009 *Use of Educational Technology in U.S. Public Schools* report by the National Center for Educational Statistics. In this report put out by the Department of Education, the startling gap between access and use of computers and technology becomes evident. Though ninety-seven percent of teachers have access to computers in their classrooms, only forty percent report using them “often.” The numbers for professional development were very low, and the percentage of teachers who felt they were prepared for “effective use of educational technology” was only sixty-one percent (NCES 4). It is easy to see through the data tables presented that technology integration is stagnating, although this report does not investigate or identify what the causes are.

As technology becomes more advanced and intuitive, people find new ways to use it for specific applications. In “ Integrating Curriculum, Instruction, Assessment, and Evaluation in a Technology-Supported Genetics Learning Environment,” Hickey, Kindfield, Horwitz, and Christie focused on a computer program developed to teach genetics to see how effective it was and to compare it to conventional approaches to teaching the subject. While using the genetics program, students were able to see many

different applications of the concept and were still able to communicate with their classmates. Using a computer also made learning more fun for the students, which likely increases their dedication and understanding of a subject. While studies like "Integrating Curriculum." hint that pedagogy could benefit from change, the article does not go into much detail about the positive, far-reaching affects technology can have in the classroom, and instead focuses on this specific application. Nonetheless, this study is "a noteworthy example of the synergy between educational technology and contemporary pedagogical principles" (Hickey et al 496). This study shows that when curriculum is infused with technological aids such as computers and software, students and teachers benefit from it.

It is easy to disregard the positive affect even a small change can have on a school, but every modification counts. Even something as simple as having a virtual encyclopedia versus a print one can make a huge difference as described by Merritt et al. in "Magnet and Specialized Schools of the Future: A Focus on Change." Printed volumes take up a great amount of space, can be damaged or lost, and will likely be out of date within a few years. Virtual volumes save space, are easily accessible and taken care of, and can be updated every year (Merritt xi). Students who have easy access to accurate information will always be more informed and knowledgeable, and teachers will be more effective and will be able to teach outside of their subject, such as using engineering principles in art projects. By having this type of multidisciplinary learning, students of all interests will have a more well-rounded education.

2.2 **The Critical Effect of Teachers on Technology Integration**

In any field, the people who apply the changes in a practice are the ones who determine the success of the changes and "every reform effort should take into consideration the knowledge, skills, beliefs, and attitudes of the people who will implement the changes" (Angeli and Valanides 608). Teachers are the people who interact with the students, parents, and administrators on a daily basis. The teachers get handed a set of standards or benchmarks that they must meet, and how they implement the standards is usually up to them; although there are some standards for technology being developed, teachers currently are not required to integrate technology into their classrooms. Aust, Newberry and O'Brien observed that the level of technology integration in American schools was low, and believing that teachers were unable to integrate effectively, they created a learning cohort. The cohort was a group of teachers who had different levels of experience using technology. This cohort focused on investigating why teachers are struggling with integration and finding ways for teachers to collaborate to try and increase their integration efforts. It is a prime example of how working directly with the teachers helps to solve problems.

Creating cohorts and collaborative learning experiences "allows for the joint construction of knowledge and sharing cognitive load, thus facilitating higher levels of learning" (Hu 118). In " Turning Points in the Professional Development Model and Methodology," Strong-Wilson emphasizes the importance of including teachers in research and describe the effects of Learning with Laptops (LWL). LWL is a professional development program that gives teachers hardware and resources to develop

technology-integrated curriculum. The program has four core elements: face-to-face meetings, teacher blogs, documentation of practice, and public sharing of research (Strong-Wilson 51). Teachers use the laptops in their classrooms, and over a two-year period, work with other LWL teachers, researchers, and students to develop a more integrated curriculum while gathering research about the strategies that work and those that do not. It is a constantly changing program, making improvements on each new cohort group, but it a step in the right direction for teacher professional development.

In "A socio-technical analysis of factors affecting the integration of ICT in Primary and secondary education," Andeli and Valanides conducted a study in public schools throughout Cyprus, which has similar goals and current structures as the U.S.. Believing that when technology is integrated into the classroom "learning objectives vary from achieving deep understanding of concepts to developing critical thinking, decision making, and problem-solving skills, to cultivating positive attitudes toward learning," they wanted to investigate if and how ICT was being integrated into the curriculum (Andeli and Valanides 621). They focused on teachers, believing that teachers are the medium through which technology will be brought into the classroom. They conducted a survey of over 500 teachers and found many interesting and interdependent factors affecting the use of ICT in schools. Almost every teacher has at least one computer at home and felt confident about his/her computer capabilities for personal use, and even when questioned about their confidence in using it in the classroom, they had positive responses; however, the results of the survey showed only a small a number of teachers actually use ICT in their classroom on a regular basis.

Andeli and Valanides found that when it actually came to using ICT teachers' confidence dropped, fear took over, and the lack of encouragement lead to them abandoning attempts to integrate ICT. These attempts were not encouraged by administrators or insisted upon by parents, so it was completely up to the teachers discretion of the pursuit of technology in the classroom followed through. Although parents and people outside the schools system attribute a lot of control and power in the classroom to the administrators or school board members, it is ultimately the teachers who implement changes and practices in the classroom.

2.3 **Invisible Integration**

Cornu says that integration is the natural progression of technology, and when things are natural and "invisible," like the television, they are fully integrated (6). Teachers can no longer only deliver knowledge, but must be "counselors, advisors, organizers, leaders, and managers" (8). Cornu paints a picture of a fully integrated educational system, where computers and technology are a natural part of the system. Many other researchers have this same idea: integration is not about just having a computer in the classroom, but about making it an indistinguishable part of the curriculum.

Edutopia, a website founded by the George Lucas Educational Foundation, states "when effectively integrated into the curriculum, technology tools can extend learning in powerful ways." Fully integrated technology means the technology is:

- Routine and transparent;
- Used without the student or teacher actively thinking about the tool itself;

- Available and easily accessible at all times;
- Helping students to reach their goals and their curricular requirements effectively;
- Fully immersing students in the learning process. ("What is Successful")

In the same way that other pieces of technology have become an indistinguishable part of our lives, technology tools need to be seen in the classroom as unremarkable and part of the regular routine. Many students and teachers are distracted by the novelty and excitement of using technology right now, but when the students are engaged in learning without being sidetracked by the tools, technology will have reached full integration; students will need to "select technology tools to help them obtain information in a timely manner, analyze and synthesize the information, and present it professionally" (*National Education Technology* 6). These types of critical thinking and analytical skills are what will help the students in their future, digitally based careers. Currently, Erekson and Shumway say "the universal, society-permeating nature of technology makes it very difficult to focus and organize technology education curriculum," but by developing many methods and working with teachers, administrators, and the students, it is possible to do (28). Technology integration requires constant research and updating teaching techniques frequently.

To illustrate what a fully integrated classroom might look like, imagine a modern classroom with an interactive whiteboard, which is a device that is digitally links to a computer and can both project and record without a keyboard or mouse. In this fully integrated classroom, the teacher demonstrates a concept on the board using video and

examples. She then projects an unsolved problem on the board and lets the students come up and try different methods to solve it. While one student is at the board, other students are taking interactive notes on laptops or iPads, and they are able to insert the visuals projected on the board into their notes. The students can record video and audio to get a comprehensive record of what was covered in class.

Many classrooms today have interactive whiteboards, but most teachers just use them as a simple projector and do not actively involve students (Spector 152). Teachers have not been trained in all the ways an interactive whiteboard can be used and "fail to recognize that in some situations the interactive whiteboard can both save time and increase student interest" (Spector 152). With professional development, teachers will learn how to integrate tools like interactive whiteboards, which can create a fully integrated technological curriculum. This process will require many different avenues: legislature, administration, infrastructure, but the most important avenues will be through teachers.

2.4 **The Evidence of Teachers' Barriers**

There are many different factors and issues that prevent teachers from integrating technology; some are within their control and some are not. Things like access to hardware and funding are decided at a school, district and state level, but issues like time, attitude, and priorities come from the teacher. In "Addressing first- and second-order barriers to change: strategies for technology integration," Ertmer explains the differences between first and second-order barriers and how they both need to be addressed to be able to integrate technology. First-order barriers have to do with the

physical hindrances such as lack of equipment or time, while second-order barriers have to do with mental hindrances, such as attitude and beliefs about technology. Ertmer believes that addressing these barriers is not done in a step-by-step process though; it must be done simultaneously because first and second-order barriers can be intertwined and one might not present itself until the other is being solved.

The idea that teachers are the key to successful integration is reinforced in Ottenbriet-Leftwich's article "Teacher value beliefs associated with using technology: Addressing professional and student needs." The researchers first explain how important teacher's beliefs and practices are, and how these two often conflict with each other. Ottenbriet-Leftwich et al. conducted a study about the practices and beliefs of eight award-winning teachers to better assess how the teacher's beliefs influence their practices, and also aim to support "the notion that teachers are capable of considering and selecting appropriate ways to use technology to enhance teaching and learning" (1324). Each of these eight teachers were successful in integrating technology into their curriculum and had positive attitudes about integration. Through these examples of successful teachers, we are able to see how they are overcoming barriers and what might be inhibiting other teachers. Surprisingly, one of the most impactful issues was the teacher's own attitude toward technology.

Ottenbriet-Leftwich et al. believe that teachers are not only the key to technology integration, but that their input is essential to get it right. To integrate effectively, "teachers should contribute to the discussion of what technology uses are valuable for teaching and learning; value should not be solely attributed to only a constructivist

pedagogical approach" (Ottenbriet-Leftwich et al 1324). The teachers in Ottenbriet-Leftwich's study genuinely believed that by using technology in their classrooms, they were positively affecting students' learning and their futures. They overcame barriers because of their belief in the positive affect it would have, and they were able to surmount the difficulties it presented. Each of the eight participants had different methods, but all observed improvement in student performance and learning when using technology. Some students who never participated in regular classwork and homework on paper or from a textbook would actively engage themselves in the work when using computers (1328). This study shows that using technology in the classroom really benefits student learning, and the way to achieve that is through helping teachers. By changing teacher's beliefs and values about technology, they will be more able and willing to integrate technology in the classroom.

Ertmer's article shows, however, that integrating technology is a complex process and it is not as simple as just giving a teacher computer access. The physical access to a computer is one first-order barrier that seems easily solved, but when a teacher has the computer, he may then bring up other issues, such as "I don't know how to use it" or "I'm afraid it will be unreliable." These kinds of excuses are examples of second-order barriers manifesting. By simultaneously addressing barriers, like installing computers and sending teachers to a workshop about computers, teachers will become more confident and the likelihood that they will incorporate technology into the curriculum will increase.

Ertmer then discusses the different areas that can help to solve these problems, which she believes will take time and dedication, but can be done if we focus on the teachers and all the obstacles they need help to overcome. Administrators and educational consultants need to put a "great emphasis on professional growth, as opposed to program-technology adoption" because "professional development experiences might be more effectively linked to new visions for teaching and learning, made possible with technology, rather than the development of user proficiency in the operation of specific software and hardware" (Ertmer 13). Even though Ertmer believes teacher's confidence alone does not overcome barriers, Aust, Newberry, and O'Brien showed that creating a cohort encouraged teachers to at least start developing new activities incorporating technology.

2.5 **Multidisciplinary Learning**

Another issue Ertmer presents is that integrating technology is much more than just doing homework on the computer. Two examples of statements from inservice teachers show the difference; one description talks about the physical integration, such as having desks with computers and an LCD projector, but the more effective description focuses on the advancement of the curriculum, which also happens to include computers. A fully integrated class is described as a classroom "in which students have opportunities to see the connections between subject areas and in which multidisciplinary learning occurs" (Ertmer 3).

Most parents want their children to have a "well-rounded" education, but the current education system separates subjects with few interconnections. Real-world jobs

and experiences require a person to have a wide breadth of knowledge that they can apply in many different situations. Multidisciplinary learning takes place when a student's learning transcends the narrow focus of one subject. Since technology is "ubiquitous," it allows for a powerful prospect to unite all subjects of study in a school (Erekson and Shumway 28). Creating multidisciplinary lessons pushes students to make significant links across subject areas, such as English, mathematics, social studies, and science ("Characteristics of"). An example of a multidisciplinary lesson would be one that takes place in a middle school English language arts classroom, but incorporates science and technology as well; in this lesson, students have to develop an essay and website about their birthstone. They use science principles to study about the birthstone and its mineral properties, English to write an essay describing their birth and a report describing their birthstone, and technology skills to create a website portfolio with their essay, report, and charts created in word processing software (National Educational Technology 53). Both the English and science teacher can collaborate on this project, and they can encourage the students to collaborate as well. Projects like this encourage multidisciplinary learning, and the length and scope of the project exposes students to a multidimensional learning experience.

Even students understand the benefits of multidisciplinary learning. The California Center for College and Career says that "in a 2006 survey of more than 3,000 at-risk, early high school students in California, more than 80 percent revealed that they would study more and work harder in school if they saw the relevance of their classes to their future education and careers" (Designing Multidisciplinary 1). This fact reinforces

the idea that invisible integration, along with multidisciplinary learning, can make students more motivated and interested in the curriculum. Creating an education system that is fully integrated and multidisciplinary requires "supportive administrators, class schedules that facilitate teacher collaboration, investments in finding and working with industry and postsecondary partners outside the high school and the district, sustained teacher enthusiasm and commitment, and a foundation of solid integrated curriculum material" (Designing Multidisciplianry 3).

2.6 **Areas for Further Exploration**

Progress using technology is ever evolving in other aspects of society, but education seems to be stuck in a rut. The current pedagogy, and the individual schools have trouble adjusting to the changing times and face many obstacles from funding, bureaucracy, and doctrine. There are many different avenues to change, but researchers agree that teacher development is the most effective and efficient way to institute change. Cornu notes that teachers teach as they were taught, so preservice teachers should be taught using technology, not about how to use it. Ertmer agrees with this sentiment (Bai and Ertmer 94). In "Creating an Environment for Pre-Service Teachers to Develop Technical Pedagogical and Content Knowledge," Chun Hu explains that preservice training is important, but continued education is needed after teachers enter their positions. In the study, Hu studied a twelve week preparation program offered to post-graduate new teachers. Throughout the course of the study, the pre-service teachers made some improvements in their technical knowledge, but the percentages were not immense; however, professional development takes time and the small

percentage increase would grow larger over time. The development of teachers' technology, pedagogical, and content knowledge "relies on constant professional development in which awareness created during pre-service education would serve as a foundation" which will enhance every teacher's strategies (Hu 126). By exploring teacher training and professional development, we will learn even more fully what problems they are facing about how to overcome them.

In "Increasing Preservice Teachers' Capacity for Technology Integration through the Use of Electronic Models," the focus is heavily on the self-efficacy of teachers and how to improve it. Self-efficacy is one's own measure of personal ability to complete tasks and capability to learn. Ertmer et al. believe that increasing a teacher's self-efficacy will increase performance. She identifies four primary keys to self-efficacy:

- Personal mastery – successful task completion
- Vicarious experience – observing models
- Social persuasion – "I know you can do this!"
- Physiological indicators – emotional arousal, relaxation (Ertmer et al 97)

Although Ertmer found that working on self-efficacy was extremely effective in increasing technology use, she explains that it is very difficult to develop programs and workshops that focus on self-efficacy. Making collaboration between teachers easier would have a positive affect. Learning from teachers who are already putting technology to use in their classrooms would have a constructive effect on other teachers' self-efficacy.

If is difficult to institute broad changes in education because every school and classroom is different, and many people are resistant to change. We can see from many of these studies that most teachers are open to technology use and have a positive attitude toward integration, but when it comes to putting a technological curriculum into practice, they hit walls that prevent it. Whether these walls are from outside sources or their own frame of mind, "the adoption of changes requires educating teachers to understand and accept the nature of the restructuring effort, and develop the knowledge, skills, and attitudes that are required for bringing about the change in their classrooms" (Angeli and Valanides 608).

Although the end goal to fully integrate technology into the education system is immense, there are several manageable steps that can be taken to make it a reality. All the studies and research discussed in this chapter suggest that technology integration is a worthy cause, and that teachers are the key to its successful integration. Because of inconsistencies and bureaucracy, it is very difficult to institute changes in education, but with continuing research and work, it is an attainable goal. Continued research will provide more proof that technology integration is needed and that there are many different avenues to achieve it. Research studies can show teachers, administrators, policy makers, and government officials that a change is needed. The more studies that support this claim, the more validity it will have.

In order to contribute to the effort of educational reform for technology integration, I will conduct my own study. I want to show that through teachers, we can make a positive and substantial change in the current education system. This thesis

aims to show whether a technical school has made any advancements in technology integration by comparing it to national statistics for technology integration. My study will investigate whether the teachers at a technical school feel that they face similar barriers, and to the same degree as regular schools. I will conduct a survey gathering data about teacher's perceptions and opinions of technology use at a technical school in Kissimmee, FL. By observing different types of schools and educational structures, we can look for both the success and failures and move forward toward system reform. Education is meant to "sustain" a society's knowledge and potential, and as society and technology advances, the education system needs to reflect and incorporate those changes to produce an intelligent and well-prepared generation.

CHAPTER 3 METHODOLOGY

In an effort to help teachers overcome barriers to technology integration, many researchers are conducting studies on what those barriers are and proposing possible solutions to the problem. One approach that can help find a solution is to study schools or teachers that are overcoming those barriers and applying that knowledge to new reforms. The focus of my research study was to determine whether the teachers in a technical school had better rates for technology integration than the national average. In order to contribute to the body of knowledge about technology integration in K-12 schools, I chose to study a technical school in order to compare the amount of technology use to those of regular schools. Most studies focus on regular schools and do not take other alternative schools, such as technical and magnet, into consideration. By comparing the two results, we can see whether a technical school has some advantages over a regular school, which might suggest solutions for those schools, or it will show that technical schools are on par with regular schools and that a complete overhaul of the pedagogy of education is needed to properly integrate technology.

This chapter discusses the research methods used to collect data during this study. It explains the process for approval, development and distribution of the research study.

3.1 **Sample**

The subjects for this study were taken from Professional and Technical High School (PATHS) in Kissimmee, FL. PATHS is the only technical school in Osceola

County, and students partake in technical training while completing their high school curriculum. PATHS is not an open acceptance school; students have to apply during the last year of middle school and be accepted into PATHS. If a student's GPA drops or there are any disciplinary problems, the student is expelled from the program and has to go back to the school he was originally assigned to if he had not applied to PATHS. PATHS has several different programs the students choose from that allow them to receive a certification or license in either a Business Technology, Industrial, or Health Science field, as well as their high school diploma. This type of career-based education in a technical or magnet school offers "an educational experience that's much more relevant to the world of work than what" other regular high schools provide (Merritt et al. 8).

Because of an acquaintance, I had contacts at the school and knew what the school was like and how it was different from other schools. I chose to use all the teachers at PATHS for my sample. The total number of teachers at PATHS is 41 and 26 participated in the online survey, for a 63% return rate. The teachers at PATHS are important for my study because they teach at a technical school, and some of them have taught at other traditional schools, so they have knowledge about how a technical school works and how it is different from other, more traditional schools.

Both the principal of PATHS, Peter Hodges, and the member of the Osceola School Board who represents PATHS, Julius Melendez, gave authorization for the study. Additionally, permission and approval for the study was given from the University of Central Florida Institutional Review Board (Appendix A). After obtaining written

permission from the principal of PATHS, completing the CITI training, and submitting research protocol documents, I obtained permission from UCF IRB to conduct the study. All the teachers were notified about the survey beforehand and were given Explanation of Research forms, as per IRB requirement. Their individual names and information will not be exposed during this study, so the study qualified as exempt research. During my study, I aimed to answer the following questions:

- What do the teachers at PATHS feel are their biggest hindrances to integrating technology?
- What do they feel they are doing well to integrate technology in their classrooms?
- What do the teachers at PATHS feel would help them at successful integrating technology more?
- Do the PATHS teachers' use of technology suggest that technical schools might integrate technology better? If so, why?
- Have the teachers at PATHS noticed at difference in technology and computer resources between their school and other schools?

The instrument for the study was a survey consisting of 43 questions, 5 of which were demographic questions (Appendix B). The average age of teachers surveyed at PATHS is forty-five, with the youngest being twenty-six and the oldest being sixty-two. Of the 26 teachers surveyed, eighteen were female. All of the teachers have bachelor's degrees, and eighteen have master's degrees as well. The teachers are from a variety of subjects such as science, math, language arts, reading, foreign language and social studies, which was spread fairly evenly across the sample. Out of the 25 sampled, 6 have

been teaching for over 20 years, 4 have been teaching for 5 years or less, 4 teachers have been teaching for 6 to 10 years, 2 have been teaching for 16 to 20 years, and the largest group is 10 teachers have been teaching for 11 to 15 years.

I used SurveyMonkey to implement the survey. It is a survey generator website that is approved and suggested by the UCF IRB. Within SurveyMonkey, I was able to choose the layout of the survey, the distribution of questions on each page, and the type of questions (multiple choice, short answer, check-box). Mr. Hodges provided me a list of the emails of all the teachers at PATHS, which I put into my SurveyMonkey address list. I was able to send a link in an email to all the teachers that lead them to the survey, and it tracked which teacher was responding through the link so there were no repeat responses. This created a reliable method of data collection. I was able to select only the participants who had not yet responded, and send that particular group more emails to remind them to complete the survey. I believe this increased the number of responses. SurveyMonkey also has several analysis and graphing tools once the data has been collected. The only drawback of using SurveyMonkey is that all the communication was through email, so it did not encourage the teachers to participate as eagerly as a face-to-face interaction would. Still, more than half of the teachers responded, which provided enough data.

I sent three emails with a link to the survey during the initial two-week period of June 6, 2012 to June 19, 2012. The survey closed on June 20th. I reopened the survey at the beginning of the Fall semester and sent another email on August 28th. The final email reminder was sent on September 24th, 2012. Each email explained to the teachers

that I am graduate student conducting a study for my thesis, and asked them to participate. In the second round of collection, only three additional teachers participated, so most of the teachers participated after the first round of emails. I left the survey open for over a month to try and get as many responses as possible.

I created the questions for the survey by referencing the National Center for Education Statistics (NCES) national survey, which is a survey that fulfills a congressional mandate to collect and analyze data about the status of education in the U.S. It measures the number of computers available in a classroom, availability and frequency of use of computers and other devices, types of software, student use, and other related topics. The NCES survey used a combination of multiple choice, Likert scale, and short answer questions, which I modeled in my study. The NCES study does not provide an analysis of the data, just the numerical data. It is meant to be used for information and reference purposes, and many researchers cite it in their studies.

I also referenced a survey developed by researcher Christopher Moersch. Originally, I planned to use the LoTi survey developed by Moersch, but I realized that it would not be appropriate because it focuses more on student use than teachers use. Moersch created a consulting company aimed at helping schools integrate technology better, but his survey focuses more on what the students are doing and what available to them more than the teachers. Of the fifty questions in his LoTi survey, more than half ask about the student's activities in the classroom. I needed to have questions aimed specifically at the teachers and their opinions. Also, using the LoTi survey would not

give me data that I could compare to anything. Moersch's company does not publish the results of other surveys, and it would not be comparable to the NCES study.

Creating my own survey was the most appropriate approach because it addressed the specific needs of my study. I needed to assess the LoTi at PATHS by asking the teachers about their efforts to integrate technology, their opinions about the barriers they faced, and their perception of technology in the classroom. I was unable to use other studies because many of them focus on the students and how much better they do on tests when they use a computer, or how often a student uses a computer to do classwork. These questions are a reflection of the practices that teachers use, but they don't directly ask the teachers what their opinion or efforts for using technology are. I was able to model my questions after that of the NCES survey, and incorporate what I know about PATHS to get the most accurate information from the teachers.

The questions aim to assess at what level PATHS is integrating technology by asking the teachers about their perceptions and opinions. I asked the teachers about the obstacles they face, from whom they receive the most help, and how effective the teachers feel they are. Some of the questions from the NCES survey, such as how often students use computers for learning, do not contribute to the data I am collecting since it focuses on the teachers. I asked questions such as "How often do you use computers for instruction?" instead of "How much time do the students spend learning on computers?" so it would measure the teacher's integration efforts more than students time on computers. On some of the questions, I let the teachers used a short answer form instead of multiple choice because I can use the categories from the NCES to turn

their answers into numerical data. For example, if I am asking about the biggest hindrance to technology and my categories are funding and access to hardware, any teacher who mentions money as a problem will go into the funding category and anyone who mentions lack of equipment will go into the access to hardware category. I can also use the quotes the teachers give to more accurately show what their feelings and opinions are. In this way, I can use the data for multiple purposes.

This study compares a technical school's LoTi to the national averages for LoTi based on the perceptions and practices of the teachers at the school. The results of this study can be used by the principal of PATHS to help see ways they have or can overcome barriers, by other teachers and school administrators, and by the people who are creating and working on ways to integrate technology into K-12 education. The data from this study will show whether teachers think their efforts to integrate are successful, whether they think they could be doing better, and what would help them to do so. This study is limited by its size, however. Although sampling a technical school is a different approach and can create a more comprehensive view of the issue, one school does not accurately represent all the schools. Also, I was not able to study the ways to overcome obstructions in implementing technology. I compare my results to those in similar studies and hypothesize possible solutions based on previous research.

I analyze the data by comparing it with that of the NCES survey. I then input the results of the survey into a Microsoft Excel spreadsheet along with the data from the NCES survey. Charts show the differences in percentages of the answers of the teachers at PATHS and the national averages. These charts show whether teachers at PATHS are

integrating technology any better, at the same level, or less than that of teachers at the national level. The results from PATHS and from the NCES survey will be put into a spreadsheet. The data is correlated using the Correlate function in Excel. This function uses Pearson correlation coefficient, which measures the strength of linear dependence between two variables. It shows on a scale of -.1 to .1 how highly two sets of data are correlated. I can correlate answers of the same question between PATHS and NCES, and correlate data between two answers of different questions to see if they are dependent. For example, I can correlate the amount of hours spent in professional development to percentage of computer use in the classroom to see if these two factors are correlated. This type of correlation is used for factors that have been suggested as being interdependent. Using the articles and studies from my literature review, I can also compare the short answers that the PATHS teachers gave. If many of the teachers say that access to hardware is one of the biggest hindrances, but the statistics show that they have access to many different devices, this may be evidence that there are second-order barriers holding them back.

Overall, the methodology of this study was successful, with some limitations and struggles. In future studies, I would choose a larger sample and I would follow up the survey with face-to-face interviews. However, this study will provide a valuable look into a technical school and whether the teachers there have found ways to overcome the common barriers that inhibit them from technology integration. The next chapter will show the results of the study and make comparisons between PATHS and regular public schools.

CHAPTER 4 DATA ANALYSIS

This chapter provides an analysis of the data collected from the teachers at Professional and Technical High School (PATHS) in Kissimmee, FL. My survey was an attempt to get at the issues teachers are facing when seeking to integrate technology into the classroom. Similarly, every few years a survey is conducted by the National Center for Education Statistics (NCES) so that the government and the public can get an overview of what the status of technology integration in K-12 education is. The NCES survey samples over 4,000 teachers across all 50 states. The report has 11 tables, which show the results of the 15 questions asked; the tables shows the results in percentages and do not included the number of teachers for each response. For example, the table specifies that 94% of teachers use the Internet often, but it does not give the numbers such as, 3,980 of teachers responded “often” to that question. The first line of each table show the answer for the overall sample, and then lists the percentages for responses based on demographic data such as school size, community type, free/reduced lunch eligibility, and years of teaching. The report does not include a description of the methodology or an analysis of the data; the data is presented for informational purposes. It tells the reader about the usage of computers and technology tools for instruction, how much time teachers spend in professional development and the quality of it, and other issues related to how much teachers are using technology in the classroom for instructional purposes. This information can be used by government

officials to influence policy or by researchers to further investigate technology integration issues.

A sample of the questionnaire used to gather the data is included at the end of the NCES report. A group of teachers randomly selected from a list that was given to the NCES from a random sampling of schools from all 50 states and the District of Columbia were mailed the NCES survey to complete and return. I used this questionnaire when creating my own survey by adapting the questions to a digital format, and giving the teachers additional opportunities to explain their answers. All but three questions were taken directly from the NCES survey for my survey; three questions from the NCES survey were not included because they focused on student use, which I was not studying. In addition to the NCES survey questions, I also asked several questions that gauged the teacher's opinions on topics like capability to use technology, avenues of support, professional development, and obstacles and assets. These additional answers provided me with a closer look into what teacher's opinions and feelings about how they are integrating technology, and further expanded on the issues discussed in the NCES survey.

My goal for gathering and analyzing the data was to make participation easy for the teachers and to create a reliable sample of data to analyze. My methodology was to create an online survey based on the NCES survey to distribute to the teachers that would provide data on the teachers levels of technology integration; to analyze the data using statistical formulas and graphs; and to draw conclusions on whether a technical school has found ways to integrate technology based on the results. I duplicated the

questions from the NCES survey and referenced the Moersch LoTi survey for the additional questions, and put them into SurveyMonkey. SurveyMonkey allowed me to create a bank of multiple choice, Likert scale, and open-ended questions that resulted in a wealth of information and data to evaluate. The surveys were sent to teachers through email and each teacher was only allowed to respond once. Sixty-three percent of the teachers at PATHS participated in the survey. Once the data was in, I created a spreadsheet that listed both the number of teachers per response and the percentage of teachers per response. For the questions taken from the NCES survey, the percentages of each answer categories were listed and correlated using the Pearson correlation function, which measures linear dependence. After comparing the data from the NCES survey to the results from PATHS for the same questions, I expanded on the topics by creating graphs and tables that emphasized the PATHS teacher's opinions on issues like professional development, access to technology tools and devices, their greatest obstacles and assets, and their experiences at other schools. Including the qualitative data allowed me to make meaningful connections between the level of technology integration and the barriers PATHs teachers are dealing with.

I was able to gather data that allowed me to directly compare the level of technology integration at PATHS to the levels of teachers from the NCES survey. I did this by pairing the results of my survey to the results of the NCES and using statistical analysis tools in Excel. These analysis tools show how highly two sets of data are correlated, or related to each other. If the PATHS sample is highly correlated to the NCES sample, that means that PATHS teachers have not found new ways to overcome

barriers. The NCES survey gives an overview of how schools around the country are doing at integrating technology, but a specific sample like PATHS can show how an individual school is dealing with technology integration barriers. The relationship between the two could imply whether the problem can be solved at a school level, or whether a reform throughout the entire education system is needed.

The statistics and information I accumulated from the PATHS teachers were compared to the statistics provided by the NCES survey focusing on teacher's use of technology in the United States. Because PATHS is a technical school, I hypothesized that the teachers may have found ways to overcome the common barriers to technology integration, such as access, time, and attitude. My research question is "Have the teachers at PATHS, a technical school, discovered methods to overcome the barriers that inhibit most teachers when trying to integrate technology into the classroom?" However, the analysis showed that PATHS has similarly low levels of technology integration despite its categorization as a technical school. The correlation data, graphs, and tables presented in this chapter reinforce the concept that barriers prevent teachers from integrating technology in their classrooms and curriculum.

When starting this thesis, my intent was to create an all-encompassing view of how the students, administrators, and teachers in a particular school were interacting with technology. After beginning my research however, I found that focusing on teachers was the most effective and efficient way to measure a school's level of technology integration because teachers are the common ground between all the people involved in education. Teachers communicate and work with the administrators,

students, parents, and policy makers, who may never interact with each other. By measuring a teacher's perceptions and opinions, we can gain a more accurate and informative view of a school because the teachers see how decisions and policies affect students, parents, and administrators either positively or negatively. Teachers see how changing regulations and rules the amount of time students spend with hands-on activities versus standardized tests; or how much time an administrator spends facilitating teacher meetings and collaborations versus filling out paperwork; or how often parents get to see what their child is learning in a web portfolio versus a report card. Teachers see whether policy changes have positive or negative impacts on all the different individuals in a school.

Although my hypothesis that PATHS teachers may have found ways to overcome integration barriers was incorrect, the data collected from the PATHS teachers is still valuable. After comparing the data and finding the teachers were not achieving integration, I saw from their opinions about hindrances and assets, and their beliefs about technology use in the classroom, that teachers are like any other subgroup of people facing a major change or reform. There are people who are open to new ideas and those that are stuck in their ways; some individuals make no effort to change and some are completely unaware of their own power to institute change. All of the data compiled in this chapter aims to show that although PATHS teachers have not overcome the integration barriers that all teachers currently face, there are avenues to solutions through teachers, such as professional development and self-efficacy, that could positively change the perception of technology use in schools.

4.1 **Teachers' Use of Technology**

When it comes to an overall view of how much time PATHS teachers spend using computers for instruction, it is a close correlation to that of the NCES survey (Figure 1). Using the data collected from my survey, and correlating it with the data provided by the NCES survey concludes whether PATHS teachers are incorporating technology into the curriculum more than average. When asked, "Overall, what is the percentage of time you use a computer for instruction?" the PATHS teachers responded that 46% use computers "sometimes" and 27% "often". The NCES survey showed that 29%of teachers use computers "sometimes" and 40% "often." Computer use in this context means using computers for instruction such as assigning homework, tests, or practice, not just for planning or grading purposes. Although using computers does not prove whether the integration is seamless and invisible, it is a place to begin for technology integration. PATHS and the NCES survey were correlated at r=.79 for time spent using computers for instruction. Any correlation above .5 is considered strong, so a correlation of .79 indicates that PATHS level of computer use is similarly low to that of the NCES teachers.

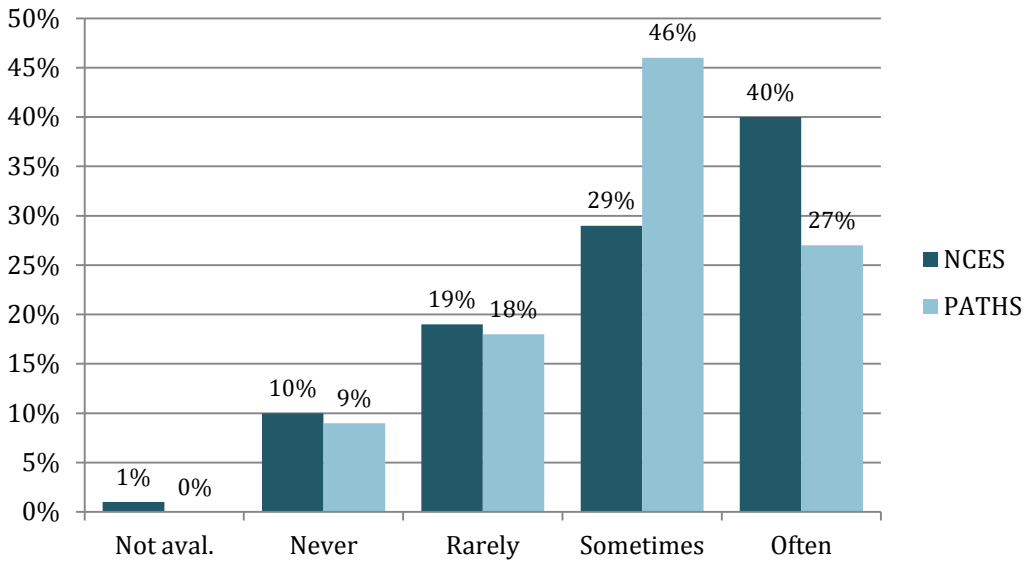


Figure 1. Percentage of time computers used for instruction

The results show that PATHS teachers use computers for instruction for relatively the same amount of time as the teachers sampled nationally for the NCES survey. If PATHS teachers had found ways to better integrate technology into the curriculum, the correlation between PATHS and NCES would be lower and I would expect to see a higher percentage of PATHS teachers using computers "often." Asking about the average percentage of time computers are used for instruction is very broad because it does not specify what qualifies as instructional use and it allows teachers to generalize the percentage of time. Considering that this questions works in favor of the teacher, the fact that PATHS is still so close in percentage and correlation to NCES already suggests that PATHS is at the same level of integration as the NCES survey. This implies that PATHS teachers have not found significant solutions to overcome integration barriers.

Computer use for PATHS teachers is a part of their daily lives. All of the teachers sampled said they have a computer at home and 92% said they use it on a daily basis. As explained in Ertmer's study focusing on self-efficacy, the confidence teachers have for home and personal use does not always translate to use in the classroom. Teachers have the basic skills needed for computer use, but those skills are not enough to fully integrate. There is something being lost between teacher's use of computers at home and for personal use, and their integration of technology and computers into their work and teaching.

4.2 **Teachers' Use of Specific Applications and Tools**

PATHS teachers were asked "Which of the following do you use for class prep, instruction, or administration: Word Processing Software, Database management software, spreadsheets/graphing programs, software for making presentations, software for administering tests, and the Internet." A significant correlation was found between PATHS teachers and the NCES sample's use of these applications (r=.98). A correlation coefficient so close to 1.0 means that PATHS and NCES teachers use the same applications almost the exact same amount of time. Table 1 and Figure 2 show that the percentage of PATHS and NCES teachers who use the applications in the classroom is almost indistinguishable. Only in one category is there a noticeable difference between PATHS and NCES.

Table 1. Applications used for class prep, instruction, and administration.

	Word Processing software	Database Management software	Spreadsheets/ graphing programs	Software for making presentations	Software for administering tests	The Internet
NCES	96.0%	44.0%	61.0%	63.0%	44.0%	94.0%
PATHS	95.8%	50.0%	71%	66.7%	58.3%	91.8%

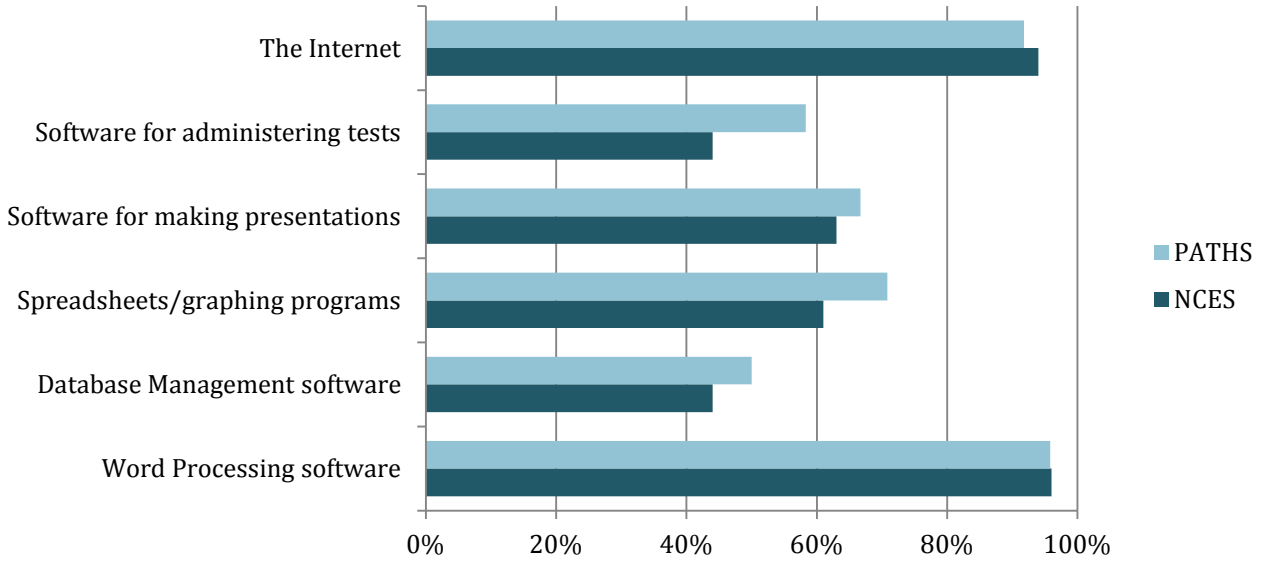


Figure 2. Applications used for class prep, instruction, and administration.

In most applications PATHS teachers were at the same level as teachers from NCES; the percentage differences between word processing, database management software, software for making presentations, and the Internet were all around 5%. In using spreadsheets/graphing programs and for administering tests, however, PATHS percentages were higher. There is over a 10% difference between PATHS and NCES for spreadsheets/graphing programs and administering tests. PATHS teachers use applications to administer tests 14.3% more than NCES teachers. Since Osceola County provides access to some software programs like Gaggle, which is an online community for teachers and students, and Quia, for administering tests, the access to this type of software may account for the higher percentage. One third of the PATHS teachers said lack of access to equipment was one of their biggest hindrances; however, when they are provided with a tool, such as Quia, their percentages for using that tool are significantly

higher. The evidence that when PATHS teachers had access to a specific technology tool they could apply to their curriculum, their percentage of use of that tool went up, draws a noticeable parallel between access and use.

Correlations between the NCES survey and PATHS were also considerably high when it came to how much the teachers used the school or district network for completing specific tasks (r=.99). Teachers were asked "How frequently do you use the school or district network for: entering/viewing grades, entering/viewing attendance, and administering tests?" The tedious but necessary tasks of entering grades and taking attendance can monopolize a teacher's time, but using technology can make these monotonous tasks much easier and efficient. All of the teachers at PATHS surveyed use the school network to enter grades and attendance, and a high majority of them use the network to administer tests, as seen in Figure 3. The NCES survey shows that nationally teachers also use the network for grades and attendance, but considerably less frequently for administrating tests. The low use of teachers from the NCES survey using the network for tests might be because most schools do not provide a resource such as Quia. Using Quia over the network allows the teachers at PATHS to create tests quickly and efficiently. One of the PATHS teachers said that "professional development in Gaggle and moodle" and other technologies have been the most helpful in integrating technology. This is confirmation that when both access and training are provided, the frequency of technology use is increased.

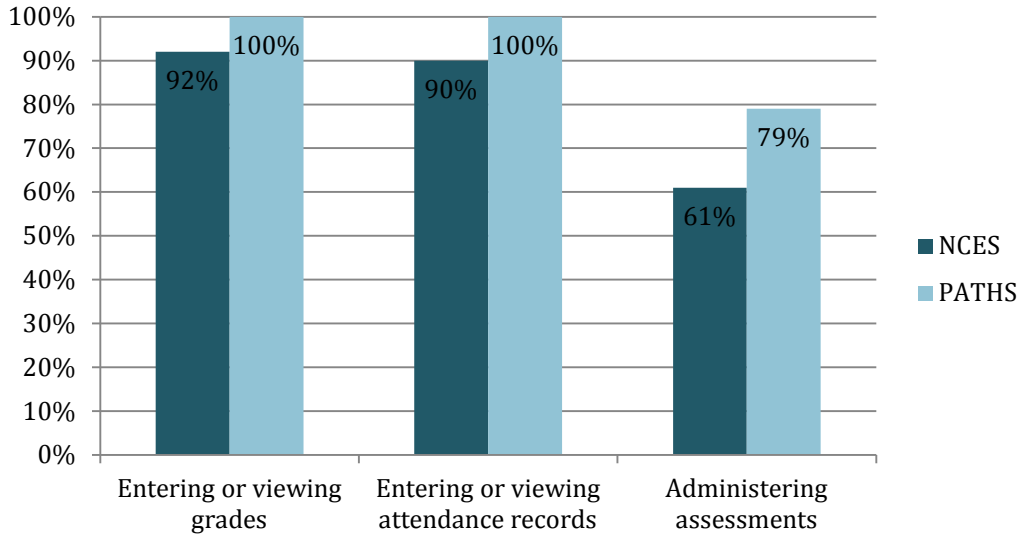


Figure 3. Frequency of using school or district network

Both my survey and the NCES survey asked, "How frequently do you remote access: school email, documents, student data, and applications?" Although the correlation between PATHS and NCES is not as high for frequency of remote access (r=.73), PATHS teachers remotely accesses documents, student data, and applications more than the national average (Figure 4). This may be due to the fact that PATHS teachers have such a high rate of computer use at home, so they access information remotely at home more than they access it directly at school. Only 82% of NCES teachers report having computers available at home, whereas all of the PATHS teachers surveyed had a computer at home. PATHS teacher's self-efficacy and confidence is higher at home and outside of the school environment, which might imply that increasing their self-efficacy within the classroom will increase computer use in the classroom.

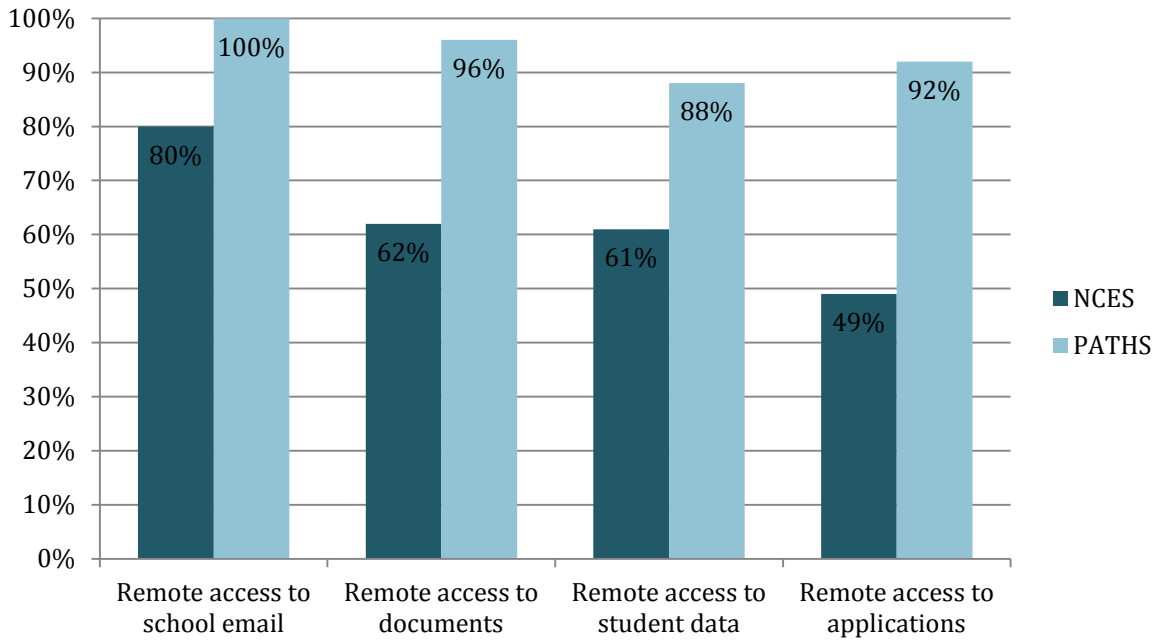


Figure 4. Frequency of remote access

My survey asked about what technology tools were available to the teachers, and how frequently they are used for instruction in order to compare PATHS teachers' availability and use to the NCES teachers' availability and use. The number of devices available to PATHS teachers and how frequently the tools are used for instruction will show if PATHS teachers are integrating technology any better than teachers at the national level, as shown in the NCES survey. I asked the PATHS teachers if they have access to an interactive whiteboard and handheld devices (graphing calculators, iPods, smartphones), and how frequently they use these tools. Table 2 shows that only 46% of PATHS teachers have access to interactive whiteboards compared to 61% for NCES, but 57% of PATHS teachers have access to handheld devices, which far outshines the NCES sample at only 12%. However, PATHS teachers use both of these tools less than 30% of the time, while NCES teaches use both interactive whiteboards and handheld devices

50% of the time or more. The fact that PATHS teachers have access to these tools, but are not using them very frequently, means that they must be lacking something other than access to technology tools.

Table 2. Availability and Use of Specific Devices

	Interactive Whiteboard		Handheld Devices	
	Available	Use Often	Available	Use Often
NCES	61%	57%	12%	50%
PATHS	46%	26%	57%	29%

4.3 **Teacher Professional Development**

One of the proposed solutions to low technology integration is more training or professional development for teachers. When asked "How many hours have you spent in professional development for educational technology during the past 12 months?" PATHS teachers correlated highly with the NCES survey (r=.89). The majority of teachers, over 50% of the samples at both PATHS and at the national level, spend only one to eight hours in professional development for each school year (Figure 5). Considering the average number of hours spent working each year is 1,787, eight hours spent learning about how to improve job quality and effectiveness is negligible. When asked if any teacher spent 33+ hours in professional development, none of the PATHS teachers spent that much time in training, while 7% of teachers from the NCES survey do.

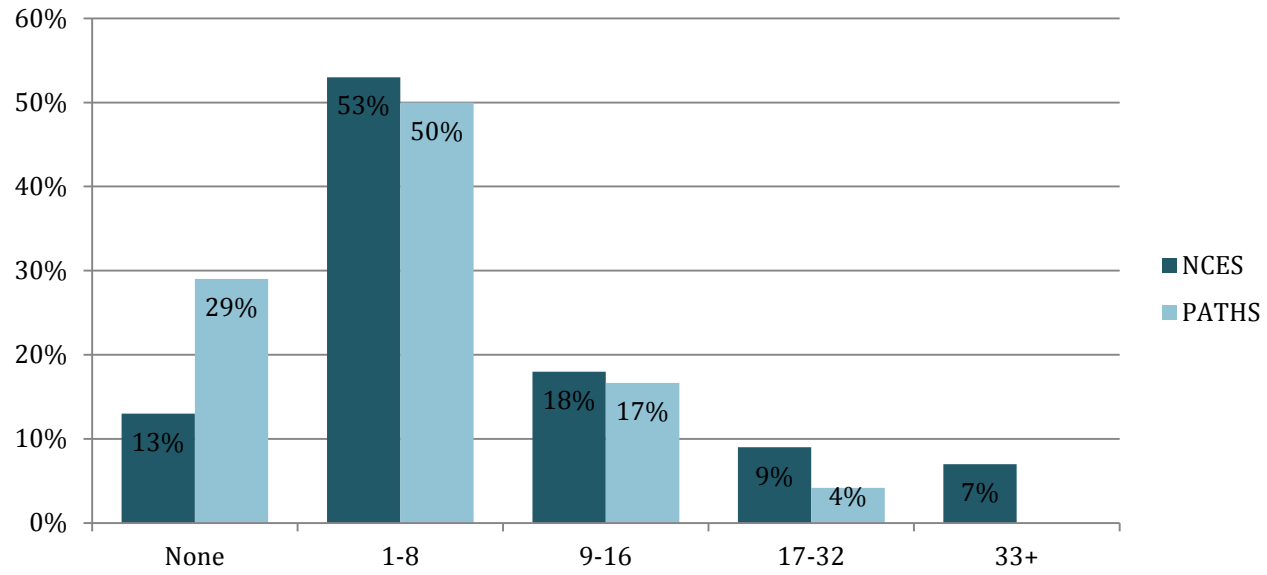


Figure 5. Hours spent in professional development

The NCES survey does not provide specific information about what kind of professional development is offered or where. The small group of NCES teachers that attend 33+ hours on professional development may be attributed, however, to some states that have policies requiring beginning teachers to participate in mentoring programs, such as the North Carolina Beginning Teacher Support Program. This program requires new teachers to spend a certain number of hours in their first few years of teaching on professional development and working with a mentor. Programs like this could help to encourage professional development because not only will teachers be required to attend, but once they attend a few sessions and see the benefits, it could encourage them to continue development past the first years of their teaching career. Also, teachers who are a part of a program like the one in North Carolina will see that there are many options for them to learn from others and develop teaching

strategies and skills; the teachers will not feel alone and without any support which will increase their self-efficacy and confidence.

One of the PATHS teachers specified that she had not spent any time on professional development through the district, but while completing her master's degree she logged over 100 hours of professional development. The same teacher also said:

> I feel like people like myself who are highly knowledgeable and DO use quite a bit of technology are left out. Any [professional development] that does exist is for beginners. Nothing is done to "feed" or advance or support anyone who is advanced and willing to work even harder to integrate technology.

Her hard work shows that some teachers are willing to make the effort to integrate technology, but her lack of support through the district makes it hard for other teachers to follow her example. This teacher had to go outside of the education system to get the help she needed, and this might explain why so many of the teachers at PATHS do not pursue more professional development. The professional development that is offered is not applicable, not available, or too difficult to attend. The low percentage of time spent in professional development shows that while most schools and districts are pushing for technology integration in their communications to teachers, administrators and policy makers are not encouraging teachers or offering ways for teachers to learn and improve their technology literacy through the education system.

When asked whether the professional development offered meets their goals and needs, PATHS teachers scored lower than NCES in all categories about the quality and availability of the training (Figure 6). Only half of the teachers surveyed at PATHS who

participate in professional development feel it is offered at convenient times and places, compared to 83% from the NCES survey. District and state efforts do not take teacher issues into account when planning and providing for professional development. Teachers have a hectic schedule; although many schools dismiss early in the afternoon, many teachers spend hours after school grading, creating tests, and other tasks that prepare them for the next school day. In addition, a lengthy seminar where only a small percentage of the information is truly valuable decreases teachers' belief that professional development is useful. Teachers also have a small amount of funding, and many different levels of knowledge and skill, but most of the professional development provided does not address any of these concerns.

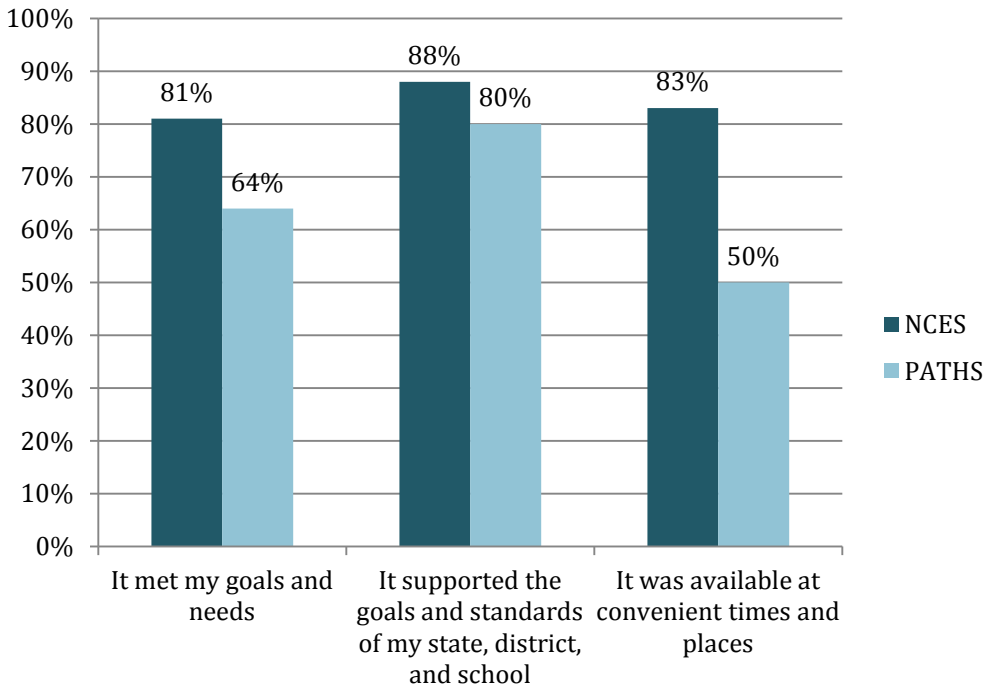


Figure 6. Opinion of Professional Development

There is no middle ground for teachers to learn about technology integration, even though most identify themselves as intermediate computer users (Ertmer 99). Having professional development that offers different options for multiple learning levels might encourage more teachers to participate. The more time spent in professional development, the more comfortable teachers feel using computers in the classroom (NCES iv). Thirty-two percent of the PATHS teachers sampled mentioned a lack of training or professional development as their biggest hindrance to integrating technology. Although the correlation between professional development and computer use is low (r=-.07), this relationship might indicate that the lack of professional development is what is causing low computer use. Ertmer, Ottenbreit-Leftwich, and Bai, all found that some level of professional development helps teachers integrate more frequently and effectively.

If professional development is not available, teaching cohorts are a good alternative. When asked "What do you feel has been the most helpful at integrating technology into your curriculum?" 66.7% of the PATHS teachers said they receive the most help from other teachers. One teacher added, "It takes a long time to create a specific activity for class on new technology. If there were a way to share activities that other teachers have made around the county, I think it would help me get started." It is beneficial for teachers to collaborate with other educators who have had experience in the same curriculum and know how to integrate technology into it. When teachers work together and learn from each other, like in a teaching cohort, information is obtained quicker, easier, and in a timelier manner than other methods of learning (Aust et al.

182). Any way that teachers can learn and collaborate with others, whether it is other teachers or technology experts, helps them to become more confident and capable in using technology in the curriculum.

4.4 **Technology Attitudes and Beliefs at PATHS**

Many of the questions I asked in my survey were meant to assess PATHS teacher's perceptions of their own work and the factors that affect it. Comparing the results of my survey to the NCES data answers my hypothesis of whether teachers at a technical school have found ways to overcome barriers by knowing from previous research that technology integration in K-12 education is low, and having the data provided by NCES. I added questions that were not on the NCES survey to try to get a more comprehensive view of what barriers PATHS teachers are facing and what they feel they are doing well, such as what tools they have access to and who they get the most help from. After comparing PATHS to NCES, it is evident that PATHS has not achieved technology integration, and the teachers at PATHS have not found ways to overcome barriers that inhibit most teachers from integrating technology. The close correlations between the PATHS data set and the NCES data set show that PATHS has not strayed from the flawed path of technology integration that other schools have established. So what, if anything, do PATHS teachers feel is different about the way they use technology in their curriculum? What do PATHS teachers feel could help them integrate more? In order to fully answer my research questions, I added more questions to my survey than the NCES survey provided. This extra data reinforces that many of the

PATHS teachers are facing second-order barriers that are preventing the teachers from fully integrating technology into their classrooms.

I developed a set of questions of fifteen questions that could be answered using a Likert scale with questions going from 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, to 5-Strongly Agree. For example, a result of 4.7 is a statement that the teachers strongly agree with. SurveyMonkey provided an analysis of these questions by averaging the answers on a 5 point scale. The statements shown in Table 3 reveal how PATHS teachers feel about their access to technology, their own capabilities, and the support they receive. These statements that the PATHS teacher agree or disagree with expand on the questions asked earlier in the survey. My survey and the NCES survey asked for a percentage of time teachers use computers, but statements like "There is a lack of administration support for adopting technology into teaching and learning" and "I do not have the time to implement technology in the curriculum" show how teacher's beliefs are structured around technology. Teacher's beliefs and opinions are what form their self-efficacy and confidence, and gathering data that shows what teacher's opinions are will make it easier to identify any second-order barriers.

PATHS teacher's strongly agree with the statement "I have basic technology skills for adapting technology in teaching and learning", rated at 4.42., and "Technology is applicable in the course I teach" at 4.19, but this opinion is inconsistent when compared to the numerical data which shows that most PATHS teachers are not using technology often, which is evidence of a second-order barrier. Teachers felt almost neutral when asked "I do not have the time to adapt to technology" and "I do not have the time to

implement technology in the curriculum" but time was mentioned as one of their biggest obstacles. One teacher said she lacks "time to attend the professional development as I often am working 2 jobs or have other class demands" and another mentioned she doesn't have "the opportunity to practice with it to feel comfortable/confident with the technology available."

Table 3. Teacher's Perceptions

Statement	Rating
I have basic technology skills for adapting technology in teaching and learning.	4.42
I have access to essential hardware.	4.04
I have access to essential software.	3.88
Technology is unreliable.	2.50
I do not have the time to adapt to technology.	2.50
I do not have the time to implement technology in the curriculum.	2.62
There is a lack of administration support for adopting technology into teaching and learning.	2.16
Other teachers share, discuss, and support my use of technology.	3.62
Technology is applicable in the course I teach.	4.19
Classroom management is more difficult when using technology.	2.46
The available software does not meet my needs sufficiently.	2.73
There is adequate funding to develop technology-based activities.	2.21

The statements “There is a lack of administration support for adopting technology into teaching and learning” and “Other teachers share, discuss, and support my use of technology” show that teachers are receiving some support, but it is not significant. This supports the conclusion that increasing professional development and teacher collaboration might improve teacher’s self-efficacy and beliefs of the value of technology, which will increase integration efforts.

Though the PATHS teachers rated their access to hardware and software as high, most of the questions about time and support were rated around 2.50, which is close to neutral. This means the teachers do not feel strongly or evenly moderately positive about their amount of time and support. If there are specific issues holding the teachers back, it should show in the rating of time, availability, and support that the teachers are lacking those things, but none of the ratings are below 2.0 or above 3.0.

The contradiction of PATHS teachers’ beliefs that they both have access to hardware and software, but access is also inhibiting them from fully integrating implies that second-order barriers may be behind the low level of technology integration at PATHS. Since PATHS teachers are not labeling access to equipment as a significant problem, as both access to hardware and software were rated above 2.50, some of the hindrances must be coming from their own confidence and self-efficacy. Since they don’t have first-order barriers, second-order barriers may be present. As Ertmer points out, second-order barriers may not be apparent even to the teachers who are experiencing them (5). For example, a teacher who complains about not having enough access to hardware, but then receives computers that end up getting dusty in the back of

the classroom has second-order barriers. The information PATHS teachers gave in the survey is that they have a fair amount of access to hardware and software, though they would like more; but the even though PATHS teachers do have some tools available, such as interactive whiteboards and handheld devices, they do not use the tools they have on a daily basis. The teachers at PATHS do not realize yet that the biggest issue they are facing is their own self-efficacy and confidence.

When asked "What do you perceive as your greatest obstacle to expanding your use of technological devices and resources as an educator?" PATHS teachers identified time as their biggest hindrance to integration. Figure 7 shows 41% of teachers at PATHS identify time to plan and learn and their biggest obstacle, with access to technology at 32%. Interestingly, Figure 8 shows that PATHS teachers also identify access as an asset.

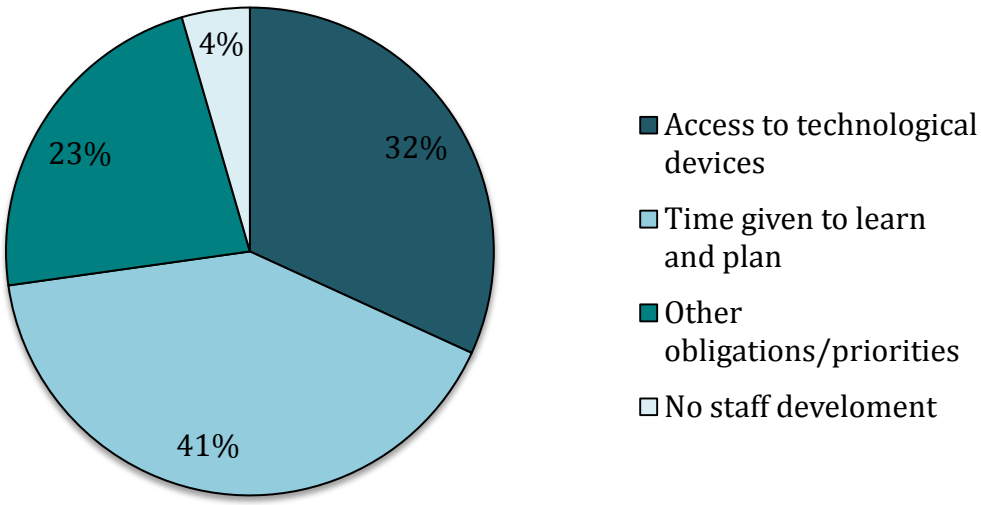


Figure 7. PATHS teacher's greatest obstacles

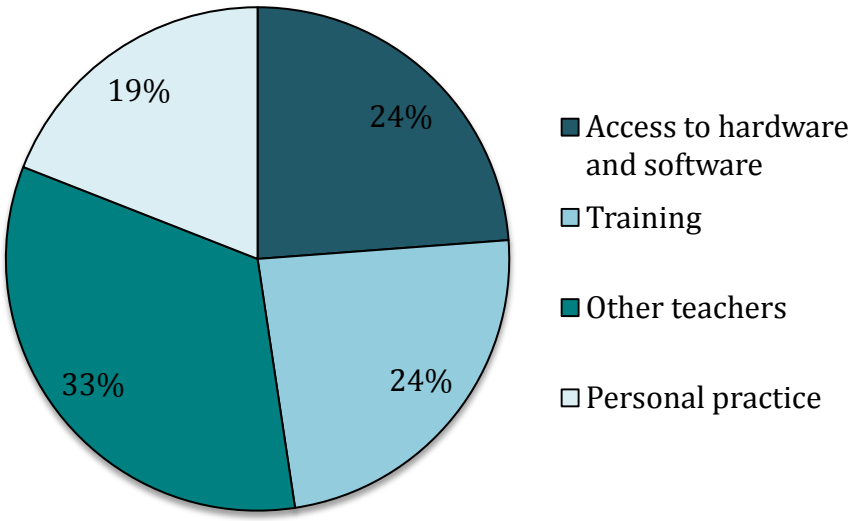


Figure 8. PATHS teachers' greatest assets

Twenty four percent of PATHS teachers believe their access to hardware and software is an asset in their attempts at integrating technology. The belief that access is both a hindrance and an asset to integrating technology is true, but when teachers have access to technology but have not fully integrated it into their curriculum, Ertmer argues that is evidence of second-order barriers.

When asked about support, over half of PATHS teachers said yes to "Do you feel your school helps you to integrate technology effectively in your curriculum?" As shown in Figure 9, 54% of teachers at PATHS believe that their school helps them to integrate technology, even though their actual levels of technology use are low. The PATHS teachers' belief that the school helps them to integrate technology might imply that the problem lies with a keyword: effectively. Since PATHS teachers, and other teachers around the country are not engaging in much professional development, many teachers might not realize the extent and expectation of what true integration is. To a current

PATHS teacher, integration may simply mean using a whiteboard for a presentation once or twice a week. Again, this belief or misconception of how to integrate technology thoroughly is a second-order barrier. Engaging teachers in more professional development will allow them to see what comprehensive integration looks like and how they can achieve it.

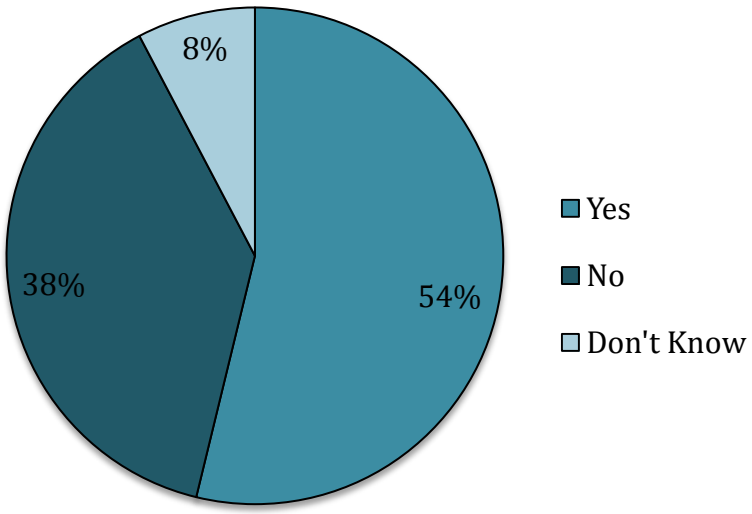


Figure 9. PATHS teachers' support from the school

Despite PATHS teacher's belief that they are integrating technology well, the overall findings of this survey are that PATHS teachers have not found new ways to overcome barriers to technology integration and their level of integration is as low as the NCES survey. PATHS is similar to all other schools; barriers exist and persist that prevent teachers from creating a curriculum that infuses technology into the learning process. Some of the PATHS teachers have taught at other schools, but although 42% of the teachers feel that other schools are less effective at integrating technology, a close second of teachers at 31% feel that PATHS is equally as effective. Twelve percent of

PATHS teachers had a better experience integrating technology at another school. These percentages show that at least every school is attempting technology integration, whether or not they are successful at it.

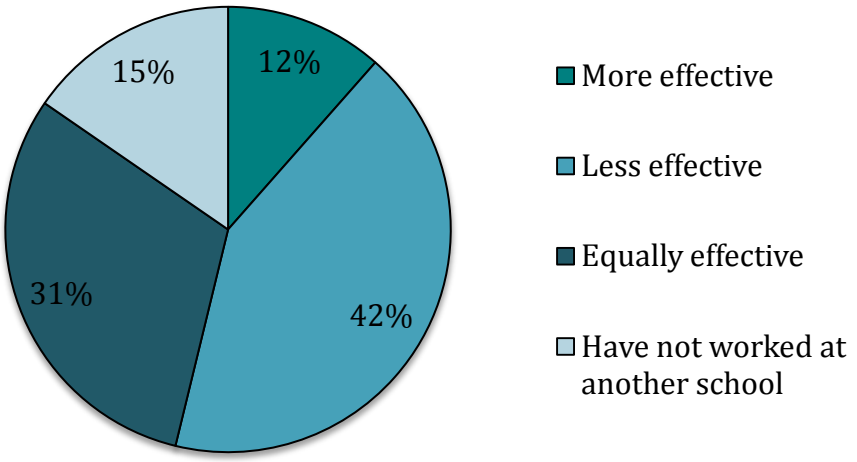


Figure 10. Technology Integration Attempts at Other Schools

Despite the discouraging levels of technology use at PATHS, many of the teachers still find help and support. As shown in Figure 8, when asked "What do you feel has been most helpful at integrating technology into your curriculum?" help from other teachers and peer collaboration was identified as the most helpful tool for integration. One of the PATHS teachers said the most helpful thing to her was "Professional development and/or aid from peers, which are almost the same thing." Her statement reinforces the idea that teachers not only value collaboration highly, it is the resource that has been the most effective and available for them. Teachers appreciate each other and often go out of their way to help each other. Teachers are experts in their field, and teaching is a difficult profession, which is not comparable to any other career. If we want

teachers to learn from experts how to integrate technology more effectively, they should be learning from others teachers who have been successful.

4.5 **Conclusion**

Although initially I was examining whether a select group of teachers had found ways to overcome barriers, it is also helpful to find evidence that barriers exist in all levels and forms of education. Showing that even alternative schools are still struggling with technology integration suggests that major reforms are needed and people in control of policy, funding, and teacher education need to address these issues. The analysis of the data collected from PATHS suggests that a school will have a better level of technology integration if effort is put into developing the self-efficacy and confidence of the teachers. More is needed than just simple access to the technology tools. Cuban, Kirkpatrick and Peck hypothesize that simply adding a computer to an already established lesson does change the pedagogy, and without changing the approach to teaching, high school classrooms will look the same in 50 years as they do today (830). If no changes occur, the students of the future will not be learning in environments that prepare them for the job market or the expanding global economy.

When teachers do use technology, it is easily evident that the founding principle is to benefit students (Offtenbriet-Leftwich et al. 1331). Thus, by showing teachers that fully integrating technology as an invisible part of the curriculum will benefit students the most, we can change their beliefs which will affect their strategies. The most important piece of information gathered from PATHS is the knowledge that teachers want to integrate technology, and they do realize it's important. The real challenge now

is to show teachers how expansive technology integration needs to be without scaring or intimidating them. Initially, it will be a lot of work to fully integrate technology into the curriculum, but the short and long term benefits for both the teacher and student are substantial. Every day, teachers will be able to focus more on the absorption and understanding of the lesson by the student instead of on tedious tasks and classroom management; students will feel more involved in the lesson and will be able to connect it to the real world. Over the years, teachers will be able to enrich the lives of more and more students, and those students in turn will enrich society. Technology has already enriched the lives of many people in the workplace and at home, and we now have the knowledge to make those positive changes in the classroom as well.

CHAPTER 5 CONCLUSION

Throughout my research and my own survey, I found that teachers do not believe they are given the tools needed to integrate technology effectively to any serious degree. The small amount of help that is given is only for beginners and does not carry the teachers into actually infusing the technology into the curriculum. When beginning this project, I had thought that a school like PATHS, with different resources and a specific objective, might be more successful at integrating technology. After reading some similar studies, however, and analyzing the results of my survey, my study revealed that PATHS faces the same issues and barriers that plague other schools. The issues are not a simple matter of resources and funding; they runs deep into the foundation of the pedagogy and attitudes of the teachers.

The results of this study reinforce the ideas discussed in other research: professional development and teacher training is needed to improve technology integration. However, this study added something different to that conclusion. An alternative school structure, like a technical or magnet school, does not address these needs and does not overcome the barriers teachers face. Alternative schools change the structure of classes and administration slightly for the students, but the principles and practices remain the same for the teachers. Teachers in an alternative school like PATHS do not receive any extra or special training to help them integrate technology into the curriculum, nor do they get any respite from the hindrances other teachers face.

Teachers at PATHS face integration barriers coming from time, training, funding, and confidence, just like all other teachers across the country.

Changing teacher's beliefs and value of technology can have a profound difference on how much effort they put into integration. One PATHS teacher's statement "I often fail to see how [technology] serves more effectively than simpler methods coupled with piqued curiosity," shows that many teachers still do not see the value in using technology. Some teachers still believe that traditional methods of learning are suitable, but for today's global and technological economy, students are not prepared to be competitive and innovative in the workforce. My research led to the conclusion that professional development that emphasizes to teachers the profound affect using technology has on the lives and careers of the students will encourage teachers to make a concentrated effort to increase their own use of technology.

The results of my survey indicated that teacher's self-efficacy, confidence, and knowledge are the biggest hindrances to technology integration. These hindrances provide the most logical explanation for the contrast between teacher's home use of computers and their use of computers in the classroom. Combined with previous research conclusions, and the opinions expressed by the PATHS teachers, professional development and teacher collaboration can help enormously to increase technology integration. The most practical solution to low technology integration is changing the amount and quality of professional development and teacher education, "including great emphasis on professional growth, as opposed to program-technology adoption" (Ertmer 13). Simply adding technology into a lesson does not mean the technology is integrated;

teachers need to value and understand the effect technology has on student learning and weave it together with the curriculum.

Creating cohorts, online learning communities, and providing easily accessible means of communication between teachers could help teachers to feel more comfortable with the technology, and supply them with reliable and trusted sources of information. Aust's study of creating a teacher cohort was effective in improving teacher's beliefs and self-efficacy. Angeli and Valanides found that "Teacher professional development about the instructional uses of ICT in the classroom and about computers as learning tools for providing us with new forms of media that can enrich learner communication and expression is absolutely in great need" (620). More and more research reinforces the concept that teachers are the gateway to integration, but there has been little change in teacher appreciation and support. Teachers around the country are spending more time on strike to try to protect their pensions and benefits than they are adapting and evolving their teaching strategies. The educational system needs major reforms in practice and principles if the United States wants to be a competitor and innovator in the global marketplace.

5.1 **Connection to Technical Communication**

Considering that teacher education and training seems to be the core issue in low technology integration, there are many ways the principles and theories of technical communication could help to solve the problem. Technical communication focuses heavily on the user and ease of use. I have learned throughout my course of study that as a technical communicator, I should strive to provide products and information that are

clear and pertinent to the audience I am addressing. When analyzing the issues of technology integration in K-12 education, I immediately saw ways that technical communicators could help.

The policies, procedures, and communications of the educational system are currently complicated and ineffective. Teachers deal with regulations and rules on a daily basis that inhibit them from teaching or that they do not even understand. A recent conversation with a teacher revealed to me that he had spent a day in professional development, which comprised of several hours spent watching a video about chemical lab safety. The video spent most of the time alerting the teacher to dangers and things to avoid in the lab due to student safety, and was an overload of information that the teacher would never be able to remember. It was an unproductive use of the teacher's time and did not enhance his teaching in any way. The education system is flooded with barriers and hindrances like these that discourage teachers from innovating.

If technical communication principles and theories were applied to professional development, it could improve the quality and effectiveness of the experience. Providing a comprehensive analysis of the audience, teachers, to the designers and developers of professional developments materials would help make sure it reaches teachers in a way that is timely, relevant, and helpful. By analyzing the user, we can see in what ways teachers prefer to learn: face to face or over the Internet? Do teachers prefer to hear from other teachers, or experts? Would it be more effective to give them examples of lessons that incorporate technology, or give them the principles of an integrated lesson? By administering usability tests on seminars, workshops, and online communities for

teachers, we can learn what the most effective methods are for both learning potential and cost. Using technical communication design principles on the websites, materials, and equipment teachers use will make it easier and more likely that teachers will make an effort to use the technology in their classroom.

Technical communicators should also apply their skills to the equipment and software being developed for K-12 education. Many textbooks now come with a CD-ROM for the students and/or teachers to use for practice and developing lessons, but the textbooks themselves are still heavy and stale. Textbooks could be evolved into digital formats, viewable on a computer or iPad, with interactive activities that engage the students as they are learning a concept. These digital formats would also save money on printing and production, and would keep student for lugging heavy books from school to home all the time. Teachers could take advantage of digital format by customizing chapters and lessons, and possibly have a system that lets them view which students have read the assigned chapters and which have not. It would achieve the goal of making learning more student-centered while enhancing the teacher's ability to use the technology tools available. Technical communicators could be the bridge between the educators who are using these resources and the engineers who are designing them.

5.2 **Areas for Further Research**

This study was able to show that teachers at a technical school have not found ways to overcome barriers that inhibit them from integrating technology to the benefit of their students. My study however was limited to only one school and cannot provide implications for technical and magnet schools around the country. I was not able to

show how other schools may have found ways to overcome barriers because I was limited to a small sample. PATHS is an example of one technical school, but there are innumerable different types of school structures around the U.S. and other countries that may have been more successful than PATHS. Technology integration is an issue that many researchers are investigating, but few consider how alternative schools are dealing with this issue. Conducting further research on how different types of schools and the teachers in those schools are dealing with technology integration could provide valuable insights into the most effective solutions.

Some high schools in Florida are making progress and advancements, which is a promising start, but further research is needed to assess the effectiveness of their efforts and what the next step is. Clearwater High School, in Clearwater, FL, has gone bookless, equipping all their students with e-readers instead of traditional textbooks. This allows student to access information easier and saves on paper production and distribution costs, but do the students read the electronic copy of their textbook more? Crooms Academy of Information Technology in Sanford, FL is a high school that is making great advances to technology integration. All the students have laptops and all the classrooms have Smartboards. Teachers can use the Smartboards to uploaded lessons online which students can access on their laptops in the classrooms or at home. This would allow students to be more actively involved in a lesson and to continue the lesson outside of the classroom by studying the lesson at home. Crooms is rated as an A school and has received awards and acknowledgements for using technology throughout the school, but no research has been done on the effects these tools have on the students and teachers.

Teachers at Crooms have these tools, but are they using them? Would their technology use be similar to PATHS, or does the community of support and integration push the teachers to use technology more? By pursuing similar studies at schools like Crooms, which is praised so highly for its progress, we can see if some schools have found more successful ways to integrate technology.

By conducting more studies on how effective different types of schools are at integrating technology, the successful strategies and tactics will emerge. Continuing to focus on teacher barriers and how to overcome them will be the most effective way to move toward fully integrated technology in the classroom. Surveying teachers is an effective way of gathering data, but in addition researchers should create model cohorts and evolve professional development to test what approach works most effectively. Technical communicators can contribute to this effort by conducting usability tests, and working with teachers to develop training that is clear, easy, and accessible.

As a technical communicator, I highly value the education I have received from kindergarten to my current graduate level, but I also see what the possibilities are for improvement and want to work toward meeting those goals. I value teachers as the implementers of education in our society, and see that they are lacking in the support and instruction they need to advance. The issue of technology integration is complicated and "the interdependencies between technology and people" play an important role in determining its effectiveness (Angeli and Valanides 608). Further research needs to be done on teacher's needs, the current state of professional development, and how technical communicators can help to solve the problem.

This thesis has reinforced my belief that technical communicators can contribute to the resolution of low technology integration in education. My survey verified that teachers are not finding new ways to use technology in the curriculum, and efforts to change this through policy have fallen short. We are attempting to reinvent education while holding the current system in place, when we should be reaching down to the foundations of pedagogy and making changes there. Education needs to move from teacher-centered to student-centered; single media to multimedia; isolated work to collaborative work; passive learning to active/exploratory/inquiry-based learning; and factual, knowledge-based learning to critical thinking and informed decision-making (*National Educational Technology* 5). Integrating technology fully into any subject's curriculum achieves these goals. As Ertmer and other researchers emphasize, this is a not quick or easy process, but it is worth the time, effort, and funding it requires. Integrating technology into K-12 education will create a generation of people who are more informed, better critical thinkers, and more innovative in the workplace. As the global market grows and advances, American school children need the tools to compete, and "nothing influences students more than their teachers' own professional and personal development" (Angeli and Valanides 608). By creating an educational system that supports teachers and provides them with the tools and resources that gives them the confidence to use technology, positive changes will take place in the lives of every American student.

APPENDIX A: UCF IRB APPROVAL LETTER

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Kaitlin E. Martinez**

Date: **June 05, 2012**

Dear Researcher:

On 6/5/2012, the IRB approved the following activity as human participant research that is exempt from regulation:

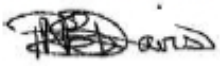
Type of Review:	Exempt Determination
Project Title:	Technology Implementation in K-12 Schools: A Research Study of Perceptions and Practice
Investigator:	Kaitlin E. Martinez
IRB Number:	SBE-12-08271
Funding Agency:	
Grant Title:	
Research ID:	N/A

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Patria Davis on 06/05/2012 11:12:55 AM EDT



IRB Coordinator

APPENDIX B: SURVEY

Technological devices comprise of laptops, tablets, handheld devices, interactive whiteboards, document cameras, etc.

1. Which subject do you primarily teach?
    a. Math
    b. Science
    c. English/Language Arts
    d. Physical Education/Health
    e. Social Studies
    f. Library/Media
    g. Fine Arts
    h. Administration
    i. Other
2. How many years have you been teaching? (fill in the blank)
3. What is your age group? (fill in the blank)
4. What is your gender?
    a. Male
    b. Female
5. What is the highest degree you have received?
    a. Bachelor's
    b. Master's
    c. Educational Specialist
    d. Doctorate
    e. Other
6. How often do you use technological devices as an educator in your classroom?
    a. Daily
    b. A few times a week
    c. A few times a month
    d. A few times a year
    e. Never
7. Do you have access to a computer or technological device at home?
    a. Yes
    b. No
8. How often do you use a technological device outside of the classroom?
    a. Daily
    b. A few times a week
    c. A few times a month
    d. A few times a year
    e. Never
9. Which statement best describes the staff development or training you receive in regards to technological devices?
    a. Specific device skills training (training on specific applications)
    b. Curriculum integration (how to integrate successfully)

c. A combination of skills training and curriculum integration
d. None

10. What do you perceive as your greatest obstacle to expanding your use of technological devices and resources as an educator?
    a. Access to technological devices
    b. Time given to learn and plan
    c. Other obligations/priorities (FCAT, new textbooks)
    d. No staff development opportunities
    e. Other: please specify-
11. From whom do you receive the most help or guidance using technological devices?
    a. Students
    b. Other teachers
    c. Administrators
    d. School specialists
    e. District specialists
    f. Other
12. Do you feel your school helps you to integrate technology effectively in your curriculum?
    a. Yes
    b. No
    c. Don't Know
13. Have you worked in another public school? If so, were technology integration attempts more or less effective?
    a. More effective
    b. Less effective
    c. Equally effective
    d. Have not worked at another school
14. Are there actions or resources that you feel would help you to integrate technology more in your classroom?
    a. Yes
    b. No
    c. Don't Know
15. Which of the following provides the biggest barrier to you in integrating technology in your curriculum?
    a. Time to plan
    b. Availability of training and/or workshops
    c. Support from administration or IT professionals
    d. District resources
    e. Other priorities (FCAT, curriculum requirements) Please specify:

Please indicate whether you agree or disagree with the following statements with regard to technology:

1 – Strongly disagree 2- Disagree 3 – Neutral 4 – Agree 5 – Strongly Agree

16. You have basic technology skills for adapting technology in teaching and learning.
17. You have access to essential hardware.
18. You have access to essential software.
19. Technology is unreliable.
20. You do not have the time to adapt to technology.
21. You do not have the time to implement technology in your curriculum.
22. Training is provided at convenient times.
23. There is a lack of administration support for adopting technology into teaching and learning.
24. Other teachers share, discuss, and support your use of technology.
25. Technology is applicable into the course you teach.
26. Classroom management is more difficult when using technology.
27. The available software does not meet your needs sufficiently.
28. There is adequate funding to develop technology-based activities.
29. Professional development at PATHS meets my goals and needs.
30. Professional development at PATHS reflects the goals and standards of the school.
31. Professional development at PATHS reflects the goals and standards of the district.
32. Professional development at PATHS reflects the goals and standards of the state.

Fill in the blank:

33. What percentage of time would you say that you use computers during instruction?
34. Is an interactive whiteboard available to you?
35. How frequently do you use the interactive whiteboard for instruction during your class?
36. Are handheld devices available to you?
37. How frequently do you use handheld devices for instruction during your class?
38. How frequently do you use the school or district network for:
    a. entering/viewing grades
    b. entering/viewing attendance
    c. implementing assessments
39. How frequently do you remote access:
    a. school email
    b. documents
    c. student data
    d. applications
40. Which of the following do you use for class prep, instruction, or administration:
    a. word processing software
    b. database management software
    c. spreadsheets and graphing programs
    d. software for making presentations

e. software for administrating tests
f. the Internet
g. other applications

41. How many hours have you spent in professional development for educational technology during the past 12 months?
42. What do you feel has been the most helpful at integrating technology?
43. What do you feel has been the biggest hindrance in integrating technology?

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