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An investigation of the relationships between technology use and teachers' self-efficacy, knowledge and experience

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AN INVESTIGATION OF THE RELATIONSHIPS BETWEEN TECHNOLOGY USE AND TEACHERS' SELF-EFFICACY, KNOWLEDGE AND EXPERIENCE

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DEDICATION

To my sister, Dana Halle, who supported me every step of the way. She believed I was capable of completing this project even when I had doubts. Thank you for your time, guidance and laughter.

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ABSTRACT

Dramatic changes have occurred in the area of technology development and society's use of technology in daily life and the workplace. Yet in many classrooms, technology integration remains a significant challenge for educators, creating a digital disconnect that threatens to handicap students as they graduate and compete for jobs in the 21st century.

The purpose of this study was to examine whether teacher self-efficacy, teacher knowledge, and teaching experience influence levels of technology integration in the classroom. The research question asked was: How well do measures of self-efficacy, teacher knowledge and teaching experience predict teachers' scores on a state measure of classroom technology use? More specifically:

1. What is the relationship among self-reported teachers' self-efficacy, teacher knowledge, and teaching experience?
2. How well do they predict technology integration?

Based on the existing literature on the topic of teacher integration of technology into classroom instruction, the study hypothesized that these factors would play a significant role in predicting technology use. Research was conducted using four knowledge subscales in the form of surveys to quantify the existence and extent of these relationships.

The data were analyzed using descriptive statistics, a correlational matrix, and hierarchical regression. There were 44 usable surveys (N=44). This study yielded mixed results. While technology knowledge was proven to be a significant predictor of overall technology proficiency, teacher self-efficacy and teaching experience were not.

Technological Pedagogical Content Knowledge (TPACK) variables were consistently a statistically significant predictor of all three dependent variables (Using Technology in the Classroom, Using Technology to Support Learning, and Overall Proficiency). The higher the teachers' TPACK scores, the more technology use and proficiency they reported.

The outcome of this research suggests avenues for teacher education programs, professional developers and administrators. Giving administrators, professional developers, and teacher education programs a better understanding of some of the factors that impact effective use of technology in the classroom may give them a better chance at equipping educators to take advantage of the technological tools available in the 21st century.

Chapter 1: Introduction

Education and Technology in the 21st Century

In their most recent book, *That Used to Be Us: How America Fell Behind in the World it Invented and How We Can Come Back*, the Friedman and Mandelbaum (2011) state:

> Two decades after the Cold War came the era of revolution in Information Technology. It began in the United States and spread around the world…It gave all Americans greater access to information, entertainment, and one another-and to the rest of the world as well. (p. 18)

In fact, modern technology has been in classrooms since the first computers were introduced in 1983. But studies suggest that many of today's educators shy away from technology or fail to integrate it into their curriculum in any meaningful way (Bataineh & Abdel-Rahman, 2006). Many use technology only for administrative tasks, word-processing, or to vary instruction delivery (Gray, Thomas, & Lewis, 2010). Although schools provide access to technology and varying levels of professional development, effective integration is not happening (Bauer & Kenton, 2005). With educational technology providing a plethora of options to enhance learning and engage students, why would an educator choose to rely only on traditional methods of instruction? Explanations may revolve around teachers' sense of self-efficacy (their willingness to engage in risk-taking behavior), teacher knowledge (what they know), and teaching experience (their comfort level). If administrators, professional developers, and teacher education programs could understand the factors impacting effective use of technology in the classroom, they could better equip educators to take advantage of available technological tools.

Importance of Technology Integration

Empowering teachers to integrate technology into teaching and learning has the capacity to improve instructional practice and better engage students (Ringstaff & Kelley, 2002). Technology gives teachers the power to transform lessons. No longer is a map a flat piece of paper, with free interactive tools such as Google Earth, students and teachers can take virtual field trips around the world without leaving the classroom. Textbooks come to life in digital form, allowing students to use features such as audio, hypertext, video links, and imagery.

Not only can use of technology enhance instruction, it can better engage the new generation of tech-savvy students. Tools such as cell phones, email, and the Internet are staples in students' lives, except when they enter the classroom, where they may be given access to a computer only once a week or told not to use their cell phones (Cuban, 2001). A study by the Kaiser Family Foundation (Rideout, Foehr, & Roberts, 2010) reported that students between the ages of 8 and 18 spend the vast majority of their non-school hours using cell phones, computers, televisions, or other media devices. A survey of over 2,000 students in grades three to twelve revealed a daily average of 7 ½ hours spent using media devices outside school hours (more than 53 hours a week). This represents an increase of over an hour a day in media usage since 2004, highlighting the imbalance between technology use within and outside the school day. With technology use so ingrained in students' daily lives outside school, educators are missing a valuable opportunity to engage students with tools they are already comfortable using if they fail to integrate technology during the school day.

Today's Classroom – Where is Effective Technology Integration?

What is happening with technology in the classroom? The National Center for Education Statistics (NCES) produced a report on the availability and use of technology among teachers in elementary and secondary schools in 2009 (Gray et al., 2010). The findings showed that during instructional time, teachers and students used computers often (40%) or sometimes (29%). Teachers whose schools had systems for administrative tasks used technology to record grades (92%), take attendance (90%), and view results of student assessments (75%). This showed a disparity between professional and instructional use of technology. Teachers are using technology for their own efficiency and productivity, yet not as much for instructional use.

In 2008, the National Education Association (NEA) and the American Federation of Teachers (AFT) conducted a survey of 1,923 public school teachers addressing the effectiveness of technology in K-12 classrooms. The results showed that while some of these teachers had access to computers and the Internet in their classrooms, there was little evidence that they were able to use it successfully in their teaching (NEA, 2008). Whether an educator's failure to use technology effectively is caused by lack of value, lack of basic skill, or lack of understanding of integration, it results in a digital disconnect for students (Dexter, 2002).

Students notice the digital disconnect as well. According to Professor S. Craig Watkins (2010), author of *The Young and the Digital: What the Migration to Social Network Sites, Games, and Anytime, Anywhere Media Means for Our Future:*

> There is a growing belief that there is a disconnect that exists between students and their classrooms. Our kids are technology rich, yet kids are asked to power down and turn it off in the classroom. We pretend that what they do outside the classroom shouldn't have a bearing on what happens in the classroom. (p. 185)

Watkins' words about the digital disconnect were echoed by the Annual Speak Up Survey, which represents the opinions of 1.5 million K-12 students, teachers and parents. Since 2003, the Speak Up National Research Project has offered organizations a way to collect feedback from students, teachers, and parents on important education issues. Some key findings from the Speak Up Survey include the following:

- There is a persistent digital disconnect between students and adults.
- Students are frustrated with the lack of technology use in school.
- There is a lack of relevancy in education.
- Students adopt and adapt emerging technologies for learning easily.

These findings provide a new and unique student vision, offering ideas on how a technologically involved classroom might function. In this vision, students are leveraging emerging technologies to drive achievement and educational productivity. This vision offers three emerging themes of learning: socially based learning, un-tethered learning, and digitally rich learning. Socially based learning allows students to leverage emerging communication and collaboration tools to create personal networks of experts. If students were able to use their mobile devices and if K-12 schools embraced online learning, students would be un-tethered (no longer tied only to the traditional paper resources of the classrooms), enabling them to learn in *their* world. Digitally rich learning refers to the use of relevancy-based digital tools, content, and resources – such as online textbooks, gaming, simulations and animations, and use of digital media – as key to education productivity (Project Tomorrow, 2010).

According to the Speak Up 2009 Survey (Project Tomorrow, 2010), 56% of teachers across the nation believe there are potential benefits for using mobile devices for instructional purposes and to increase student engagement. However, 65% of those teachers also state their biggest concern about using mobile devices is that students will be distracted by other mobile applications, such as texting, surfing the web, or gaming. Teachers recognize that mobile devices in the classroom could also prepare students for the world of work (45%), extend the school day for learning (41%), improve teacher-parent-student communication (40%), and personalize instruction (33%; Project Tomorrow, 2010).

These results demonstrate that educators and students agree about many aspects of integrating technology into the classroom setting. The problem is that no one has figured out how to close the gap on this digital disconnect, helping students learn in a way that is more aligned with how they live ("Learning for the 21st Century," 2003). Students are concerned that this disconnect is slowing the development of skills they will need to compete in a technology-driven global economy. Today's students are embracing technology, and teachers need to follow suit.

The Impact of Self-Efficacy, Teacher Knowledge, and Teaching Experience on Technology Integration

For many teachers, integrating technology into instruction and learning can be a risky undertaking. Teachers ask themselves; how long will it take to learn this new technology, what if it fails to enhance the lesson, what if the computer crashes, what if it doesn't improve student learning? Left unanswered, these questions create barriers to technology integration.

To be effective, however, teachers need to be able to adapt to the demands and challenges of teaching, exhibiting resilience and persistence when faced with new information. They must be innovative, creative, and willing to risk failure. An investigation into whether a relationship exists between teachers' self-efficacy, teacher knowledge, and level of experience may assist in the development of a conceptual framework for encouraging and empowering teachers to use technology in the classroom.

Teacher self-efficacy. When adopting any new innovation it is important to study teachers' self-efficacy. If teachers have confidence in their teaching, will they take greater risks in their instruction and be more apt to integrate technology into their teaching? Self-efficacy refers to "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). It is a factor that can help predict and explain how teachers will act on what they know and what they can do (Gibbs, 2002). A teacher's self-efficacy plays a key role in how he/she defines tasks and selects strategies (Albion, 2001). It also can influence behavior in the classroom (Fives & Buehl, 2008). Pajares (1996) found "a strong relationship between teachers' self-efficacy beliefs and their planning, instructional decisions and classroom practices" (p. 326). High self-efficacy is a strong predictor of teacher effectiveness (Gibbs, 2002).

According to Bandura (1997), a person's feeling of self-efficacy can influence his/her ability to learn new skills. Teachers with high self-efficacy are more confident, are greater risk takers, can tolerate failure, persist more at achieving their goals, give greater effort to challenging tasks, and think outside the box (Vannatta & Fordham, 2004). However, Pajares (1996) argues that teachers' knowledge, skills and experience *alone* are not always stable predictors of their actions. Teachers lacking confidence in their abilities often fail to effectively apply their knowledge and skills in the classroom (Gibson & Dembo, 1984). Teachers with low self-efficacy are less confident, less committed to teaching, and allocate less time to instruction (Enochs, Riggs, & Ellis, 1990; Gibson & Dembo, 1984).

Teacher's self-beliefs and self-confidence are critical to the effective use of technology in the classroom (McGrail, 2005; Penuel, 2005; Windschitl & Sahl, 2002). Teachers who are more efficacious are more likely to take the risks necessary to use technology in their classrooms (Ivers, 2002). What about teachers with lower self-efficacy? Are they less likely to integrate technology in their classrooms? A key component of this research involves understanding self-efficacy and the role it plays, if any, in predicting which teachers will integrate technology into their classrooms.

Teacher knowledge. Teachers' knowledge of technology, pedagogy, and content can help them to be more effective. The Technological Pedagogical Content Knowledge Framework (TPACK) provides a clear definition of technology integration and the knowledge required to achieve it. Proposed by Mishra and Koehler (2006), TPACK describes an integrated framework related to how teachers' understanding of technology and pedagogical content knowledge interact with one another to produce effective technology integration in the classroom. This framework is an adapted model of Lee Shulman's (1986) pedagogical content knowledge (PCK) framework. With the complexity of teaching, it is important that educators integrate knowledge of pedagogy, knowledge of the subject matter, and now, knowledge of technology into their instructional practice. Unfortunately, the majority of teachers look at technology as a separate subject they are required to teach instead of a tool to help them teach or to help students learn. Teachers who use technology only for administrative tasks or to deliver instruction–without allowing student access–are not appropriately preparing students for their future (Hayes, 2007; Wells & Lewis, 2006; Zhao & Frank, 2003). In an ideal classroom, the teacher will view pedagogy, content, and technology as interdependent, weaving the three domains together into their lessons to actively engage their students (Koehler & Mishra, 2008). It is important to note that the TPACK framework does not prescribe what content to teach, which pedagogies to use, or what technology to include in a teacher's lessons. Thus, it is critical that educators have teaching experience and a strong grasp of pedagogy and content knowledge. Technology integration is a high-risk activity; teachers with a solid foundation of pedagogy and content knowledge will be more likely use technology in their instruction.

Teaching experience. Does experience matter when it comes to technology use? Research has shown that age, gender, life experiences, and career stage all affect the teacher's response to implementing new ideas in the classroom (Fullan, 2001). It is not unreasonable to presume that veteran teachers with the knowledge and experience gained from years on the job would feel comfortable in their jobs, have higher efficacy, and take risks by integrating technology. A teacher with 15 years of teaching experience should have a certain level of comfort and the ability to adapt to curricular changes, new strategies, and trends. However, while seasoned teachers might feel the most comfortable about teaching as a practice, they are also more likely to have gaps in their technical knowledge since technology use was not as prevalent when they began their careers. At the other end of the spectrum is the new teacher. Although new teachers may have more technical knowledge than veterans, they are newer to the classroom, lacking some of the familiarity and comfort gained by experience. One might expect that newer teachers would engage in less risk-taking behavior, foregoing technology integration in favor of gaining mastery over classroom management and curriculum basics.

One question for this study is whether classroom experience impacts technology integration. While one can make a plausible argument for a relationship between increased experience and increased technology use, the research is unclear. Some studies show that new teachers are more likely than veterans to embrace technology, while others suggest that not much technology use should be expected from new teachers (Forssell, 2009). It may be the case that experience alone is insufficient to generate the level of confidence and knowledge necessary to translate into effective technology integration in the classroom.

Purpose Statement

The purpose of this study was to examine whether teacher self-efficacy, teacher knowledge, and teaching experience influence levels of technology integration in the classroom. Will highly efficacious teachers integrate technology more often than their counterparts with lower efficacy? Do teachers with greater technological knowledge integrate technology more effectively than those with less knowledge? Does more classroom experience lead to higher levels of technology integration?

Armed with a better understanding of how self-efficacy, teacher knowledge, and teaching experience influence practice, administrators can create more effective staff development programs. Properly supported teachers should do a better job integrating technology in the classroom and preparing students for the 21st century.

Research Questions

This research explored the following question; how well do measures of self-efficacy, teacher knowledge and teaching experience predict teachers' scores on a state measure of classroom technology use? More specifically:

1. What is the relationship among self-reported teachers' self-efficacy, teacher knowledge, and teaching experience?
2. How well do they predict technology integration?

Significance of the Study

Dramatic changes have occurred in the area of technology development and society's use of technology in daily life and the workplace. Yet in many classrooms, technology integration remains a significant challenge for educators, creating a digital disconnect that threatens to handicap students as they graduate and compete for jobs in the 21st century. This study looked at three possible predictors of technology integration: teacher self-efficacy, teacher knowledge, and teaching experience. Understanding the interplay between these predictors and technology integration will facilitate the design of more effective pre-service teacher education programs and professional development programs.

Summary

Child development scholar Jean Piaget (n.d.) stated, "The principle goal of education is to create men and woman who are capable of doing new things, not simply repeating what other generations have done" (para.1). The classroom teacher designs daily lessons based on curriculum, prior knowledge, and past experiences. Generally, teachers plan their lessons in ways that make them feel most comfortable instead of ways that create the best learning environment for students. For many teachers, integrating technology is too time intensive and scary. They fear the unknown; what if the lesson fails, what if the technology doesn't work, what if I can't answer a question because I don't know the answer? Rather than taking risks, they stay with what is familiar and safe: traditional, and often less-effective methods of teaching. By providing a framework like TPACK and providing targeted professional development, teachers may feel better equipped to meet the needs of 21st century learners. This investigation into the relationships among factors that influence teachers' use of technology in the classroom can provide critical information that can benefit teachers and better prepare students for the 21st century.

Chapter 2: Literature Review

Investigating Literature on Self-Efficacy, Technology Integration, Teacher Knowledge, and Teaching Experience

This chapter reviews existing research related to the relationships between teachers' self-efficacy, teacher knowledge, and teaching experience as factors that could predict technology integration in the classroom. The following sections address definitions, theories, and measures of each topic to identify the current state of research in these areas.

The Concept and Development of Self-Efficacy

A teacher's self-efficacy can have a powerful effect on his or her success or failure in the classroom and can affect the choices he or she makes (Bandura, 1995). It does not matter what a teacher knows, what skills he or she possesses, or what he or she has accomplished if he or she does not believe he or she is capable of accomplishing the task at hand. This isn't to say that people can do things beyond their capabilities just because they believe they can, but rather to assert that confidence in one's capability is a strong indicator of behavior (Kennet & Keefer, 2006; Pajares, 1996). Low self-efficacy becomes an obstacle to teachers as they lack the persistence required to succeed (Pajares, 1996). A highly efficacious teacher has greater resilience to meet the challenges that occur in the classroom. With the appropriate tools and the necessary support, teachers can build their self-efficacy and become more successful in all areas of teaching.

There are four main sources of information that help a person form beliefs about self-efficacy (Bandura, 1994; Ebmeier, 2003; Shaughnessy, 2004). The most influential source is one's mastery experiences: the actual experiences individuals have and on which they base other experiences. Successful experience builds a person's sense of efficacy while failure undermines it, especially if failure occurs before efficacy is established (Bandura, 1994). Vicarious experiences, another source of efficacy information, are weaker than authentic mastery experiences, but can be valuable when people have no prior experience or are uncertain about their own abilities. In this type of role modeling experience, the more socially similar a person is to the role model, the stronger the influence he or she has on the person's self-efficacy beliefs. When the role model succeeds or fails, it will have an affect on the person's willingness to try the same type of activity. The third source of information, verbal persuasion, is less effective than mastery or vicarious experiences in helping to form self-efficacy beliefs. In some instances, people just need to hear positive verbal praise to increase their self-efficacy (Bandura, 1997). The last source of information is a physiological state, such as anxiety, stress, fatigue, and mood. A person's emotional state can have a powerful effect on his/her actions.

Definitions of self-efficacy. Researchers have defined teachers' self-efficacy in many ways. Bandura (1995) defines self-efficacy as a "person's belief in their capabilities to organize and execute the courses of actions required to manage prospective situations" (p. 2). Bandura asserts that people are motivated by two kinds of expectations: self-efficacy and outcome expectancy. Self-efficacy belief is a component of social cognitive theory and a critical factor in how well knowledge and skills are acquired (Pajares, 1996). The concept of self-efficacy also arises under different labels such as *teachers' sense of efficacy*, a teachers' belief in his/her ability to have a positive effect on student learning (Ashton & Webb, 1986); and *teacher efficacy*, the "extent to which the teacher believes he or she has the capacity to affect student performance" (Berman, McLaughlin, Bass, Pauly, & Zellman, 1977, p. 4). Guskey and Passero (1993) define teacher efficacy as "teachers' belief or conviction that they can influence how well students learn, even those who may be difficult or unmotivated" (p. 4). Tschannen-Moran, Woolfolk Hoy, and Hoy (1998), use the term teacher self-efficacy in a manner most closely related to Bandura's definition. They define "teacher self-efficacy as the teacher's belief in his or her capability to execute courses of action required to successfully accomplish a specific teaching task in a particular context" (p. 233). This definition of teacher self-efficacy views it as a trait specific to an instructional task and circumstance rather than the generalized task of teaching. For the purpose of this study, self-efficacy is defined as "the teacher's belief in his or her capability to execute courses of action required to successfully accomplish a specific teaching task in a particular context" (Tschannen-Moran et al., 1988, p. 233).

Findings related to self-efficacy. According to many researchers, highly efficacious teachers are open to new ideas and willing to try new teaching methods and strategies (Berman et al., 1977; Guskey, 1988; Stein & Wang, 1988). Greater commitments to teaching (Coladarci, 1992; Evans & Tribble, 1986) as well as greater enthusiasm towards teaching (Allinder, 1994; Guskey, 1988) are common characteristics of teachers with a high sense of self-efficacy. Self-efficacy beliefs influence the choices teachers make and their behaviors. Most teachers engage in activities in which they feel competent and confident and avoid those in which they do not. Their perseverance and resilience when obstacles appear are also affected by their beliefs. Thus, the higher a teacher's sense of efficacy, the greater is his/her effort, persistence, and resilience when tackling obstacles (Bandura, 1997).

In relation to teaching, a teacher's sense of efficacy, or his or her confidence that his/her teaching leads to student learning, is a powerful concept and a teacher characteristic that reliably predicts instructional practices and student outcomes (Tschannen-Moran et al., 1998). Teachers with higher self-efficacy will complete tasks with greater success. Their success will be based on their effort, persistence, and willingness to challenge themselves (Bandura, 1997; Berman et al., 1977; Guskey, 1988; Pajares, 1996; Stein & Wang, 1988). Teachers with lower self-efficacy will be drawn to simpler tasks overall as a coping mechanism to avoid failure (Dweck, 1999; Pajares, 1996).

While many studies in educational research have focused on self-efficacy beliefs (Pajares, 1996; Pintrich & Schunk, 1995), few have investigated the relationship between self-efficacy and technology use (Albion, 2001; Enochs et al., 1993; Riggs & Enochs, 1993; Wang, Ertmer, & Newby, 2004). Studies have been conducted on subject matter-specific self-efficacy–such as the effects of efficacy on science teaching and learning (Riggs & Enochs, 1993), teacher efficacy on writing (Lavelle, 2006), and computer self-efficacy with respect to actual usage of computers (Kukafka, Johnson, Linfante, & Allegrante, 2003; Pajaras & Kranzler, 1995; Zhao, Pugh, Sheldon, & Byers, 2002).

In the late 1980s, studies linked self-efficacy to changes in teacher practices (Smylie, 1988) and teacher success in implementing innovative programs (Stein & Wang, 1988). Several studies have recognized *level of confidence* as a factor that influences teaching with computers (Albion, 2001; Downes, 1993; Handler, 1993; Summers, 1990).

The findings suggested that teachers with low confidence used the computers less than those with higher confidence. A teacher's belief in his/her ability to use computers or his/her confidence is directly related to his or her use of computers (Marcinkiewicz, 1994). Research also suggests that self-efficacy beliefs are related to instructional practices (Ashton & Webb, 1986). This study explored self-efficacy beliefs in relation to instructional practices and technology use in teaching. Will a teacher who believes in his/her general teaching abilities (higher self-efficacy) integrate technology into his/her teaching more and with greater success?

Extending findings from other studies of efficacy, it would be logical to conclude that teachers' belief in their ability to work effectively with technology would significantly impact their use of technology in teaching (Hill, Smith, & Mann, 1987). Teachers who performed better in computer-related tasks were found to have higher levels of computer self-efficacy (Harrison, Rainer, Hochwarter, & Thompson, 1997). Efficacious teachers were more likely to take the risks necessary to use technology in their classrooms (Ivers, 2002). Albion (2001) states that teachers' self-efficacy beliefs "are an important and measurable component of the beliefs that influence technology integration" (p. 2).

There is value in knowing teachers' sense of efficacy regarding teaching, and yet, surprisingly, it is a characteristic that is largely ignored by professional developers, teacher education programs, and school administrators. A teacher's potential success at technology integration may be predicted by his or her sense of self-efficacy. The definition of *technology integration* is an essential component of this analysis.

Technology Integration in the Classroom

During his 1996 State of the Union Address, President Bill Clinton stated:

> In our schools, every classroom in America must be connected to the information superhighway with computers and good software and well-trained teachers.... I ask Congress to support this education technology initiative so that we can make sure this national partnership succeeds. (Clinton, 1996)

In this address, President Clinton asked congress to support education technology, yet 15 years later, administrators and teachers are still struggling to find an effective model of technology integration in K-12 classrooms. In a recent survey, findings showed that 93% of K-12 classrooms were connected to the Internet with a 5:1 student to computer ratio (Gray et al., 2010). There might be huge gains in technology and Internet access in U.S. classrooms, but is access really enough? A survey of 3,665 K-12 teachers in four states (California, Florida, Nebraska, and New York) examined computer use in classrooms (Norris, Sullivan, Poirot, & Soloway, 2003). Forty-four point seven percent of the teachers reported that their students used technology for less than 15 minutes per week for curricular use. A meager 17.6% and 6.3% of teachers reported curricular use of technology and the Internet for more than 46 minutes per week. While these figures may not be representative of every classroom, it does raise an interesting question. Can it be called technology integration if there are computers in the classroom, yet no one is using them? Clearly the answer is no. Results of the national Speak Up for Schools survey show that technology is not being used effectively in schools (Project Tomorrow, 2010).

According to the International Society for Technology in Education (ISTE, 2000), "technology integration is defined by the ability of students to be able to select technology tools to help them obtain information in a timely manner, analyze and synthesize the information, and present it professionally" (p. 6). Successful integration of technology in the classroom depends on the teacher (Heinecke & Knestis, 2003), as well as the school's vision and leadership. The simple act of equipping a classroom with technology does not equate to effective integration into teaching and learning or changes in teaching practice (Cuban, Kirkpatrick & Peck, 2001; Lim & Chai, 2008; Lowther, Inan, Strahl, & Ross, 2008; Ross, Smith, Alberg, & Lowther, 2004; Rutherford, 2004; Smeets, 2005). There have been too many instances of technology being placed in classrooms where it sits untouched by both teachers and students (Abrami, 2001; Cuban, 2001; Muir-Herzig, 2004; Sutherland et al., 2004). In a study involving 19 schools, teachers used computers only to meet their immediate needs, such as instructional delivery and to communicate with parents and colleagues (Zhao & Frank, 2003). Another study showed that most teachers who used technology used it for its most basic functions: email, word-processing, and the Internet (Lawless & Pellegrino, 2007).

According to previous studies, effective technology integration depends on several factors: teachers' beliefs and attitudes (Becker, 2000; Chen, 2008; Jimoyiannisa & Komisb, 2007; Lim & Chai, 2008; Van Braak, Tondeur, & Valcke, 2004; Vannatta & Fordham, 2004; Wozney, Venkatesh, & Abrami, 2006); demographic characteristics of teachers, such as years of teaching (Bebell, Russell, & O'Dwyer, 2004; Van Braak, 2001); access to technology and support (Hohlfeld, Ritzhaupt, Barron & Kemker, 2008); pedagogical, content, and technological knowledge (TPACK; Koelher & Mishra, 2006; Pierson, 2001); ongoing professional development (Becker, 1994; 2000); and teaching models or mentors (Bitner & Bitner, 2002). Technology integration takes place at different levels depending on the teacher, the situation, and the aforementioned factors. Some teachers use technology primarily to deliver instruction (Bauer, 2002; Moersch, 1995), while others use it to augment or improve instruction (Kulik, 2003; Ross, Hogaboam-Gray, & Hannay, 2001). Ideally, a teacher uses a combination of the two, integrating technology as a method of both delivering and improving instruction. If a teacher does not see value in the use of technology or have confidence in using it, he/she will not find a place for it in day-to-day instruction (Dexter, 2002). Schools commonly focus on the technology itself instead of using technology as a tool for learning and effective instructional practice (Earle, 2002). As Harris, Mishra, and Koehler (2009) assert, "learning about technology is different than learning what to do with it instructionally" (p. 402). Teachers must still possess a basic knowledge of technology in order to be able to make effective choices about when, how, and what technology to use with students. However, effective technology integration should not be measured by the amount of time the technology is used but by why and how it is used for learning (Earle, 2002).

Technological Pedagogical Content Knowledge Framework (TPACK)

Research shows that teachers' use of technology requires comprehensive and complex knowledge (Lambert & Sanchez, 2007; Margerum-Leys & Marx, 2002). TPACK reconnects technology to pedagogy and content (Harris et al., 2009). Within the TPACK framework, there are three key domains of knowledge that are essential to good teaching: pedagogy (knowing how to teach), content (possessing a mastery of subject matter), and technology (familiarity with tools and usage). The large disparity seen in technology integration happens when teachers have only some of the knowledge in the three domains (Koehler & Mishra, 2008). The TPACK framework builds on Shulman's (1986) description of pedagogical content knowledge (PCK) to explain how teachers' understanding of technology and PCK interact to produce effective technology integration in the classroom. Teachers are faced with the challenge of how to incorporate multimodalities and differentiated technologies to facilitate teaching to the various learners in their classrooms. The TPACK framework provides a roadmap for teachers to address these challenges.

TPACK is comprised of six sub-domains: (a) content knowledge (b) pedagogical knowledge, (c) pedagogical content knowledge, (d) technological knowledge, (e) technological content knowledge, and (f) technological pedagogical knowledge.

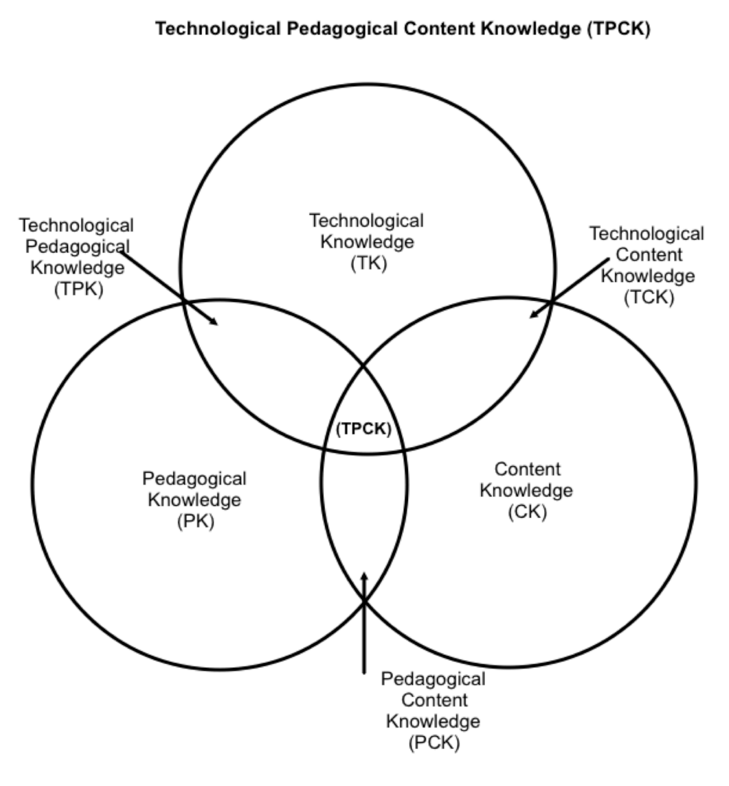

Figure 1. Technological Pedagogical Content Knowledge (TPACK) Model. Adapted from "Technological Pedagogical Content Knowledge: A new framework for teacher knowledge," by P. Mishra, and M.J. Koehler, 2006, *Teachers College Record*, 108(6), 1017-1054.

Content knowledge. Content knowledge (CK) is knowledge about the subject matter. CK can be broken down into three categories: subject matter knowledge, pedagogical content knowledge, and curricular knowledge (Mishra & Koehler, 2006; Shulman, 1986). A teacher must have a comprehensive base of content knowledge to be effective. Content knowledge is one of the three main domains of knowledge (see Figure 1). For teachers to master content knowledge, they have to understand the structure of their subject matter (Shulman, 1986). Shulman notes,

> the teacher need not only understand that something is so; the teacher must further understand why it is so, on what grounds its warrant can be asserted, and under what circumstances our belief in its justification can be weakened and even denied. (p. 9)

Teachers who understand their discipline, and can think within it, can also apply it to real world situations. This helps students apply the content to something they already understand. For example, a teacher might broaden a lesson to real-life situations to help students connect with the concept.

Due to hard economic times, budget cuts, and larger class sizes, teachers frequently change grade levels. This can make it difficult to become an expert in any one content area. However, teachers with higher self-efficacy may be more successful regardless of the situation (Berman et al., 1977; Guskey, 1988; Stein & Wang, 1988).

Pedagogical knowledge. Pedagogical knowledge (PK) is knowledge about the practices or methods of teaching. Pedagogy is the science of teaching, which includes student learning, classroom management, lesson plan development, and student evaluation. Teachers need to know how to teach; regardless of the subject area, they should be able to present the material so students can learn. Pedagogical knowledge is one of the three main domains of knowledge of the TPACK model.

The teacher with PK knows many teaching strategies, can apply them flexibly in their classroom, understands how to manage the classroom, and can effectively assess students' learning (Mishra & Koehler, 2008). For example, they use strategies to help their students recall previously learned facts before introducing new information. A teacher may prompt a student, remind him or her of a term, use a concrete example to promote his or her understanding, or use the strategy of "wait time" to allow all students to think and remember.

Having the ability to manage a classroom, be flexible, and assess students' learning are all strategies that make integrating technology easier. PK is part of the professional body of knowledge that helps teachers analyze and understand the process of teaching–with or without technology.

Pedagogical content knowledge. Pedagogical content knowledge (PCK) is the most "useful form of representation of ideas" as it relates to the most regularly taught topics in one's subject area (Shulman, 1986, p. 9). As teachers are faced with a variety of learners with different learning styles and differing levels of prior knowledge, they try to adapt the curriculum to meet the needs of all learners.

The most important aspect of PCK is that the subject matter is transformed for teaching. There are many content areas of teaching, such as math, language arts, social science, science, art, and music. As previously mentioned, the teacher must be creative and represent the subject matter in a variety of ways to meet the needs of all learners. The teacher must also be able to adapt the instructional materials to meet the needs of students based on their prior knowledge (Mishra & Koehler, 2008). For example, a teacher's discussion on the use of blogs to teach about the life in Ancient Egypt may be categorized as content knowledge, if one concentrates on the teacher's understanding of history. It may be categorized as PK, if one concentrates on the teacher's understanding of motivation and student learning, and pedagogical content knowledge, if one concentrates on how the teacher merges content and pedagogy together in a given context.

Failure to adapt curriculum is a major issue in public education. Regarding PCK, Shulman (1986) emphasizes the importance of combining content areas and teaching so it is interesting and accessible to all students. Shulman states that quality teaching is the transformation of content.

Technological knowledge. Technological knowledge (TK) is a hard domain to master because technology is always changing (Mishra & Koehler, 2006). It is one of the main domains in the TPACK model, the domain that was missing from Shulman's (1986) PCK model. TK should include a basic understanding of the most current digital technologies such as computers, Internet, video, and other devices such as cell phones and digital cameras (Mishra & Koehler, 2006). TK also includes basic computer skills such as word processing, email, and spreadsheets. The more technologically literate teachers have a basic knowledge of technology innovations such as blogs, wikis, podcasts, and social networking. Video games and simulations would also fall into this domain as a pertinent piece of knowledge. Teachers with TK also know about analog and digital technologies, can keep up with rapid changes, and are good at troubleshooting. These characteristics are helpful when it comes to technology integration.

If a teacher has a good understanding of TK, he or she is better able to make choices about what technology to use in the classroom. Technology serves many purposes in the classroom, such as enhancing teacher productivity, taking attendance, creating seating charts, and making grade keeping easier. Two other areas that can be improved through effective use of technology are instructional practices and student learning. It is up to the individual teacher to decide what technology to use and how to use it in their classroom. With greater knowledge of technology these decisions may become easier. A teacher must be knowledgeable and comfortable enough with technology to integrate it into a lesson. For example, a teacher may ask students in a language arts class to use a digital camera to create a digital story.

Teachers should have enough technology knowledge to take advantage of tools that can enhance learning and prepare their students for the 21st century. Time, access, confidence, and motivation can all serve as obstacles for teachers acquiring technological knowledge.

Technological content knowledge. Technological content knowledge (TCK) is the understanding of how technology and content influence and constrain one another (Mishra & Koehler, 2006). Teachers not only need to be experts in their subject matter, but also have a solid understanding of the various ways the subject matter can be represented, especially with the application of technology.

Teachers make hundreds of decisions every day about their teaching and how their students will learn best. Teachers make many of these decisions based on their prior knowledge and experience. Teachers who are technologically proficient can select the proper technology to help students better understand a topic. For example, using an educational software program, such as Geometer's Sketchpad, may help students understand certain geometry concepts better. While knowing one's subject matter is critical, knowing how to use technology to best enhance it makes one a better teacher. Putting the two together and using appropriate and effective technology is the key to effective instructional design.

Technology changes practices and society (Mishra & Koehler, 2008). Society will always be resistant to change; people fought the movement from oral tradition to written, from ink to print, and now from print to digital. Now, society is moving from print-based classrooms to digital learning environments. Teachers not only have to know their subject matter, they have to know which technologies to use to best represent the content and be able to represent that content to their students in an effective manner.

Technological pedagogical knowledge. Technological pedagogical knowledge (TPK) is an understanding of how teaching and learning changes when certain technologies are used (Mishra & Koehler, 2006). It is essential that teachers understand the strengths and constraints of technology and develop appropriate lessons that integrate the tools that will best help students learn. Teachers should not use technology simply for the sake of using technology. It is important to understand that both content and pedagogical choices impact which technologies are appropriate. Teachers need to design learning where pedagogy and technology overlap. Mishra and Koehler (2006) state that an important part of TPK is "developing creative flexibility with available tools in order to repurpose them for specific pedagogical purposes" (pp. 16-17). Teachers need to break out of their traditional ways and look beyond the immediate technology to make it work for their own pedagogical purposes. Teachers who understand TPK understand that their teaching practices and instructional strategies will most likely change with the use of technology.

Using TPACK as a framework for teachers. If understood and implemented in the classroom, TPACK could be an effective framework to guide teachers' integration of technology. It must be emphasized that these three domains of knowledge, technology, pedagogy and content are interdependent (Mishra & Koehler, 2006) and work together within specific contexts in the classroom. TPACK gives teachers choices about what to teach, how to teach it, and what technologies to use. Applying the TPACK framework to the development of teacher knowledge does not imply a prescriptive and single approach to technology integration. It will depend on the skills of the teacher, the technology available, and what is appropriate for the objective of the lesson. For example, one teacher interested in integrating technology into science may consider the use of a virtual field trip, while another may choose to have students do a virtual dissection. At the same time, an English teacher may integrate technology by using collaborative software such as GoogleDocs to have students peer edit persuasive essays or write book reviews on Amazon.com. Thus, TPACK requires flexibility not just with the content but also with technology and pedagogy.

With respect to technology integration, little attention has been given to the key domains of content and pedagogy. An important aspect of technology integration is that "introducing new technologies into the learning process changes more than the tools teachers use. It also has deep implications for the nature of content-area learning as well as the pedagogical approaches from which teachers can select" (Harris et al., 2009, p. 395). A growing number of scholars are recognizing that TPACK helps to effectively integrate technology into their instruction (Franklin, 2004; Gunter & Baumbach, 2004; Hughes, 2003; Koehler & Mishra, 2008; Pierson, 2001). Introducing TPACK to teachers challenges them to develop and act upon TPACK in whatever form and degree may be comfortable to them, not change their philosophy of teaching. Teachers that already possess expertise in all three domains are "flexible at navigating the space that is defined by the three elements of content, pedagogy, and technology and the complex interactions among these elements in specific contexts" (Mishra & Koehler, 2008, p. 10). They are already designing their curriculum to meet the needs of all learners and all situations within the classroom and integrating technology along the way. These teachers are TPACK experts, which is different that being solely an expert in one domain (Mishra & Koehler, 2006).

Teaching Experience

This study investigated whether teaching experience, as measured in years of teaching, was a predictor of technology integration. It also looked at the possible relationship between teaching experience, self-efficacy, and teacher knowledge. Existing research shows inconsistent findings on the impact of teaching experience on instructional practice and technology use.

During the first few years of teaching, teachers are busy learning their subject matter, their classroom management skills, and effective practices and strategies to gain student achievement. Inexperienced teachers are often less effective (Goe, 2002; Kain & Singleton, 1996) and less likely to integrate technology into their curriculum. If new teachers *are* using technology, it is usually for administrative tasks like posting grades, taking attendance, and other programs that are already defined at the school (Hayes, 2007; Wells & Lewis, 2006; Zhao & Frank, 2003). New teachers have no experience, as measured in years of teaching. However, they may have experience with a particular content area in their classroom or have knowledge of technology. A concern with new teachers and their technology use is that their attention is often focused primarily on classroom management rather than instruction practice (Forssell, 2009; Fuller, 1969). The literature suggests that under current conditions, it may be unrealistic to expect too much technology integration from new teachers (Forssell, 2009).

Some of the research showed that after the first 5 years of teaching, teaching experience as a factor in technology use lessens in significance and levels off after 5-7 years (Allen, 2003). An argument that can be made is that after the first few years of teaching, one's confidence level increases, allowing for more risk taking and more use of technology, unless one does not hold the knowledge necessary to carry that out. That is where the need for TK arises. Whether a teacher is young or old, new or experienced there may be a need to increase their knowledge of technology and digital tools so that they can apply it to their curriculum and allow students access to it.

Some studies have suggested a significant relationship between teaching experience and students' use of computers in the classroom (Hernandez-Ramos, 2005; Kim & Bagaka, 2005). Other studies suggest that teachers with less than 5 years of experience use technology for preparation and classroom management and less for content delivery and student engagement (Bebell et al., 2004). Newer teachers may have less fear of the technology itself, but they lack the management skills and core content knowledge needed to run an effective classroom, which limits their use of technology (Fatemi, 1999). Teachers with 6-10 years of teaching were reported to be more willing to use technology than new teachers (Hernandez-Ramos, 2005). A study by Hernandez-Ramos (2005) also suggested that teachers were found to implement new innovations more effectively when they were comfortable with their content, pedagogy, and classroom management skills, something with which new teachers still struggle. Veteran teachers, those with 11 years of experience or more, were not as willing to use the technology, but when they did so, they did it to a greater degree than teachers with less than 5 years of experience.

Experience is important because to some extent, technology in the classroom is disruptive to teaching; it has been said that technology can break the patterns of instruction. According to Mishra & Koehler (2006), "teachers need to be flexible when using technology and sometimes reshape not just their understanding of technology but of all three components [technology, pedagogy, content]" (p. 1030). Experience gives teachers a comfort level with pedagogy, content, and possibly technology; however, when implementing any new technologies, teachers need to consider how they impact pedagogy and content.

Does experience as measured by years of teaching help to develop confidence? The results of this study may show that experience as measured by years of teaching is an important factor in predicting technology integration in the classroom. Many studies showed that confidence is likely to increase during teachers' pre-service years (Brousseau, Book, & Byers, 1988; Housego, 1990; Hoy & Woolfolk, 1990). However, there are also findings stating that in-service teachers have greater confidence, with some decline in later years (Anderson et al., 1988; Guskey & Passero, 1993; Korevaar, 1990; Moore & Esselman, 1992).

Summary

It is evident that the need exists to discover what skills and supports will help teachers effectively integrate technology into their classrooms. What combination of variables will help teachers engage in effective technology use? Strongly efficacious teachers are more likely to take such risks. Therefore, examining the relationship between self-efficacy and technological integration is important if administrators are going to better support teachers. It is also known that teacher knowledge affects efficacy, so knowledge and self-efficacy both appear to affect technology integration. However, it is unclear how much knowledge and confidence affect behavior. The purpose of this study was to determine if a relationship exists between teachers' self-efficacy, teacher knowledge, teaching experience, and technology integration.

Chapter 3: Methodology

Research Design

The goal of this research was to examine whether teacher self-efficacy, teacher knowledge, and teaching experience were predictors of successful technology integration in the classroom. For the purpose of this study, self-efficacy was defined as teachers' perceived capability to produce results or obtain a goal rather than their actual level of competence (Pajares, 1996; Tschannen-Moran et al., 1998). By examining teacher self-efficacy, teacher knowledge, and teaching experience as they relate to use of technology in teaching and how they influence practice, this study could prompt changes in classroom practice, professional development activities, and teacher education programs.

Purpose of Study

The purpose of this ex post facto study was to examine whether teachers' self-efficacy, teacher knowledge, and teaching experience influence levels of technology integration in the classroom. While there are many variables that may play a role in whether or not teachers use technology in their instruction, this study focused on these three variables as possible predictors. This study used quantitative research questions to investigate relationships between (a) self-reported teacher self-efficacy, teacher knowledge, and teaching experience, and (b) self-reported technology integration.

Research Questions

This study explored the following question; how well do measures of self-efficacy, teacher knowledge and teaching experience predict teachers' scores on a state measure of classroom technology use? More specifically:

1. What is the relationship among self-reported teachers' self-efficacy, teacher knowledge, and teaching experience?
2. How well do they predict technology integration?

Four knowledge scales were used for this survey as stated previously. One of the measures used for this study is part of a larger construct, the CTAP Ed Tech Profile (ETP). In the CTAP Ed Tech Profile, participants responded to the entire survey, however, this study only pulled data from the subscales defined as Standard 9: Using Technology in the Classroom (see sample question, Figure 2), and Standard 16: Using Technology to Support Student Learning and Overall Proficiency. These scales are described in more detail in the instrumentation section.

Research Design

This method for this study is an ex post facto research method using multiple regressions to predict technology integration. When translated literally, ex post facto means *from what is done afterwards*. In educational research, it means *after the fact.* This design was selected because the study was looking at technology integration as it was happening or had happened. Ex post facto research method looks at cause and effect, focusing first on the effect, and then attempting to determine what caused the observed effect. There was no manipulation of independent variables and there was no treatment or intervention for the participants. The data collection tool was questionnaires.

Population

The population for this study was male and female K-6 public school classroom teachers of varying ages and from various ethnic backgrounds.

CCTC Program Standard 9: Using Technology in the Classroom Description: (9a) Each candidate considers the content to be taught and selects appropriate technological resources to support, manage, and enhance student learning in relation to prior experiences and level of academic accomplishment. **Question 1: Management and alignment of technological resources with lesson content.**
(A) I do not use technological resources in my classroom.
(B) I am able to identify how some technological resources are able to help students learn, but I do no often use technology or encourage students to use technology to learn lesson content.
(C) When I design lessons I try to include a variety of technological resources: drill and practice, electronic encyclopedias, word processing and publication software, and instructional games. I also may use presentation software to introduce content. My students usually take turns working individually at classroom computers or in the computer lab.
(D) I design lessons that require my students to locate and use appropriate technological resources to complete instructional goals. They may include simulations, mind mapping, electronic portfolios, and multimedia with sound and graphics. Students often work in collaborative groups at computer learning stations I have set up either in the classroom or computer lab.

Figure 2. CCTC Program Standard 9: Using technology in the classroom

Sampling

The sampling is not random but rather a convenience sampling (Creswell, 2009) of elementary school teachers from one school district. Fifteen elementary schools agreed to participate in the study. Four of the schools were selected based on their current participation in the Enhancing Education Through Technology (EETT) Competitive Grant. In September of 2010, the grant began its first year of implementation of a 1:1 netbook environment in grades five and six at these schools. Since 2001, the federally funded EETT grant has been providing funding for grades four through eight to help eligible local educational agencies use technology to enhance teaching and learning. The unit of analysis is a third through sixth grade teacher at one of 15 public elementary schools in Southern California. Participation in the study was voluntary. The study took place during the third semester of 2011.

Setting

The study was conducted in a suburban school district that is located in the second largest county in California, in terms of population. This school district currently serves 21,450 students. Nine out of the 16 schools selected to participate in the study fall under the Title I category (See Table 1). All Title 1 funded schools that do not make Adequate Yearly Progress (AYP) are identified as Program Improvement (PI) Schools under the Elementary and Secondary Education Act. Established in 1965, the purpose of this act is to improve the academic achievement of the disadvantaged and schools that qualify receive funding to support this goal (U.S Department of Education, 2004). Zone 1 schools are in one of our affluent neighborhoods with a small percentage of English Learners. Zone 2 schools included the EETT grant schools and four of these schools are Title I schools. There are a large number of English Learners at Schools CP and K. The schools in Zone 3 have the largest populations of English Learners in elementary schools in the district. Five of the six schools are Title 1 schools while four of the six are in program improvement, three in year 5 and one in year 1. Zone 4 included one school with few English Learners.

Table 1

District Demographics

	% English Learners	Title 1	Program Improvement
District	27.1		
Zone 1			
School E	6.2	No	
School H	1.6	No	
School NC	2.6	No	
Zone 2			
School CP	63.3	Yes	
School D	16.7	No	
School K	44.1	Yes	
School P	42.2	Yes	
School S	58.9	Yes	
Zone 3			
School A	55.3	Yes	Year 1
School C	16.6	No	
School P	89.4	Yes	Year 5
School R	77.3	Yes	Year 5
School V	41.8	Yes	
School W	81.6	Yes	Year 5
Zone 4			
School NH	7.5	No	

There are three identified clusters of participants based on the schools they are from. The first cluster is the EETT grant cluster (Zone 2). Eighteen of the teachers who participated in the study were involved in the grant project, a 1:1 netbook implementation with the deployment of 600 netbooks into the fifth and sixth grade classrooms. This was the largest 1:1 netbook initiative within the District. These 18 teachers have received extra professional development, mentoring, and support throughout the year. This may lead to higher technology integration than the average teacher at the same school or within the 15 schools. The second identified cluster was the fifth and sixth grade teachers at one elementary school (Zone 4) who have been using netbooks in a 1:1 environment for the past 3 years. We will call this the "Netbook School." This school was never part of the EETT grant and received all funding and support on its own. The teachers may already use technology in their classrooms more than the average teacher at the same school or within the 15 schools. All the other teachers at the "non-project schools," as they will be labeled, make up the third cluster (Zones 1 & 3). These schools may have pockets of technology integration happening but nothing that is deliberate in a large scale.

Demographics of Study

In this study, 185 third through sixth grade teachers in 15 schools in one unified school district in southern California were invited to complete both the California Technology Assistance Project (CTAP) Ed Tech Profile Assessment (ETP) and the Teacher Self-Efficacy, Knowledge & Experience (TSEKE) survey. The Ed Tech Profile survey, a state measure, was used to report technology use. Standard 9: Using Technology in the Classroom, and Standard 16: Using Technology to Support Student Learning, and Overall Proficiency were the sub scales used in this study. The second survey was a combination of Tschannen-Moran and Woolfolk Hoy's (2001) Teachers' Sense of Efficacy Scale (TSES; long form), the Technological Pedagogical Content Knowledge (TPACK) scale developed by Ismail Sahin (2011) and the demographic survey. Fifty teachers completed the survey, which represents a 27.0% response rate of those surveyed. Five of the participants who completed the TSEKE survey did not complete the CTAP Ed Tech Profile survey and were eliminated. Additionally, one respondent who completed the TSEKE survey answered only the demographic questions, so this record was excluded from all analyses. Therefore, only 44 of the original 185 surveys were used in the statistical analyses, which represent 88.0% of the completed surveys or 23.8% of the targeted sample population who were originally asked to take the survey.

Instrumentation

Through a set of developed survey questions, this study explored four variables: teacher self-efficacy, teacher knowledge, teaching experience, and technology use in the classroom. The surveys were administered in two different sessions. The first survey asked about teacher technology use. The second survey included the other three variables: teacher self-efficacy, teacher knowledge, and teaching experience.

Teachers' Self-Efficacy Scale. The first variable was teachers' self-efficacy, defined as "a person's belief in their capabilities to organize and execute the courses of actions required to manage prospective situations" (Bandura, 1997, p. 3). The Teachers' Sense of Efficacy Scale (TSES; long form) was used to measure teachers' self-efficacy in the areas of instructional practice, classroom management, and student engagement. This study was most interested in measuring the teachers' efficacy in their instructional practices. The TSES (long form), sometimes referred to as the Ohio State Teacher Efficacy Scale, has been validated and proven reliable by Tschannen-Moran and Woolfolk Hoy (2001). The TSES was used without any modifications and with permission from its creators. The TSES survey uses Likert scale questions. The Likert scale is one of the most widely used scales in survey research and can be used to measure attitudes and preferences by asking the participant to respond with his/her level of agreement to the question (Bryman & Bell, 2007). The TSES required teachers to respond to 24 questions about their teachers' self-efficacy using a 9-point Likert scale ranging from 1 (*nothing*) to a 9 (*a great deal*).

An instrument that is valid measures what it states it will measure. There has been much research and controversy over the validity and reliability of self-efficacy measures. The internal consistency for the TSES (long form) was reported by Tschannen-Moran and Woolfolk Hoy (2001). Table 2 represents their analysis.

Table 2

Analysis of TSES Scale

	Mean	Standard Deviation	Alpha
TSES	7.1	.94	.94
Engagement	7.3	1.1	.87
Instruction	7.3	1.1	.91
Management	6.7	1.1	.90

According to Tschannen-Moran and Woolfolk Hoy (2001), the TSES has demonstrated consistency in three moderately correlated factors: Efficacy in Student Engagement, Efficacy in Instructional Practices, and Efficacy in Classroom Management. They also subjected the 24-item long form to two separate factor analyses, one with pre-service teachers (N=111) and the other with in-service teachers (N=255). The in-service teachers revealed the same three strong factors as were found in their previous studies. These three factors (engagement, instruction, and management) accounted for 54% of the variance of in-service teachers' responses on the 24-item instrument.

Tschannen-Moran and Woolfolk Hoy (2001) reviewed the construct validity of both the short and long form of the TSES scale by comparing them to other existing teacher efficacy measures and looking for correlations. They had participants respond to the TSES, the Rand Items, and the Hoy and Woolfolk (1993) 10-item adaptation of the Gibson and Dembo (1984) Teacher Efficacy Scale (TES). The scores on the TSES (long form) were positively related to both the Rand Items ($r = 0.18$ and 0.53, $p<0.01$) as well as both the personal teacher efficacy (PTE) factor of the Gibson and Dembo measure ($r = 0.64$, $p<0.01$). The results of these analyses indicate that the TSES is reasonably valid and reliable, and positive correlations with the other measures of personal teaching efficacy provide evidence for construct validity.

Teacher knowledge – TPACK survey. The second variable was teacher knowledge that is defined by TPACK, which measures technology, pedagogy and content knowledge as well as the intersections of this knowledge. The TPACK survey (See Appendix A) was used to measure the three core domains of knowledge: technology (TK), pedagogy (PK) and content (CK) as well as their intersections: technological pedagogical knowledge (TPK), technological content knowledge (TCK), pedagogical content knowledge (PCK) and technological pedagogical content knowledge (TPACK).

The TPACK survey was developed by Ismail Sahin (2011) to measure TPACK in pre-service teachers. The original survey was administered to Turkish-speaking pre-service teachers studying English language education, however, it was also translated and tested in English to examine language equivalence. The results found that it met the language equivalence. The TPACK survey contained Likert scale questions requiring teachers to respond to a five-point scale: 1=*not at all*, 2=*little*, 3=*moderate*, 4=*quite*, and 5=*complete*.

Validity and reliability was measured by administering this survey to 348 pre-service teachers. The construct validity was measured using exploratory factor analysis (EFA), which is done to determine whether the survey item for each subscale measures each variable effectively. According to the results of the study, the survey items did measure each variable successfully. Statistically significant correlations existed among the subscales. These results showed that knowledge in technology, pedagogy, content, and their intersections are related. Overall, findings from the present research study demonstrate the TPACK survey is a valid and reliable measure.

For the reliability of the scale, Cronbach's alpha coefficient was used. The internal consistency scores for each subscale calculated were determined as 0.93 for TK, 0.90 for PK, 0.86 for CK, 0.88 for TPK, 0.88 for TCK, 0.92 for PCK, and 0.92 for TPACK. Findings suggest that Cronbach's alpha coefficients of the subscales showed the internal consistency of the scale and the item-total correlations of the scale items are quite high.

In order to determine reliability the survey was administered twice. A reliability coefficient was determined as 0.80 ($p < 0.01$) for the TK subscale, 0.82 ($p < 0.01$) for the PK subscale, 0.79 ($p < 0.01$) for the CK subscale, 0.77 ($p< 0.01$) for the TPK subscale, 0.79 ($p < 0.01$) for the TCK subscale, 0.84 ($p < 0.01$) for the PCK subscale, and 0.86 ($p < 0.01$) for the TPACK subscale. Overall, these results confirm the test-retest reliability of the survey.

Teaching experience – Demographic survey. The third variable was teaching experience measured by years of teaching, which was measured through the demographic characteristics survey. This survey, specifically designed for this study, provided background information about the participants to gain better understanding and insight from the results. The demographic survey included 12 questions about school name, age, gender, years of teaching, level of education, grade level taught, and personal use of technology. Lastly, teacher names were collected so that responses between the two surveys could be matched.

Technology integration – CTAP EdTechProfile. Technology use by teachers was the fourth variable in this study. A teacher assessment tool called the EdTechProfile (ETP; see Appendix B for permission for use) measured this variable. This tool came from the California Assistance Technology Project (CTAP), has been widely used by school districts throughout the state, and is administered annually by the state of California to educators and students. The purpose of the ETP, a California Department of Education State Educational Technology Service (SETS) project, is to provide teachers and administrators with tools and data that guide decisions about how to effectively support teachers and integrate technology into classroom instruction. The subset of questions in this assessment were used to measure teacher technology use, both *in the classroom* and *to support student learning*, and are based on the California Commission on Teacher Credentialing (CCTC, 2010) Standards 9 & 16 (which are the Standards of Quality and Effectiveness for Professional Teacher Programs). This study used all the items under the two sections called CCTC Program Standard 9: Using Technology in the Classroom (see Figure 2) and CCTC Program Standard 16: Using Technology to Support Student Learning. It also used the Overall Proficiency Score, which was the average of these two scores. There are three assessment levels for each item: introductory, intermediate, and proficient. On a scale of 0.0-3.0, teachers self-evaluated their level of technology use for each question. This assessment was also a requirement of the 20 participating EETT grant teachers. They were required to take it each year of the grant cycle and originally took it in May of 2010.

Although the following statistics are several years old, 130,442 out of 306,548 (42.6%) teachers, and 7,224 out of 26,496 (27.3%) administrators were active ETP users. If "purposeful user" is defined as people with both an active account and administrator-level rights in the system, there were a total of 7,224 purposeful users of ETP as of June 2006. The entire state of California has free access to ETP as a resource to educators who can access reports and information to help them:

- Evaluate and plan staff and professional development.
- Support the management and consistency of state and local funding efforts.
- Track program completion and compliance requirements.
- Improve teacher technology adoption.

Data Collection

This study explored four variables: teacher self-efficacy, teacher knowledge, teaching experience, and technology integration. Two surveys were used to collect data. Survey 1 was the CTAP ETP assessment that was administered first, followed by survey 2, which included teacher self-efficacy, teacher knowledge, and teaching experience.

An important limitation of this study involved the reliability of self-report data. Surveys, a form of self-report measures, were used in this study. Self-reported data is subject to bias, either on the part of the researcher or participants, and can affect the validity of the findings. Bias can be due to social desirability, when a participant responds in a way he or she thinks would be viewed as socially acceptable or how he/she thinks the researcher wants him/her to answer. The data may be compromised if the participant is trying to impress the researcher. Participation in this study was completely voluntary. Names were required to match results of surveys 1 and 2. The researcher referred to all data collected through this study only by an assigned number. All data associated with this study will be securely stored for 5 years as required by the human subjects review process. Once the period of 5 years has elapsed, this researcher will completely destroy all data in a manner that ensures the continued anonymity of the study participants.

The responses shared in the CTAP online survey are distinctly different from the other data collection measures used in this study in that this researcher cannot assure the confidentiality and destruction of this data. No one within the school district has access to these data. However, the Administrator in the Education Technology Office at the California Department of Education, the Director of the EdTechProfile at the California Technology Assistance Project (CTAP), and the Orange County Department of Education can access this data. These data are only used by others in accordance with grant requirements, and in overall summaries for CTAP reports. The data are kept in a password-protected online database. This data resource (CTAP) may maintain a record of assessments in their online files. However, CTAP employees never select individuals to view their data or use it in any identifying way. As previously mentioned, participants in this study were identified only by an assigned number associated with this study, and thus even if the service provider does keep a copy of the responses, this will cause no potential harm to any of the participants or to their employment.

Survey and Assessment of Variables

The three variables, teacher self-efficacy, teacher knowledge, and experience, were analyzed to see if any correlational relationships existed among them. The survey items from which these analyses were drawn came from three instruments, which include the TSES scale, the TPACK survey, and the demographic survey developed specifically for this study. The demographic characteristic questions at the end of Survey 2 gathered information about the following factors: school, age, years of teaching, level of education, grade level taught, and personal use of technology.

Participants completed a teacher assessment from CTAP called the EdTechProfile (ETP) that measured self-reported teacher technology use. This survey was administered first, followed by Survey 2, which was called "Survey 2: All About Me as a Teacher."

Procedures

Principals of the elementary schools were contacted to request permission to invite teachers to voluntarily participate in the study. The study was explained to the principals and they were informed about the requirements of the study as well as the possible benefits and significance of any findings. They were also told that the survey results would be kept confidential. Principals were not told which teachers volunteered to participate, however, they were informed as to when the study began and ended.

The study was conducted during the third trimester of the 2010-2011 school year. Schools had staff development time every Wednesday and many principals allowed teachers to take the surveys during this time to ensure as much participation as possible. However, participation was completely voluntary and only available to the teachers that had read the informed consent forms and agreed to participate. Principals that chose to allow time for the survey to be taken ended their staff development time 30 minutes early, allowing teachers to either go to the computer lab or return to their classrooms to complete the survey voluntarily. Initially, participants were emailed an informational letter briefly describing the research study. The researcher obtained teacher email addresses from the Information Technology Department. Teachers were informed of the nature of the study and invited to voluntarily participate. The directions in the email asked that they visit the survey website and read the informed consent form. If interested, they began Survey 1. They were able to download copies of the informed consent form and the participants' privacy protection for their records. Survey 1 had a 7-day deadline to complete. The participants that completed Survey 1 received a second email. The email again clarified the nature of the study and informed the participants of their roles and rights. It directed them back to the website for the link to Survey 2. By reading the informed consent online and then completing the surveys, participants agreed to participate in the study. The surveys were administered in two phases to help minimize the burden of time. Both surveys were administered online in electronic format only. A monetary incentive of a $50 gift card to Amazon.com was rewarded to four participating teachers via a raffle drawing. Participants had to complete both surveys in order to be included in the drawing. This gesture served as a small reward for participants' time and effort in completing the surveys. Participating teachers had the option to include their email address at the end of Survey 2 to be included in the drawing. The email addresses were not kept following the raffle. The researcher hand delivered the gift cards to the four winners. A final email was sent letting participants know their surveys had been received and thanking them again for taking the time to participate in the study.

The first survey launched was the CTAP ETP Assessment. The ETP questions related to technology use in teaching were administered through the CTAP EdTechProfile website. Some teachers already had a level of familiarity with this measure as many had taken the survey in the past. Teachers were asked to complete this survey annually by the state of California, however, for the past 4 years; only 25% of teachers have been required to participate to meet the state requirements. The teachers were required to create accounts on the CTAP website including their first and last names. Directions on either retrieving an old account or creating a new one were included in the email sent to the teachers, as well as on the website. A hyperlink to Survey 1: CTAP ETP Assessment was included in the email. Although all participation was voluntary and teachers could discontinue participation at any time, the CTAP survey could not be manipulated to allow teachers to skip certain questions. Nonetheless, this study was only interested in the subset of Standards 9 & 16, and although teachers had to answer the general skills questions to get to the standard 9 & 16, the researcher did not analyze the data from the general skills section.

The second survey that contained the teacher self-efficacy, teacher knowledge, and teaching experience data also asked for participants' names. The names were only used to link the responses from Survey 1: CTAP ETP Assessment and Survey 2 responses. Once they had been matched, a number was assigned to their data responses and their names were removed. Since gender was not a factor being analyzed in this study, pseudonyms are not necessary. Teachers had the option to skip questions on this survey. All data were kept confidential and were not shared with either district or school personnel.

The TSES scale, TPACK survey, and demographic questions were combined into one survey and added to an online survey tool. The order of the questions was as follows: (a) Consent Form, (b) Teacher self-efficacy Scale (items 1-24), (c) TPACK Survey (items 25-72), and (d) Demographic questions (items 73-85). The survey was approximately 30 minutes in length. This survey was administered using the online tool called Survey Monkey. Survey Monkey allows for the researcher to validate and analyze the data. The collected data can be exported into a variety of formats to be used with many software programs, like Microsoft Excel or Statistical Package for the Social Sciences (SPSS), a research tool used to statistically analyze data.

Analysis Plan

Data from the surveys were analyzed using quantitative means using SPSS statistical analysis software. Descriptive statistics were used to understand the demographic characteristics of the participants. The Pearson Product Moment Correlation was used to determine possible relationships among the four variables in the study. The researcher also conducted correlational and multiple regression analysis of the data.

Analysis of the questionnaire. Once data were collected, means were calculated for the following groups of items: teaching experience, as measured by years of teaching (Survey 2: item 17), teacher self-efficacy (Survey 2: items 1-24), TPACK (Survey 2: items 25-72), and technology use (Survey 1: Standards 9 & 16). Descriptive statistics were calculated for each item and factor. Data were screened for possible outliers, linearity, and normality.

The researcher conducted further analysis using frequency, means, standard deviation, and range. The Likert scale allowed the researcher to analyze the standard deviation. There was significance in finding out the average distance from the mean. If it was low it suggests the answers cluster around the mean. A high standard deviation indicates a lot of variation in the answers. A standard deviation of 0 is obtained when all responses to a question are the same. The researcher looked at the frequencies for each item from the TSES, TPACK, and the demographic survey. This included sample size, mean, and mode. Individual frequency tables were created for each survey item as shown in Table 3.

Table 3
Example Frequency Table for Survey Item 1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	9	2.7	2.7	2.7
	4	31	9.3	9.3	12.0
	5	141	42.1	42.5	54.5
	Strongly Agree	151	45.1	45.5	100.0
	Total	332	99.1	100.0	
Missing	System	3	.9		
Total		335	100.0		

Means were calculated from items in the survey with Likert scales. For the TSES Scale, a mean score greater than a 6 indicated a higher level of teacher efficacy. With respect to the TPACK scale, a mean score higher than a 4 indicated teachers are in agreement about a particular statement. Each survey was examined individually and then compared with the others to look for relationships among the variables using the Pearson Product Moment Correlation.

A Cronbach's alpha (α) test was used to estimate internal consistency of each of the scales. The internal consistency coefficient measured the degree of homogeneity of the items and the total test. A score of .70 or higher for a group-administered test indicates the item is measuring what it was designed to measure. A score of .70 means that at least 70% of the total score variance was due to true score variance.

Finally, hierarchical regression, a form of multiple regression, was used to regress the three dependent variables (Using Technology in the Classroom, Using Technology for Student Learning, and Overall Proficiency) onto select background/demographic variables, self-efficacy variables, and TPACK variables. Prior to running the hierarchical regression analyses, the skewness and kurtosis statistics of the TSES and TPACK variables were assessed for normal distribution—an assumption of multiple regression.

Scale reliability and data distribution of study. Cronbach's alpha (α) scores for all subscales were > .80, which indicates very good internal consistency (Cortina, 1993; George & Mallery, 2003). Additionally, to evaluate data normality, the *z* scores for skewness and kurtosis were calculated using the formulas: skewness/SEskewness (*z* score for skewness) and kurtosis/SEkurtosis (*z* score for kurtosis). The *z* scores are reported in Table 4. According to the central limit theorem, variables with skewness and kurtosis *z* scores falling between ± 1.96 are non-significant at the $p < .05$ level, and thus the data are considered normally distributed. One of the three efficacy subscales, Efficacy in Classroom Management, yielded a significant skewness *z* score. One of the seven TPACK subscales, Pedagogical Content Knowledge, yielded a significant kurtosis *z* score. The data distribution for these two variables is, therefore, non-normal. However, the skewness and kurtosis *z* scores for these two variables are non-significant at the $p < .01$ level (comparison *z* score at $p < .01 = 2.58$), indicating that the deviation from normality is small. Small deviations from the normal distribution are unlikely to affect the outcome of a multiple regression analysis since multiple regression analysis is "robust" and can withstand minor violations to the normality assumption without adversely affecting the outcome (Kerlinger & Pedhazur, 1973; Lewis-Beck, 1980).

Table 4

Cronbach's Alphas of Subscales for the Teachers' Sense of Efficacy Scale and Technological, Pedagogical and Content Knowledge (TPACK) Surveys

		Z score	
Survey/Subscale	Cronbach's alpha	Skewness	Kurtosis
Teachers' Sense of Efficacy Scale:			
Teacher Sense of Self-Efficacy Scale (TSES)	.97	-0.93	-1.42
Efficacy in student engagement	.92	-0.31	-1.58
Efficacy in instructional strategies	.93	-1.01	-1.60
Efficacy in classroom management	.93	-2.26*	-0.16
Technological, Pedagogical and Content Knowledge (TPACK):			
Technology knowledge	.95	-1.51	-1.47
Pedagogy knowledge	.87	-1.33	0.21
Content knowledge	.83	0.38	-0.98
Technological pedagogical knowledge	.97	0.05	-1.91
Pedagogical content knowledge	.87	-0.33	-2.35*
Technological content knowledge	.87	-1.09	-0.52
Technological, pedagogical and content knowledge	.93	-0.80	-0.79

Note. $^*p < .05$.

Table 5 displays the descriptive statistics for the dependent variables from the CTAP ETP Survey: Using Technology in the Classroom (Standard 9), Using Technology to Support Student Learning (Standard 16) and overall Proficiency Level. None of the *z* scores for skewness and kurtosis for the three dependent variables was significant at the $p < .05$ level and, therefore, the dependent variables are normally distributed.

Table 5

Descriptive Statistics for Standards 9, 16 & Overall Proficiency Level on CTAP ETP Survey

Standard no./Description	*M*	*SD*	Min.	Max.	Skewness	Kurtosis
9. Using technology in the classroom	2.11	0.53	1.00	3.00	-0.37	-0.48
16. Using tech. to support stud. learning	1.88	0.51	0.71	3.00	0.32	0.19
Overall proficiency level	1.96	0.45	0.97	3.00	0.11	0.70

N = 44

Summary

This study examined the relationships between teacher self-efficacy, teacher knowledge, and teaching experience to determine if they were predictors of technology integration. The study hypothesized that these factors would play a significant role in predicting technology use. Research was conducted using four knowledge subscales in the form of surveys to quantify the existence and extent of these relationships. These subscales were the TSES Scale, the TPACK survey, a demographic characteristic survey, and the CTAP ETP Assessment.

The results of this study may help improve teacher education programs, professional development activities and classroom practice. If the hypotheses are correct, school administrators and professional developers would gain insight on how to best design professional development and learning experiences for teachers and staff.

Chapter 4: Findings

This study investigated whether teacher self-efficacy, teacher knowledge, and teaching experience predicted levels of technology integration in the classroom. It also examined the impact of four teacher background variables (gender, highest education level achieved, school, and grade level taught) on technology integration in the classroom. The participants for this study included teachers from 15 elementary schools. 185 third through sixth grade teachers were invited to participate in the study. The following discussion is based on 44 usable surveys (N=44). The data were analyzed using descriptive statistics, a correlational matrix, and hierarchical regression.

Among other findings, this study confirmed that technology knowledge predicted overall technology proficiency. Technological Pedagogical Content Knowledge (TPACK) variables were consistently a statistically significant predictor of all three dependent variables (Using Technology in the Classroom, Using Technology to Support Learning, and Overall Proficiency). The higher the teachers' TPACK scores, the more technology use and proficiency they reported.

The research questions for this study were created from a review of related literature and the researcher's knowledge of the problem. During this study, the following question was addressed; how well do measures of self-efficacy, teacher knowledge and experience predict teachers' scores on a state measure of classroom technology use? Specifically,

1. What is the relationship among self-reported teachers' self-efficacy, teacher knowledge, and teaching experience?
2. How well do they predict technology integration?

Sample Data Overview

The researcher's intention was to draw a sizeable and heterogeneous sample so that the results could be generalized to the target population. In this study, the concept of generalizability pertains to the degree to which the results are applicable to the population under study, male and female K-6 public school classroom teachers of varying ages. A profile of the respondents is shown in Table 6. The "average" profile of the participants is a 41.2 year old, female sixth grade teacher, with a master's degree and 13.3 years of teaching experience. In looking at the findings, the data shows that the ratio of females to males who responded to the survey was 4:1. This was the same ratio as respondents holding a master's degree compared to those who did not. Approximately half (45%) of the respondents were 30-39 years old, and two thirds (59%) of them had taught between 10-19 years. The respondents were, for the most part, seasoned teachers.

Four out of 15 of the schools that participated in the study were also Enhancing Education Through Technology (EETT) grant schools. The grant placed netbook computers into the hands of every fifth and sixth grade student at these four schools. The 18 grant teachers spent the prior year learning about integrating technology into the classroom and becoming more technology literate. Because of this, the majority of teachers that participated in the study were sixth grade teachers, 17 out of 44 teachers. The next grade level that participated the most was fifth grade, with only 4 fourth grade teachers and 5 third grade teachers participating. Further conjecture of the impact the grant schools may have had on the results of this study will be discussed in subsequent sections.

Table 6
Descriptive Statistics - Respondents' Profile

Demographic variable	*M (SD)*	Percentage
Gender		
Male	18.2	
Female	81.8	
Age		41.2 (8.3)
20-29 years old		4.5
30-39 years old		45.4
40-49 years old		27.3
50-59 years old		18.2
60-69 years old		2.3
Unspecified		2.3
Years Teaching	13.3 (6.0)	
0-9 years		27.3
10-19 years		59.1
20-29 years		11.3
30-39 years		2.3
Highest education level		
Bachelor's degree		18.2
Master's degree		81.8
Current grade level taught		
3rd		11.3
4th		9.1
5th		18.2
6th		38.6
Combination class (multigrade)		20.5
Unspecified		2.3

Note. $n = 44$

Overall, the respondents reported using various technologies in their personal lives on a daily or weekly basis. All respondents made weekly use of technology for communication and to obtain information, with most using it daily. Yet, as shown in other studies (Harris et al., 2009), use of technology for communication and information gathering does not necessarily translate into technology integration in the classroom. As Lei (2009) found, 80% of her sample, who were pre-service teachers, used technology to communicate daily but lacked expertise or vision to translate this technology knowledge into use in classroom instruction.

Daily use of technology to access information through Google search or online news was also the most frequent response, whereas participants' modal response for using technology to access information on Stocks was *never*. With social networks being so popular currently, it was not surprising that 45.5% of the respondents use some form of social networking on a daily basis.

The modal response related to use of technology for various online shopping categories was *monthly* and *rarely*, with *never* being the most frequent response for online shopping for sports. *Rarely* and *never* were the most frequent responses for using technology for the entertainment category, with online games having a bi-modal distribution. However, in the entertainment category, respondents reported that on a daily, weekly, or monthly basis 52.2% purchased Netflix online while 46.7% watched YouTube videos online. So, while overall, the entertainment category did not report significant usage, it is clear that technology plays a role in many different parts of teachers' personal lives.

Descriptive Information About Measures

In examination of the survey responses related to teacher self-efficacy, the data indicate-that, as a group, respondents believed they were self-efficacious—they reported possessing *quite a bit* of an ability to engage students, to use instructional strategies, and to manage their classrooms. Appendix C presents the descriptive statistics for the results of the Teachers' Sense of Efficacy Scale (TSES) survey. Nineteen of 24 (79.2%) of the item means fell between 7.5 and 8.5, which is midway between *quite a bit* and *a great deal* on the teacher belief scale. All but one item mean (i.e., assist families in helping their children do well in school) were above 7.0 (i.e., quite a bit).

The TPACK subscales revealed that the respondents reported they had, on average, *quite a bit* of knowledge on technology, pedagogy, content, technological pedagogy, pedagogical content, technological content, and technological pedagogical content. According to the survey results, the respondents are tech savvy, self-efficacious, and knowledgeable in all areas measured by this study. Appendix D displays the descriptive statistics for the results of the Technological, Pedagogical and Content Knowledge (TPACK) survey. Thirty-seven of 47 (78.7%) of the item means fell between 3.5 and 4.5, which indicates *quite a bit* of knowledge in the categories identified on the survey, with 100% of the item means above 3.5, which is midway between *moderate* and *quite a bit* of knowledge.

The descriptive statistics for the TSES and TPACK surveys subscale scores are presented in Table 7. The recommended method for calculating the TSES subscale scores is the un-weighted mean of the items, which comprises the subscale (Tschannen-Moran & Woolfolk Hoy, 2001). The recommended method for calculating the TPACK subscale scores involves using the sum method (Sahin, 2011). Therefore, the efficacy subscale scores are lower than the TPACK subscale scores, despite that fact that the Likert scale used for the item responses on the TSES had a higher upper limit (9 = *a great deal*) than the TPACK items upper limit (5 = *complete*).

Table 7

Descriptive Statistics of the Subscales for the Teachers' Sense of Efficacy Scale and Technological, Pedagogical and Content Knowledge Surveys

Survey/Subscale	*M*	*SD*	Min.	Max.	Skewness	Kurtosis
Teachers' Sense of Self-Efficacy Scale:						
Teacher Sense of Self-efficacy scale (TSES)	7.74	0.93	5.88	9.00	-0.35	-1.06
Efficacy in student engagement	7.40	1.07	5.25	9.00	-0.11	-1.11
Efficacy in instructional strategies	7.84	0.95	6.00	9.00	-0.37	-1.16
Efficacy in classroom management	7.91	0.95	5.75	9.00	-0.82	-0.11
Technological, Pedagogical and Content Knowledge (TPACK):						
Technology knowledge	62.66	9.79	43	75	-0.56	-1.07
Pedagogy knowledge	25.40	3.13	18	30	-0.50	0.16
Content knowledge	24.63	3.30	19	30	0.14	-0.70
Technological pedagogical knowledge	15.90	3.06	11	20	0.02	-1.37
Pedagogical content knowledge	26.76	2.78	23	30	-0.12	-1.68
Technological content knowledge	16.23	2.67	10	20	-0.40	-0.37
Technology, pedagogical and content knowledge	19.86	3.56	12	25	-0.29	-0.56

Note. $n = 32$

What is the Relationship Among Self-Reported Teacher Self-Efficacy, Teacher Knowledge, and Teaching Experience?

To answer this question the study employed Pearson correlations to examine the relationship among teachers' scores on the three measures: teacher self efficacy, as measured by self-report data on the TSES survey; teacher knowledge, as measured by self-report data on the TPACK survey; and teaching experience, as measured by self-report data on the demographic survey. The three measures were also compared to technology use as measured by self-report data in the ETP survey.

There were moderate to strong positive correlations between the technology, pedagogy, and content knowledge (TPACK) subscales and the three dependent variables (Using Technology in the Classroom, Using Technology to Support Learning, and Overall Proficiency). These correlations suggest that teachers who have knowledge of technology, content, and pedagogy use technology when teaching because they understand its ability to facilitate reaching the objectives of the lesson and facilitating student access to content.

Table 8 displays the correlation matrix among the dependent variables of the CTAP EdTech Profile survey and the independent variables, Teacher Self-Efficacy Scales, Teaching Experience and Technological Pedagogical Content Knowledge (TPACK) subscales. There is a strong positive correlation between Technology Knowledge and (a) Using Technology in the Classroom (r = .53), and (b) Overall [Technology] Proficiency (r = .54). There is a moderate positive correlation between Technological Content Knowledge and (a) Using Technology in the Classroom (r = .48), and (b) Using Technology to Support Student Learning (r = .45). There is also a moderate positive correlation between Technological Pedagogical Content Knowledge and (a) Using Technology in the Classroom (r = .48), (b) Using Technology to Support Student Learning (r = .49), and (c) Overall [Technology] Proficiency (r = .46).

This study did not obtain expected findings based on a review of related literature and the researcher’s knowledge of the problem. Initially, it was postulated that teachers with higher self-efficacy, greater technology knowledge, and more experience would integrate technology into their classrooms more.

Table 8

Pearson Correlations Among CTAP ETP, TSES, TPACK, and Experience Variable

	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1)	Using Technology in the Classroom	1	.83***	.95***	0.04	<.01	<.001	0.12	.53***	.32*	0.15	.44**	.36*	.48**	.48**	0.23
(2)	Using Technology to Support Learning		1	.90***	0.19	0.14	0.18	0.24	.44**	.36*	0.28	.42**	.48**	.45**	.49**	0.1
(3)	Overall Proficiency			1	0.06	0.04	0.01	0.12	.54***	.31*	0.17	.38*	.39*	.40**	.46**	0.14
(4)	Ohio State Teacher Efficacy Scale				1	–	–	–	0.26	.65***	.47**	0.26	.44**	0.25	.32*	0.09
(5)	Efficacy in Student Engagement					1	.84***	.83***	0.11	.61***	.47**	0.15	.34*	0.23	0.25	0.16
(6)	Efficacy in Instructional Strategies						1	.79***	0.28	.65***	.48**	.32*	.51**	.31*	.36*	0.17
(7)	Efficacy in Class Management							1	0.17	.65***	.43**	.31*	.42**	0.31	0.31	0.18
(8)	Technology Knowledge								1	.38*	0.17	.50**	.40*	.45**	.60***	-0.02
(9)	Pedagogy Knowledge									1	.62***	.49**	.69***	.48**	.50**	0.16
(10)	Content Knowledge										1	.32*	.63***	.39*	.40**	0.04
(11)	Technological Pedagogical Knowledge											1	.65***	.83***	.74***	0.2
(12)	Pedagogical Content Knowledge												1	.63***	.56***	0.07
(13)	Technological Content Knowledge													1	.85***	0.22
(14)	Technological Pedagogical and Content Knowledge														1	0.21
(15)	Years of Teaching Experience															1

*$p < .05$. **$p < .01$. ***$p < .001$.

How Well Does Teacher Self-Efficacy, Technology Knowledge, and Teaching Experience Predict Technology Integration?

Hierarchical regression, a method of multiple regression in which variables are introduced into the analysis in blocks, was selected as the appropriate regression analysis.

The demographic variables precede in time the variable data collected on the *All About Me* survey. Therefore, the demographic variables are introduced in the first block of the regression, and the TSES and TPACK subscales are introduced in the second block.

Three hierarchical regression analyses were run regressing the three dependent variables—Using Technology in the Classroom, Using Technology to Support Student Learning, and Overall Proficiency—onto select demographic variables and TSES and TPACK subscale variables (three from TSES and seven from the TPACK). Mean substitution was used to account for missing values. The TSES variable was not included due to multicollinearity, the phenomenon where two predictors are too highly correlated such that the scores of the individual predictors may become invalid. Multicollinearity is detected when the square root of the variance inflation factor (VIF) is two or greater (Fox, 1991). As already stated, the three subscales are included in the TSES survey, which may be the reason for multicollinearity.

The demographic variables, which were introduced in step 1 of the multiple regression, included age, gender, years teaching, master's degree, and years teaching at current grade level. Because the predictive power of the demographic variables is exploratory for this research, the stepwise method of variable entry is appropriate (Field, 2005). The TSES and TPACK subscales, however, entered the regression model using the Enter method because there was a theoretical rationale for their presence in the model, as indicated in the literature review.

In the first hierarchical regression run, the dependent variable was Using Technology in the Classroom, and collinear variables were identified in the model. Efficacy in Student Engagement yielded a variance inflation factor (VIF) of 5.82 and was, therefore, eliminated. Next, Technological Content Knowledge yielded a VIF of 4.38 and was also eliminated. The final solution from the third run is reported in Table 9. The model was significant— F9, 34 = 2.92, $p < .05$—and explained 29% (see the adjusted R square) of the variance in Using Technology in the Classroom. Efficacy in Instructional Strategies was the only significant predictor of Using Technology in the Classroom—$t(44) = -2.39$, $p < .05$. Moreover, the relationship between Efficacy in Instructional Strategies and Using Technology in the Classroom was negative—the more self-efficacious the respondent felt the less they reported using technology in the classroom.

Technology Knowledge had a positive relationship with Using Technology in the Classroom and was approaching significance with $p = .08$. As such, this variable may have heuristic value. In other words, with further analysis with a larger sample size, Technology Knowledge may yield more promising results.

The effect size (ES) of each individual predictor in a regression analysis is calculated by the formula sr2/(1 - R2), where sr is the semi-partial correlation (Cohen, Cohen, West, & Aiken, 2003). Using Cohen (1992) as a guide to interpret ES, Efficacy in Instructional Strategies had a medium effect ($ES = .14$) on Using Technology in the Classroom.

Table 9

Results of Hierarchical Regression Analysis for Using Technology in the Classroom

Source / Variable	*β*	*t*	*Semi-partial* correlation
Demographic data:			
Gender	.17	1.17	.15
TSES survey:			
Efficacy in instructional strategies	-.49	-2.39*	-.31
Efficacy in classroom management	.18	0.89	.11
TPACK survey:			
Technology knowledge	.30	1.80	.23
Pedagogy knowledge	.14	0.66	.09
Content knowledge	-.04	-0.19	-.03
Technological pedagogical knowledge	-.05	-0.23	-.03
Pedagogical content knowledge	.22	1.08	.14
Tech, pedagogical & content knowledge	.24	1.13	.15

Note. $R = .66$, $R2 = .44$, adjusted $R2 = .29$, $F9,34 = 2.92$, $p < .05$. $*p < .05$.

In the second hierarchical regression run, the dependent variable was Using Technology to Support Learning and no significant predictors were identified (see Table 10). Although the overall model was statistically significant—$F(9, 34) = 2.43$, $p < .05$—the t tests of the independent subscale variables were not sensitive enough to identify significant individual predictors. The $R2 = .44$, and adjusted $R2 = .29$. This is likely due to the small sample size (n =38).

In the third hierarchical regression run, the dependent variable was Overall Proficiency, and two predictors were identified as significant predictors. In this model (see Table 11), Efficacy in Instructional Strategies and Technology Knowledge were the only significant predictors of Overall Proficiency—$t(42) = -2.48$, $p < .05$ and $t(42) = 2.16$, $p < .05$, respectively. Each of these two independent variables exerted a medium effect on the Overall Proficiency—$ES_{\text{Efficacy in Instructional Strategies}}$ = .18 and $ES_{\text{Technology Knowledge}}$ = .14. Efficacy in Instructional Strategies is inversely related to Overall Proficiency and Technology Knowledge is directly related. Respondents who reported more complete technology knowledge also reported higher Overall Proficiency. However, respondents who reported higher self-efficacy in instructional strategies also reported lower Overall Proficiency.

Technological Pedagogical Content Knowledge (TPACK) variables were consistently a statistically significant predictor of all three dependent variables (Using Technology in the Classroom, Using Technology to Support Learning, and Overall Proficiency). The higher the teachers' TPACK, the more likely they were to use technology and be proficient in doing so. Self-efficacy and experience were not as strong predictors of technology integration.

Table 10

Results of Hierarchical Regression Analysis for Using Technology to Support Learning

Source / Variable	*β*	*t*	Semi-partial correlation
Demographic data:			
Gender	.22	1.42	.19
TSES survey:			
Efficacy in instructional strategies	-.31	-1.44	-.19
Efficacy in classroom management	.23	1.06	.14
TPACK survey:			
Technology knowledge	.15	0.89	.12
Pedagogy knowledge	-.04	-0.20	-.03
Content knowledge	.04	0.23	.03
Technological pedagogical knowledge	-.13	-0.59	-.08
Pedagogical content knowledge	.38	1.75	.24
Tech, pedagogical & content knowledge	.26	1.22	.16

Note. n = 38, R = .63, $R2$ = .39, adjusted $R2$ = .23, F9,34 = 2.43, p < .05.

Analysis of the inferential statistics resulted in both unexpected and expected outcomes. The study reveals an inverse relationship between self-reported self-efficacy and technology use. It also shows that TPACK variables were consistently a statistically significant predictor of all three dependent variables (Using Technology in the Classroom, Using Technology to Support Learning, and Overall Proficiency). The higher the teachers' TPACK scores, the more they reportedly use technology and are proficient in doing so.

Table 11

Results of Hierarchical Regression Analysis for Overall Proficiency

Source / Variable	*β*	*t*	Semi-partial correlation
Demographic data:			
Gender	.19	1.33	.17
TSES survey:			
Efficacy in instructional strategies	-.50	-2.48*	-.31
Efficacy in classroom management	.20	0.99	.13
TPACK survey:			
Technology knowledge	.35	2.16*	.27
Pedagogy knowledge	.08	0.41	.05
Content knowledge	-.02	-0.13	-.02
Technological pedagogical knowledge	-.17	-0.85	-.11
Pedagogical content knowledge	.33	1.63	.21
Tech, pedagogical & content knowledge	.24	1.16	.15

Note. $n = 38$, $R = .68$, $R2 = .46$, adjusted $R2 = .31$, F9,34 = 3.18, $p < .01$. $*p < .05$.

Impact of Grant Schools

Four out of 15 of the schools that participated in the study were also Enhancing Education Through Technology (EETT) grant schools. The grant placed netbook computers into the hands of every fifth and sixth grade student at these four schools. The 18 grant teachers spent the prior year learning about integrating technology into the classroom and becoming more technology literate. They also made up almost 50% of the responses with 18 out of 44 teachers responding from the grant schools.

It was hypothesized that these teachers would report higher technology use in the classroom, which would also mean higher overall proficiency and higher self-efficacy, based on the researcher's assumptions. However, in analyzing the results of this study, the prevalent access to technology did not make a difference in technology use or proficiency. When data was compared between the different schools, no patterns arose to imply that with greater access came greater technology use. On the contrary, teachers who were not a part of the EETT group or the "non-EETT" teachers actually scored higher on the TPACK survey than the EETT teachers (see Table 12). Data was analyzed using both the t-value for equal-variance test and the t-value for unequal-variance test. There were significant differences in the areas of *technology knowledge, technological pedagogical knowledge, and technological content knowledge.* In these specific areas, the teachers in the non-EETT group scored higher on than those in the EETT group (see Table 12). Possible reasons for this will be discussed in Chapter 5.

Table 12

Differences Between EETT Teachers & non-EETT Teachers Based on Variance Variable

Independent Variable	T-value for Equal-variance	T-value for unequal-variance	Differences
Standard 9	.5697	.5738	No difference
Standard 16	.4065	.3998	No difference
Overall Proficiency	.4766	.4757	No difference
SE: StudentEngage	.7638	.7527	No difference
SE: Instruction Strategy	.1628	.1881	No difference
SE: Class Manage	.7736	.7815	No difference
TechnologyKnowledge	.0370	.0414	Teachers in non-EETT scored higher than EETT.
Pedagogy Knowledge	.3040	.3069	No difference
Content Knowledge	.1483	.1434	No difference
Technological Pedagogical Knowledge	.0404	.0448	Teachers in non-EETT scored higher than EETT.
Pedagogical Content Knowledge	.1026	.1005	No difference
Technological Content Knowledge	.0419	.0464	Teachers in non-EETT scored higher than EETT.
Tech Ped Content Knowlege	.0734	.0629	No difference
Technological Knowledge Average	.0370	.0414	Teachers in non-EETT scored higher EETT.
Pedagogical Knowledge Average	.3036	.3065	No difference
Content Knowledge Average	.7736	.7815	No difference
TPK Average	.0404	.0448	Teachers in non-EETT scored higher than EETT.
PCK Average	.1025	.1003	No difference
TCK Average	.0489	.0464	Teachers in non-EETT scored higher than EETT.
TPACK Average	.0734	.0629	No difference

Limitations

There are limitations to this research. One limitation is that all the user data collected was self-reported data. The results are limited by the accuracy of teacher characterizations. Self-reported data can be subject to bias, either on the part of the researcher or participants, which can affect the validity of the findings. Bias can be due to social desirability, when a participant responds in a way he/she thinks would be viewed as socially acceptable or how he/she thinks the researcher wants him/her to answer. A possible way to overcome this limitation would be to use qualitative data in the form of interview questions. By asking respondents follow-up interview questions the researcher could help explain the data results and make sense of any correlations. A basic assumption of conducting face-to-face interviews is that "the meaning people make of their experience affects the way they carry out that experience" (Blumer, 1969, p. 2). Therefore, the intent of conducting interviews for future studies would be to capture the participants' explanations, feelings, motivations, and concerns (Hatch, 2002) regarding their sense of efficacy, teacher knowledge, and teaching experience as well as their self-reported perceptions of using technology in their classrooms.

A second limitation of the study is that only six background characteristics related to the teacher were included in this study. Teachers may differ on other background characteristics not included in the study, which may have impacted the results. Additionally, school characteristics may have affected the results. A few examples of other independent variables that may be important, contributing factors for this study are: school technology resources (e.g., one indicator of a school's available resources might be the affluence of a school's surrounding community, which could be measured by the percentage of students participating in the free or reduced-price lunch program), teacher training in the integration of technology into the curriculum (e.g., hours of staff development or continuing education units in technology integration), principal support of technology integration (e.g., a rating of low, medium, and high based on school goals/objectives and/or the frequency with which the principal pushes a technology agenda), attitude and support for technology of a grade-level team at a teacher's school site, and teacher ethnicity.

A third limitation is that the correlational research design makes it impossible to generalize the findings outside the sample. The research, however, may have implications for other populations with similar background characteristics and teacher attitudes as those in this study. Streiner (2006) argued that group size of under 30 participants might raise issues of concern related to generalizability. The current research, with 44 participants, adequately met the group size requirement for the hierarchical regression analyses.

Fourth, although the size of the sample was large enough to detect significant predictors of the dependent variables and significant differences in outcome measures based on teacher background variables, the small sample size raises the issue of representativeness of the results to the population. Measurement errors, also known as individual differences, are random and normally distributed in large samples and, therefore, have a greater opportunity of canceling each other out (Streiner, 2006). Furthermore, samples larger than the 44 respondents obtained in this research would yield more stable variance component estimates (i.e., standard error), resulting in less bias (e.g., randomness) in the parameter estimates (Smith, 1981; Streiner, 2006). With the results of inferential statistics (i.e., the variance component estimates), inferences can be made about relationships (i.e., parameter estimates) in the population based on the sample, but with a small sample the outcomes may be unreliable (i.e., subject to bias) and may not reflect the true relationship.

Summary

Analysis of the survey data revealed several variables that affect technology use and overall technology proficiency. TPACK variables were consistently a statistically significant predictor of all three dependent variables (Using Technology in the Classroom, Using Technology to Support Learning, and Overall Proficiency). The higher the teachers' TPACK, the more they report using technology and are proficient in doing so. Two hierarchical regression runs indicated an inverse relationship between Efficacy in Instructional Strategies and the two dependent variables of Using Technology in the Classroom and Overall Proficiency, meaning teachers more self-efficacious in instructional strategies use technology less in their classrooms and are less proficient in technology than teachers who believe they are less self-efficacious.

Being male and teacher self-efficacy in instructional strategies affect Using Technology in the Classroom scores. Being a male teacher of third or sixth grade is related to higher Using Technology to Support Learning scores. Finally, being a male teacher, teacher self-efficacy in instructional strategies, and technology knowledge affect Overall Proficiency scores.

The importance of these findings is discussed in Chapter 5. Additionally, implications for future research, practice, professional development, policy, and teacher education are presented.

Chapter 5: Conclusion

While computers have been placed in classrooms since 1983, technology integration remains a significant challenge for educators. The failure to use technology in the classroom is creating a digital disconnect that threatens to handicap students as they graduate and compete for jobs in the 21st century. This study explored three possible predictors of technology integration–teacher self-efficacy, teacher knowledge, and teaching experience–to determine if they were accurate predictors of technology integration in the classroom.

Summary and Discussion

Based on the existing literature on the topic of teacher integration of technology into classroom instruction, the study hypothesized that the following factors; teacher self-efficacy, teacher knowledge, and teaching experience, would play a significant role in predicting technology use. Research was conducted using four knowledge subscales in the form of surveys to quantify the existence and extent of these relationships. This study yielded mixed results. While technology knowledge was proven to be a significant predictor of overall technology proficiency, teacher self-efficacy and teaching experience were not.

Technology integration. According to this study, teacher knowledge was a predictor of technology integration. There were moderate to strong correlations between teacher knowledge and technology use and overall proficiency. Technological Pedagogical Content Knowledge (TPACK) variables were consistently a statistically significant predictor of all three dependent variables (Using Technology in the Classroom, Using Technology to Support Learning, and Overall Proficiency). Therefore, the more TPACK knowledge a teacher had the more he/she reported using technology and was proficient in doing so.

Integrating technology into the classroom requires more than just providing access to technology tools. Based on the literature, some of the most common barriers to technology integration include access to technology, time to learn about and integrate new technology, and availability of technical support (Barron, Kemker, Harmes, & Kalaydjian, 2003; Ertmer, 1999; 2005; Norris et al., 2003). However, another important barrier is failure to provide instruction on subject matter (content) and pedagogy (Harris et al., 2009). In fact, this study demonstrated that access was less of a barrier than teacher knowledge. Eighteen of the teachers who participated in the study were involved in the EETT grant project, a 1:1 netbook implementation that placed 600 netbooks into the fifth and sixth grade classrooms at four schools. The students had 24/7 access to technology and the 18 teachers received extra professional development, mentoring, and support throughout the year. Yet, in analyzing the results of this study, the prevalent access did not make a difference in technology use or proficiency. When data were compared between the different schools, no patterns arose to imply that with greater access came greater technology use. In fact, the non-EETT teachers actually scored higher on the TPACK survey than the EETT teachers (see Table 12). There were significant differences in the areas of *technology knowledge, technological pedagogical knowledge, and technological content knowledge* where the non-EETT teachers scored higher on their self-report data than the EETT teachers. There are a few possible reasons for this result. In reviewing the sampling, the teachers who completed the survey did so as a favor to the researcher (non-EETT teachers). They knew and had worked with the researcher in some capacity over the past fifteen years; therefore it would be likely that they have greater technology knowledge and skills. On the other hand, the EETT teachers may not have chosen to be part of the grant but because their principal wanted to they had no choice, as they did not want to switch grade levels. They also had to take the survey for the grant. Another reason that could be speculated is that although the EETT teachers had hours of professional development, access to netbooks everyday with all students, and a year of practice, they were still on the bottom of learning curve as many of them came from no tech or low tech. Perhaps they were overwhelmed.

Teacher self-efficacy. This study predicted that higher scores on the teacher self-efficacy measure would correlate with higher levels of technology integration. To the contrary, the findings revealed an inverse relationship between teacher self-efficacy and technology integration; the more self-efficacious a teacher felt, the less he/she reported using technology. As a group, the teachers believed they were self-efficacious in their ability to engage students, use instructional strategies, and manage their classrooms. However, TSES results showed that teachers reporting high self-efficacy actually used less technology in the classroom and were less proficient than their colleagues who reported lower self-efficacy.

Ertmer and Ottenbreit-Leftwich (2010) argue that despite increased access and training, teachers are not using technology for instruction because they do not have the mindset that “teaching is not effective without the appropriate use of information and communication technologies (ICT) resources to facilitate student learning” (p. 255). In other words, teachers may perceive themselves as effective without the use of technology because their beliefs about effective instruction do not hinge on technology use. Ertmer and Ottenbreit-Leftwich contend that self-efficacy alone is not enough; teachers must value technology as an instructional tool.

Ertmer and Ottenbreit-Leftwich (2010) advocate for a change in teacher practice—that higher levels of technology use for instruction would be required for 21st century teaching and learning. Perhaps the beliefs of teachers in this dataset have not caught up with the times; according to the U. S. Department of Education (2003), "technology is now considered by most educators and parents to be an integral part of providing a high-quality education" (p. 3). Although the use of self-efficacy to measure technology use yielded unexpected results, technology knowledge was an accurate predictor of overall proficiency in technology.

Teacher knowledge. This study hypothesized that higher TPACK scores would result in higher levels of technology integration. The findings showed that TPACK variables were significant predictors of all three dependent variables (Using Technology in the Classroom, Using Technology to Support Learning, and Overall Proficiency). The higher the teachers' overall TPACK scores, the more they reported using technology and describing themselves as proficient. The results also showed that one of the variables, technology knowledge, was a consistently statistically significant predictor. Teachers who reported higher technology knowledge on the TPACK survey also reported more technology use and greater technology proficiency. This result suggests that teachers who have knowledge of technology, content, and pedagogy use technology more when teaching because they understand its ability to facilitate learning and assist with students' access to content. Since an increase in knowledge, especially technology knowledge, results in greater technology use in the classroom, it would make sense to increase teachers' knowledge as a solution for increasing technology integration. Integrating the TPACK model into both teacher education programs and schools could be effective in helping teachers use technology.

Teachers must have both the confidence to take risks and the knowledge of which tools to use and how to use them if successful classroom integration is to occur (Harris et al., 2009). Teacher knowledge can be assessed using the TPACK framework, which researchers have been developing over the past several years.

Teaching experience. This study predicted that teaching experience, measured in years of teaching, would result in higher levels of technology integration. This prediction was not supported by the findings. The correlation between teaching experience and technology integration was weak. In fact, no significant relationships were found with teaching experience and any of the variables.

Research on whether teaching experience can predict technology use is inconclusive. In at least one study, teaching experience as a factor in technology use decreases in significance after 5 years and levels off completely between 5-7 years (Forssell, 2009). In this study, the respondents had an average of 13 years teaching experience, perhaps putting them into a group where years of experience ceases to impact technology use. Other possible explanations for this result include: (a) lack of motivation to integrate technology, (b) an outdated view that technology is not necessary for effective instruction, (c) demands of teaching in the No Child Left Behind era leaving little time for project-based learning and creativity, and (d) a school culture that does not prioritize technology integration.

Implications

These findings have implications for every teacher, administrator, and school seeking to prepare students for the 21st century. They are equally important for every college and university striving to prepare teachers to teach in the 21st century.

While there have been small modifications in education, there have been few substantial shifts in the 21st century. In order for systematic change to happen, there has to be a paradigm shift in education (Kuhn, 1962). Systematic change is necessary when a system's environment changes dramatically (Banathy, 1991; Boyer, 1983; Goodlad, 1984; Lieberman & Miller, 1990; Perelman, 1987; Shanker, 1990; Sizer, 1984). An effective education system is one that is adaptable to change (Daggett, 2005). To date, public schools have not proven to be effective at using technology. Recently, in an introduction to Visions 2020 Report, Secretary of Education, Dr. Rod Paige (as cited in U.S. Department of Education, 2006) stated,

> Indeed, education is the only business still debating the usefulness of technology. Schools remain unchanged for the most part despite numerous reforms and increased investments in computers and networks. The way we organize schools and provide instruction is essentially the same as it was when our Founding Fathers went to school. Put another way, we still educate our students based on an agricultural timetable, in an industrial setting, but tell students they live in a digital age. (p. 22)

If greater attention were given to supporting pre-service and in-service teachers, perhaps change would happen more easily.

In order to understand the results of this study as the data were reported and analyzed, the researcher looked at possible implications in three areas: (a) practice, (b) policy, and (c) future research. First and foremost is the idea of teacher knowledge (TPACK) being an accurate predictor of technology use. Because there is a positive correlation between TPACK and technology use, teacher education programs, professional developers, and administrators should take advantage of this and integrate TPACK as a framework in their teaching and learning activities. The second implication for practice does understand why teachers may not be using technology more. Is it that teachers are not placing value on technology as an element of effective teaching? Some teachers believe technology isn't for serious academics. In an advanced placement class, a teacher may be doing an effective job of teaching the necessary content to students without the technology and therefore doesn't see the need to integrate technology into a serious academic class where students are finding success. Teachers, who do not associate technology with deep learning, need a reason (i.e., proof) that it is essential to their students' success. School culture and leadership as it relates to technology use are crucial to effective integration of technology school wide. It is important for administrators to define expectations about technology use and build a school culture that measures, evaluates, and rewards teachers based on fulfillment of these expectations.

Implications for Practice. There has been great promise for integrating technology into classrooms, using technology as the change agent instead of the teachers, but this is wrong (Fisher, 2006). As stated by Harris (2005), "despite more than two decades of effort, technology as a 'Trojan horse' for educational reform has succeeded in only a minority of K-12 contexts" (pp. 39-40). In general, teachers are integrating technology into their existing practices and not doing anything innovative with it (Harris, 2005). When teachers do integrate technology in ways that are considered effective or best practices, they typically attribute this to "experience, organized professional learning, and school culture as the primary factors provoking instructional changes. Educational technology use, it turns out, is no Trojan horse, despite the wishes and hopes of many of its advocates" (Harris, p. 120).

Many have proven that high quality instruction and assessment provide greater increases in student achievement than technology (Goldman, Lawless, Pellegrino, & Plants, 2005; 2006; Newman, Smith, Allensworth, & Bryk, 2001). Allowing one to consider the idea that technology isn't always associated with serious academics, or deeper learning. However, technology could still support and facilitate the learning while leaving teacher as the change agents.

TPACK as a framework for teachers.

According to Harris et al. (2009),

> Though educational technology leaders have been calling for content-based, pedagogically forward-thinking technology integration for more than a decade (e.g., Fisher, Dwyer, & Yokum, 1996; Means & Olson, 1997; Roblyer, Edwards, & Havriluk, 1997), professional development for teachers still emphasizes and is organized according to technologies' affordances and constraints (e.g., Friedhoff, 2008). (p. 395)

If understood and implemented in the classroom, TPACK could be an effective framework to guide teachers' integration of technology (Franklin, 2004; Gunter & Baumbach, 2004; Hughes, 2003; Koehler & Mishra, 2008; Pierson, 2001). Teacher education programs, professional developers, and administrators should utilize TPACK as a framework in their teaching and learning activities. It could be useful to use TPACK as a framework to understand what knowledge teachers must have to integrate technology into teaching and how they might develop this knowledge.

The results of this study showed that the participating teachers who reported having content, pedagogy, and technology knowledge are using technology and are proficient in doing so. TPACK gives teachers choices about what to teach, how to teach it, and what technologies to use. Applying the TPACK framework to the development of teacher knowledge does not imply a prescriptive and single approach to technology integration. Rather, it will depend on the skills of the teacher, the technology available, and what is appropriate for the objective of the lesson. The TPACK framework should be a foundational model used to create learning activities and plan curriculum for teacher education programs.

If a teacher does not view technology as a element of serious academics or deep learning, he or she may not find a place for it in day-to-day instruction (Dexter, 2002). Schools commonly focus on the technology itself instead of using technology as a tool for learning and effective instructional practice (Earle, 2002). Using TPACK in professional development to introduce technology to teachers with the emphasis on a subject area could prove to be very helpful. Teachers do not have to articulate TPACK themselves but professional developers and pre-service teachers would be teaching it in integrated ways. An example would be to use a blog to teach writing. The focus would be writing, not the technology (the blog).

This study found an inverse relationship between self-efficacy and technology use and proficiency. Contrary to the hypothesis, teachers who believed themselves to be more self-efficacious actually used technology less. One explanation for this finding is that these teachers did not consider technology a necessary component of effective instruction. In fact, research shows that technology use can improve student learning and engagement and enhance lessons (Cheung & Slavin, 2011; Koedinger, Anderson, Hadley, & Mark, 1997; Shin, Sutherland, Norris, & Soloway, 2011; Wenglinsky, 1998). The first step in reform would involve demonstrating to teachers the value of technology integration. Staff development that showcases effective technology-support instruction tied to the curriculum would help demonstrate its value. Showing teachers the differences in student engagement with lessons driven by technology rather than paper and pencil may be enough to pique their interest.

The second step would involve making integration easy to accomplish. Schools could develop a library of model lessons tied closely to the district's adopted curriculum that incorporate a relevant technology component. If funding is available through district resources or grants, a team of teachers across grade levels and disciplines could be recruited and paid to develop lessons or lesson templates that incorporate technology. Teachers may be more apt to integrate technology if much of the planning is already done and ideas for how to incorporate technology are already fully developed. With increased value and decreased effort required, teachers may be more likely to embrace the attitudinal changes necessary for technology integration to occur (Dexter, 2002).

Implications for Policy. Strong leadership and school culture should be embedded into the entire school. It is important for administrators to define expectations about technology use and build a school culture that measures, evaluates, and rewards teachers based on fulfillment of these expectations. Since the federal government is calling for the preparation of American students in technology and 21st century skills in order to maintain a competitive workforce, it may be necessary to motivate teachers creating a policy strongly supporting technology integration in the classroom and tying technology use to teacher evaluations (i.e., requiring teachers to incorporate a technology component in the delivery of a lesson observed by the principal during a summative evaluation). Another component to this is the vision that is painted by administrators and leadership. It has to be a clear vision of what technology can accomplish for student achievement and for teachers. For many, technology is distractive to their teaching and their students; these teachers need us to do a better job of explaining and demonstrating how technology can be used effectively in the classroom.

An explanation for why school culture and leadership were not successful with the schools involved in this study is that the EETT schools and the Netbook schools each had 1:1 programs in only a handful of classrooms. It is hard to instill policies and best practices school wide when the programs themselves are not school wide.

Teaching standards were not created to regulate teachers but rather to guide them as they develop, refine, and extend their practice. It is a teacher's professional responsibility to be aware of these standards and set individual goals for themselves. While all six teaching standards are critical to effective teaching, the sixth standard, *developing as a professional educator*, is one that is of critical importance with respect to teaching in the 21st century. This standard directs teachers to develop as professional educators. Further, in Standard 6.2, teachers are encouraged to establish *professional goals and engage in continuous and purposeful professional growth and development.*

What teachers think and do is a critical piece to making changes in education—it is as simple and as complex as that (Fullan, 1982). If teachers are not self-motivated to integrate technology, perhaps they will be compelled towards change by a district that sets high expectations for technology use and measures, evaluates, and rewards teachers based on these expectations.

Implications for Future Research

The limitations identified in this study provide an opportunity for future research. One recommendation would be to increase the sample size to obtain more stable parameter estimates. The sampling was much smaller than expected. This could have been due to the time of year, it was May, and the end of the school year and the district was a bit heavy on surveys' throughout the year. Perhaps if this were given during December or January, the response rate would have been higher. Another recommendation would be to conduct broader research on the background characteristics of the teacher respondents and schools that may impact the results. This research used teacher self-report data to make inferences about the level of technology integration. However, no objective data related to the quality of instructional technology integration were collected. Frequent low-quality educational technology experiences for students in the classroom may be less valuable than fewer high-quality educational technology experiences, so level of technology use is not the only variable relevant to understanding effective classroom instruction. A qualitative data collection approach in which the research would observe and rate the quality of instruction-related technology use would provide a richer, more accurate picture of technology proficiency and technology use in the classroom. Future studies should also include follow-up interviews to capture the participants' explanations, feelings, motivations, and concerns (Hatch, 2002). Interview questions would help the researcher understand the daily lives of the participants and their attitudes and beliefs about technology beyond the quantitative data. By having a conversation with the teachers one might clarify why a particular teacher does or does not use technology in his/her teaching and determine his/her attitude about technology. The interview questions may include questions similar to those in Table 12. Consequently, a mixed methods approach would provide a more complete and objective representation of teaching and learning in the classroom.

Table 13
Possible Interview Questions for Future Studies

Interview Questions	Source
Define what "technology" means to you?	Mishra & Koehler, 2006
How do you decide when to use technology in your teaching/learning?	Albion, 2001; Bauer, 2002; Earle, 2002; Mishra & Koehler, 2008; Moersch, 1995; Pajares, 1996
In what subjects do you use technology most? Language, Arts, math, writing, social studies, science?	Mishra & Koehler, 2008
Do you usually take a pre-existing lesson and add technology to it?	Kulik, 2003; Ross et al., 2001
If you have an issue or trouble using technology do you seek out the help of your colleagues? If not, why?	Bitner & Bitner, 2002; Hohlfeld et al., 2008; Swan & Shea, 2005
Do you take advantage of District technology related trainings?	Becker, 1994, 2000

(table continues)

Interview Questions	Source
Do you feel there are barriers to using technology in the classroom? (Possible answers: time, subject matter, access) If so, what are they?	Barron et al., 2003; Ertmer, 1999, 2005; Norris et al., 2003
What training or support could the school/district provide you with to overcome the barriers?	Becker, 1994, 2000; Kanaya, Light, & Culp, 2005; Ringstaff & Kelley, 2002
Is there a particular lesson you recall where you thought technology provided real value to student learning?	Mishra & Koehler, 2006
What do you think the benefits are to using technology in the classroom/lessons?	Mishra & Koelher, 2008
Give me some examples of lessons you teach where you integrate technology.	International Society for Technology in Education, 2000; Mishra & Koelher, 2008

Final Thoughts

The outcome of this research suggests avenues for teacher education programs, professional developers, and administrators. Implications identified in the findings were: practice, policy and future research. By widening the sampling frame and increasing sample size, some of the independent variables that are approaching significance may, in fact, become significant predictors of technology use in the classroom. Giving administrators, professional developers, and teacher education programs a better understanding of some of the factors that impact effective use of technology in the classroom may give them a better chance at equipping educators to take advantage of the technological tools available in the 21st century.

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APPENDIX A

Survey 2: All About Me as a Teacher

Survey 2: All About Me as a Teacher

1. ELECTRONIC CONSENT: *Please select your choice below. Clicking on the "agree" butto that: * you have read the above information * you voluntarily agree to participate * you are at i age. If you do not wish to participate in the research study, please decline participation by click agree" button. **

☐ **Agree**
☐ **Do not agree**

Survey 2: All About Me as a Teacher

The purpose of this study is to gather information about you as a teacher. Your beliefs, skills, and demographic information. This is part 2 of a two-part survey. You have already completed Survey 1: CTAP EdTechProfile Assessment.

The survey will take about 30 minutes. Your responses will be confidential. Names will only be used to match responses between this survey and Survey 1: CTAP Assessment (previously taken). Once surveys are matched, names will be removed and replaced with a unique number.

Participation in this study is voluntary. You may choose not to participate or discontinue your participation in the study at any time.

You may also choose to skip a question at any time.

Confidentiality
We will keep your information confidential. All data is stored in a password protected electronic format. Once we match the responses from the two surveys you will only be identified by a unique number assigned to you. To help protect your confidentiality, the survey results will not contain information that will personally identify you. The results of this study will be used for scholarly purposes only.

Risks/Benefits
The biggest foreseeable risks associated with this study are imposition on the participant's time, and possible boredom or fatigue from completing the survey.

Other risks may include the following: This is a reflective exercise intended to encourage participants to think about their performance. As a result of the reflection, participants may identify certain areas of growth from them. Another area of discomfort may be in disclosing this information to Jenith Mishne, the Director of Education Technology.

The study will be beneficial in that it will help the researcher understand how to better support teachers and their technology use in the classroom.

Incentive
Teachers who complete both surveys have the opportunity to be included in a drawing for one of four $50 Amazon.com Gift Cards. Simply include your email address at the end of the survey. Responses will still remain confidential. Email addresses will not be matched in any way with responses.

Contact
If you have any questions at any time about the study or the procedures that are being used, you may contact the researcher, Jenith Mishne at jenith.mishne@pepperdine.edu or by telephone at 949-683-8675, or Faculty Supervisor/Chair, Linda Polin, at linda.polin@pepperdine.edu, or Jean Kang, Chair, Graduate and Professional Schools IRB, at gpsirb@pepperdine.edu or 310-568-5753.

This research has been reviewed according to Pepperdine University IRB procedures for research involving human subjects.

Survey 2: All About Me as a Teacher

Directions: This set of questions is designed to help us gain a better understanding of the kinds of things that create difficulties for teachers in their school activities. Please indicate your opinion about each of the statements below. Your answers are confidential.

Scale 1-9:
(1) Nothing (2) (3) Very little (4) (5) Some influence (6) (7) Quite a bit (8) (9) A great deal

2. How Much Can You Do?

	(1) Nothing	(2)	(3) Very little	(4)	(5) Some influence	(6)	(7) Quite a bit	(8)	(9) A great deal
1. How much can you do to get through to the most difficult students?	○	○	○	○	○	○	○	○	○
2. How much can you do to help your students think critically?	○	○	○	○	○	○	○	○	○
3. How much can you do to control disruptive behavior in the classroom?	○	○	○	○	○	○	○	○	○
4. How much can you do to motivate students who show low interest in school work?	○	○	○	○	○	○	○	○	○
5. To what extent can you make your expectations clear about student behavior?	○	○	○	○	○	○	○	○	○

3. How Much Can You Do?

	(1) Nothing	(2)	(3) Very little	(4)	(5) Some influence	(6)	(7) Quite a bit	(8)	(9) A great deal
6. How much can you do to get students to believe they can do well in school work?	○	○	○	○	○	○	○	○	○
7. How well can you respond to difficult questions from your students?	○	○	○	○	○	○	○	○	○
8. How well can you establish routines to keep activities running smoothly?	○	○	○	○	○	○	○	○	○
9. How much can you do to help your students value learning?	○	○	○	○	○	○	○	○	○
10. How much can you gauge student comprehension of what you have taught?	○	○	○	○	○	○	○	○	○

Survey 2: All About Me as a Teacher

4. How Much Can You Do?

	(1) Nothing	(2)	(3) Very little	(4)	(5) Some influence	(6)	(7) Quite a bit	(8)	(9) A great deal
11. To what extent can you craft good questions for your students?	○	○	○	○	○	○	○	○	○
12. How much can you do to foster student creativity?	○	○	○	○	○	○	○	○	○
13. How much can you do to get children to follow classroom rules?	○	○	○	○	○	○	○	○	○
14. How much can you do to improve the understanding of a student who is failing?	○	○	○	○	○	○	○	○	○
15. How much can you do to calm a student who is disruptive or noisy?	○	○	○	○	○	○	○	○	○

5. How Much Can You Do?

	(1) Nothing	(2)	(3) Very little	(4)	(5) Some influence	(6)	(7) Quite a bit	(8)	(9) A great deal
16. How well can you establish a classroom management system with each group of students?	○	○	○	○	○	○	○	○	○
17. How much can you do to adjust your lessons to the proper level for individual students?	○	○	○	○	○	○	○	○	○
18. How much can you use a variety of assessment strategies?	○	○	○	○	○	○	○	○	○
19. How well can you keep a few problem students from ruining an entire lesson?	○	○	○	○	○	○	○	○	○

6. How Much Can You Do?

	(1) Nothing	(2)	(3) Very little	(4)	(5) Some influence	(6)	(7) Quite a bit	(8)	(9) A great deal
20. To what extent can you provide an alternative explanation or example when students are confused?	○	○	○	○	○	○	○	○	○
21. How well can you respond to defiant students?	○	○	○	○	○	○	○	○	○
22. How much can you assist families in helping their children do well in school?	○	○	○	○	○	○	○	○	○
23. How well can you implement alternative strategies in your classroom?	○	○	○	○	○	○	○	○	○
24. How well can you provide appropriate challenges for very capable students?	○	○	○	○	○	○	○	○	○

Survey 2: All About Me as a Teacher

7. I have knowledge in...

	1=not at all	2=little	3=moderate	4=quite	5=complete
1. Solving a technical problem with the computer	○	○	○	○	○
2. Knowing about basic computer hardware (ex, CD-Rom, RAM) and their functions	○	○	○	○	○
3. Knowing about basic computer software (ex, Windows OS,Media Player) and their functions	○	○	○	○	○
4. Following recent computer technologies	○	○	○	○	○
5. Using a word-processor program (ex, MS Word)	○	○	○	○	○
6. Using an electronic spreadsheet program (ex, MS Excel)	○	○	○	○	○
7. Communicating through Internet tools (ex, e-mail, Skype)	○	○	○	○	○
8. Using a picture editing program (ex, Paint)	○	○	○	○	○
9. Using a presentation program (ex, MS PowerPoint)	○	○	○	○	○
10. Saving data into a digital medium (ex, USB Flash Drive, CD, DVD)	○	○	○	○	○
11. Using area-specific software	○	○	○	○	○
12. Using printer	○	○	○	○	○
13. Using projector	○	○	○	○	○
14. Using scanner	○	○	○	○	○
15. Using digital camera	○	○	○	○	○

Survey 2: All About Me as a Teacher

8. I have knowledge in...

	1=not at all	2=little	3=moderate	4=quite	5=complete
1. Assessing student performance	○	○	○	○	○
2. Eliminating individual differences	○	○	○	○	○
3. Using different evaluation methods and techniques	○	○	○	○	○
4. Applying different learning theories and approaches (ex, Constructivist Learning, Multiple Intelligence Theory, Project-based Teaching)	○	○	○	○	○
5. Being aware of possible student learning difficulties and misconceptions	○	○	○	○	○
6. Managing class	○	○	○	○	○

9. I have knowledge in...

	1=not at all	2=little	3=moderate	4=quite	5=complete
1. Knowing about key subjects in my area	○	○	○	○	○
2. Developing class activities and projects	○	○	○	○	○
3. Following recent developments and applications in my content area	○	○	○	○	○
4. Recognizing leaders in my content area	○	○	○	○	○
5. Following up-to-date resources (ex, books, journals) in my content area	○	○	○	○	○
6. Following conferences and activities in my content area	○	○	○	○	○

Survey 2: All About Me as a Teacher

10. I have knowledge in...

	1=not at all	2=little	3=moderate	4=quite	5=complete
1. Choosing technologies appropriate for my teaching/learning approaches and strategies	○	○	○	○	○
2. Using computer applications supporting student learning	○	○	○	○	○
3. Being able to select technologies useful for my teaching career	○	○	○	○	○
4. Evaluating appropriateness of a new technology for teaching and learning	○	○	○	○	○

11. I have knowledge in...

	1=not at all	2=little	3=moderate	4=quite	5=complete
1. Selecting appropriate and effective teaching strategies for my content area	○	○	○	○	○
2. Developing evaluation tests and surveys in my content area	○	○	○	○	○
3. Preparing a lesson plan including class/school-wide activities	○	○	○	○	○
4. Meeting objectives described in my lesson plan	○	○	○	○	○
5. Making connections among related subjects in my content area	○	○	○	○	○
6. Making connections between my content area and other related courses	○	○	○	○	○
7. Supporting subjects in my content area with outside (out-of-school) activities	○	○	○	○	○

Survey 2: All About Me as a Teacher

12. I have knowledge in...

	1=not at all	2=little	3=moderate	4=quite	5=complete
1. Using area-specific computer applications	○	○	○	○	○
2. Using technologies helping to reach course objectives easily in my lesson plan	○	○	○	○	○
3. Preparing a lesson plan requiring use of instructional technologies	○	○	○	○	○
4. Developing class activities and projects involving use of instructional technologies	○	○	○	○	○

13. I have knowledge in...

	1=not at all	2=little	3=moderate	4=quite	5=complete
1. Integrating appropriate instructional methods and technologies into my content area	○	○	○	○	○
2. Selecting contemporary strategies and technologies helping to teach my content effective	○	○	○	○	○
3. Teaching successfully by combining my content, pedagogy, and technology knowledge	○	○	○	○	○
4. Taking a leadership role among my colleagues in the integration of content, pedagogy, and technology knowledge	○	○	○	○	○
5. Teaching a subject with different instructional strategies and computer applications	○	○	○	○	○

Survey 2: All About Me as a Teacher

14. School

15. What is your age?

16. How many years have you been teaching?

17. Select highest education level received

18. Identify the year you received your teaching credential (i.e. 1997)

Survey 2: All About Me as a Teacher

19. What current grade level do you teach in?

- 3
- 4
- 5
- 6
- Combo Class (please specify grade level ex. 4/5)

20. How many years have you been teaching in your current grade level? (Note: If this is your first year in current grade level just enter a 1)

How often do you use technology in the following ways in your personal life/at home? (Check all that apply)

21. Communication

	Daily	Weekly	Monthly	Rarely	Never
Email					
Instant Messaging (ex, Skype)					
Social Networks (ex, Facebook)					

22. Information

	Daily	Weekly	Monthly	Rarely	Never
Google Search					
News (ex, CNN, ESPN, ABC)					
Stocks					

23. Online Shopping

	Daily	Weekly	Monthly	Rarely	Never
Household Items					
Books					
Travel					
Clothes					
Sports					

Survey 2: All About Me as a Teacher

24. Entertainment

Do you use these: Daily Weekly Monthly Rarely Never
Netflix
Sports
Online Games
You Tube

25. In order to match responses from this survey with Survey 1 (CTAP EdTechProfile Assessment), which you already completed, we require your name. However, once the response data is matched, a unique number will be assigned to your responses and your name will be removed. All data will be kept completely confidential and not shared with district or school personnel.

First Name ______________
Last Name ______________

26. Incentive: Email is optional: Only include it if you wish to be included in the raffle drawing for one of four $50 Amazon.com Gift Cards. This will not be used in conjunction with your survey responses.
Email Address:_____________________

APPENDIX B

Email for Permission to Use TSES Scale

THE OHIO STATE UNIVERSITY
COLLEGE OF EDUCATION AND HUMAN ECOLOGY

Anita Woolfolk Hoy, Ph.D. Professor
Psychological Studies in Education

July 14, 2010

Dear Jenith Mishne,

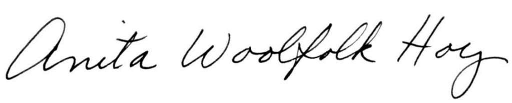
You have my permission to use the *Teachers' Sense of Efficacy Scale* in your research.

A copy of both the long and short forms of the instrument as well as scoring instructions can be found at:

http://www.coe.ohio-state.edu/ahoy/researchinstruments.htm

Best wishes in your work,

Anita Woolfolk Hoy, Ph.D. Professor



College of Education
Phone: [redacted]

29 West Woodruff Avenue [redacted]
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Columbus, Ohio 43210-1177
Email: [redacted]

APPENDIX C

Descriptive Statistics of Item Responses on Teachers' Sense of Efficacy Scale Survey

Table C1

Descriptive Statistics of Item Responses on Teachers' Sense of Efficacy Scale Survey

Teacher Belief	M	SD	Min.	Max.	Skewness	Kurtosis
Get through to difficult students	7.27	1.53	4	9	-0.32	-1.05
Help students think critically	7.80	1.21	5	9	-0.49	-0.75
Can control disruptive behavior	7.82	1.32	4	9	-1.12	1.23
Motivate students to show interest	7.18	1.40	4	9	-0.07	-0.96
Make expects of student behavior clear	8.61	0.78	6	9	-2.22	4.47
Get students to believe they can do well	7.82	1.17	5	9	-0.37	-1.04
Respond to difficult questions	8.11	1.06	6	9	-0.97	-0.29
Establish routines to keep activities running smoothly	8.47	0.83	6	9	-1.34	0.73
Help students value learning	7.73	1.17	6	9	-0.17	-1.51
Gauge student comprehension of what is taught	7.93	1.15	5	9	-0.73	-0.54
Craft good questions	7.77	1.08	5	9	-0.46	-0.52
Foster student creativity	7.52	1.34	5	9	-0.33	-1.20
Get children to follow classroom rules	7.91	1.13	5	9	-0.64	-0.57
Improve understanding of student who is failing	7.07	1.47	3	9	-0.35	-0.22
Calm student who is disruptive or noisy	7.50	1.34	5	9	-0.52	-0.82
Establish classroom management system	8.20	1.09	5	9	-1.22	0.58
Adjust lessons to proper level of student 7.66	1.20	6	9	-0.14	-1.55	
Use a variety of assessment strategies	7.88	1.21	5	9	-0.71	-0.78
Keep the few problem students from ruining lesson	7.57	1.35	4	9	-0.62	-0.39
Provide alternative explanation or example when students are confused	7.77	0.89	6	9	0.05	-1.01
Respond well to defiant students	7.50	1.34	4	9	-0.76	0.18
Assist families in helping their children	6.84	1.40	4	9	-0.03	-0.87
Implement alternative strategies in classroom	7.51	1.32	5	9	-0.13	-1.56
Provide appropriate challenges for very capable students	7.82	1.23	5	9	-0.67	-0.61

Note. n = *39*

APPENDIX D

Descriptive Statistics of Item Responses on TPACK Survey

Table D1

Descriptive Statistics of Item Responses on TPACK Survey

Subscale/Survey item	M	SD	Min.	Max.	Skewness	Kurtosis
Technology knowledge:						
Solving technical problem with computer	3.52	0.95	2	5	-0.07	-0.85
Knowing about basic computer hardware	3.82	1.04	2	5	-0.27	-1.17
Knowing about basic computer software	4.07	0.82	2	5	-0.40	-0.68
Following recent computer technologies	3.70	0.95	2	5	-0.20	-0.85
Using word processor program	4.61	0.54	3	5	-0.95	-0.17
Using electronic spreadsheet program	3.80	0.90	2	5	-0.17	-0.82
Communicating through Internet tools	4.48	0.63	3	5	-0.80	-0.31
Using a picture editing program	3.75	1.04	2	5	-0.39	-0.96
Using a presentation program	4.45	0.73	2	5	-1.34	1.73
Saving data into a digital medium	4.58	0.66	3	5	-1.34	0.62
Using area-specific software	3.70	1.07	1	5	-0.56	-0.41
Using printer	4.60	0.62	3	5	-1.35	0.81
Using projector	4.64	0.61	3	5	-1.50	1.25
Using scanner	4.27	0.95	2	5	-1.10	0.16
Using digital camera	4.63	0.58	3	5	-1.31	0.82
Pedagogy knowledge:						
Assessing student performance	4.51	0.55	3	5	-0.50	-0.89
Eliminating individual differences	3.83	0.89	1	5	-0.76	1.24
Using diff. evaluation methods/techniques	4.24	0.66	3	5	-0.29	-0.65
Applying diff. learn. theories/approaches	4.14	0.74	3	5	-0.23	-1.11
Being aware of student learning difficulties	4.12	0.66	3	5	-0.13	-0.63
Managing class	4.65	0.53	3	5	-1.16	0.34
Content knowledge:						
Knowing key subject in my area	4.53	0.51	4	5	-0.15	-2.08
Developing class activities and projects	4.61	0.54	3	5	-0.95	-0.17
Following recent developments/110inda110ants.	4.25	0.58	3	5	-0.05	-0.33
Recognizing leaders in my content area	4.00	0.86	2	5	-0.23	-1.10
Following up-to-date resources	3.80	0.93	2	5	-0.30	-0.73
Following conferences and activities	3.55	0.98	2	5	0.10	-0.96

(table continues)

Subscale/Survey item	M	SD	Min.	Max.	Skewness	Kurtosis
Technological pedagogical knowledge:						
Choosing appropriate technologies	4.02	0.82	3	5	-0.04	-1.51
Using computer applications	4.07	0.77	3	5	-0.12	-1.27
Being able to select technologies	3.98	0.83	2	5	-0.22	-0.89
Evaluating appropriateness of new technol.	3.86	0.73	3	5	0.22	-1.07
Pedagogical content knowledge:						
Selecting appropriate teaching strategies	4.44	0.59	3	5	-0.50	-0.63
Developing evaluation tests/surveys	4.21	0.77	2	5	-0.71	0.10
Preparing lesson plan with classwide activ.	4.50	0.60	3	5	-0.73	-0.38
Meeting objectives described in lesson plan	4.51	0.55	3	5	-0.50	-0.89
Making conn. among related subjects	4.53	0.55	3	5	-0.59	-0.78
Making conn. betw content & other courses	4.40	0.58	3	5	-0.33	-0.69
Supporting subjects with outside activities	3.86	0.86	2	5	-0.19	-0.75
Technological content knowledge:						
Using area-specific computer applications	3.95	0.78	2	5	-0.23	-0.51
Using technol. to reach course objectives	3.98	0.76	3	5	0.04	-1.24
Preparing lesson plan req. use of instr. tech.	4.12	0.79	2	5	-0.82	0.69
Develop class act./proj. involvg. instr. tech.	4.14	0.83	2	5	-0.79	0.24
Technological pedagogical and content knowledge:						
Integrating appropriate instruction methods	4.09	0.68	3	5	-0.11	-0.72
Selecting contemporary strategies to teach	4.00	0.79	2	5	-0.62	0.36
Teaching successfully combining content, pedagogy, and technology knowledge	4.00	0.72	3	5	< 0.01	-0.97
Taking leadership role among colleagues integrating content, pedagogy, and technology knowledge	3.77	0.96	1	5	-0.51	0.19
Teaching subject with different instructional strategies/applications	3.95	0.86	2	5	-0.37	-0.61

Note. $n = 34$

APPENDIX E

Human Participants Protection Education Certificate

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Jenith Mishne** successfully completed the NIH Web-based training course “Protecting Human Research Participants”.

Date of completion: 07/21/2008

Certification Number: 582
Protecting Human Subject Research Participants http://phrp.nihtraining.com/users/cert.php?c=57284

APPENDIX F

Pepperdine University IRB Faculty Supervisor Review Form

By my signature as a supervisor / sponsor on this research application, I certify that Jenith Mishne is knowledgeable about the regulations and policies governing research with human subjects and has sufficient to conduct this particular study, Teachers, Technology and Risk: An Investigation of the Relationships between Technology Use in the Classroom, Teachers' Self-Efficacy, Knowledge and Experience in accord with the proposed application and protocol. In addition, I have reviewed this application;

- I agree to meet with the investigator on a regular basis to monitor study progress;
- I agree to be available, personally, to supervise the investigator in solving problems should they arise during the course of the study;
- I assure that the investigator will promptly report significant or untoward adverse effects to the Pepperdine IRB chairperson in writing in accordance with the guidelines stated in Section III.G of the Investigator's Manual; and
- If I will be unavailable (e.g., sabbatical leave or vacation), I will arrange for an alternate faculty supervisor / sponsor to assume responsibility during my absence, and I will advise the IRB chairperson in writing of such arrangements.

Faculty Supervisor

Linda Polin

____

Signature Date 03/21/11

APPENDIX G

Survey 1: CTAP EdTech Profile Survey

http://www.edtechprofile.org
Category: CCTC Program Standard 9: Using Technology in the Classroom
Sub-Category: Standard 9a

Description: Each candidate considers the content to be taught and selects appropriate technological resources to support, manage, and enhance student learning in relation to prior experiences and level of academic accomplishment.

Question 1: Management and alignment of technological resources with lesson content

(A) I do not use technological resources in my classroom.

(B) I am able to identify how some technological resources are able to help students learn, but I do no often use technology or encourage students to use technology to learn lesson content.

I When I design lessons I try to include a variety of technological resources: drill and practice, electronic encyclopedias, word processing and publication software, and instructional games. I also may use presentation software to introduce content. My students usually take turns working individually at classroom computers or in the computer lab.

(D) I design lessons that require my students to locate and use appropriate technological resources to complete instructional goals. They may include simulations, mind mapping, electronic portfolios, and multimedia with sound and graphics. Students often work in collaborative groups at computer learning stations I have set up either in the classroom or computer lab.

Question 2: Knowledge of student level of technology use and academic accomplishment.

(A) I do not know my students' level of technology use and therefore do not align technology use and academic accomplishment.

(B) I am aware of my students' level of technology use and their level of academic accomplishment, but only occasionally design lessons that integrate technology.

(C) When I design lessons that use technological resources I first determine my students' level of technology use and level of academic accomplishment in the subject area.

(D) I regularly design and teach lessons that increase my students' level of technology use as well as their academic accomplishment.

Sub-Category: Standard 9b
Description: Each candidate analyzes best practices and research findings on the use of technology and designs lessons accordingly.

Question 3: Knowledge of research and best practices in technology in education

(A) I am unfamiliar with best practices regarding how to effectively use technology in the classroom.

(B) I have read some research or best practices information regarding how to effectively use technology in the classroom and know where to go to locate lessons that integrate technology. I am not yet comfortable including technology in my lessons, but use technology occasionally for other purposes.

(C) When I locate or create lessons that integrate technological resources, I analyze them according to best practices in technology integration and adapt them when I need to. I prefer to select specific technological resources that all of my students use to complete content-based assignments.

(D) Research on engaging students in a collaborative student-centered environment in which they work on authentic tasks drives my use of technology in the classroom and how I organize and present lesson content. I often encourage each of my students to select from a variety of technological resources that s/he would like to use to gather, organize and report information.

Sub-Category: Standard 9d
Description: Each candidate uses computer applications to manage records and to communicate through printed media.

Question 4: Record management with technology

(A) I do not use an electronic grade book or spreadsheet for managing student records.

(B) I use the basic functions of an electronic grade book or spreadsheet to manage student records and report them to the building or district administration because I am required to do so by my school or district.

(C) I regularly use an electronic grade book or spreadsheet for managing and reporting student grades, attendance, and assessment records.

(D) I use a grade book and/or spreadsheet programs to keep track of student data and regularly report to my students their progress as they learn lesson content. Regular progress reports are essential in my lesson design to motivate student performance. I encourage my students to use appropriate software to manage their own records when appropriate.

Question 5: Communication through technology generated printed media.

(A) I never or rarely use word processing and/or publication software and do not use it to prepare materials for my lessons.

(B) I use basic features of word processing and/or publication software to prepare necessary materials for my lessons that could include reports, tests and correspondence

(C) I am comfortable using most features of word processing, publication and/or presentation software to create presentations, newsletters or basic web pages for students and parents. I may also occasionally create banners and/or posters to communicate lesson content in my classroom.

(D) I use word processing, presentation and publication software to create instructional tools that involve my students and parents in the learning process. I also create interactive multimedia environments and web pages that provide students with opportunities to explore lesson content. I encourage my students to use word processing, presentation and publication software to communicate instructional content to peers and parents.

Sub-Category: Standard 9e
Description: Each candidate interacts with others using e-mail and is familiar with a variety of computer-based collaborative.

Question 6: Online collaboration

(A) I never or rarely use e-mail or any other online collaborative environment.

(B) I know how to use basic features of e-mail to receive, read, and send, reply, forward and save e-mail messages. I am aware of the existence of online collaborative environments like newsgroups, listservs and instant messaging, and occasionally use them in the classroom.

(C) I know how to use a variety of e-mail features including how to communicate with a group and how to create and use an address book to communicate with colleagues, students and parents. I can describe the value of online collaborative environments like newsgroups, instant messaging, and key pals in education, and may occasionally use one or more of them in the classroom.

(D) I regularly use e-mail to communicate with colleagues, students and parents, depending on school policy. I use a variety of computer-based collaborative environments to support instructional content in the classroom and provide my students with the opportunity to participate in online communication with peers and experts.

Sub-Category: Standard 9f

Description: Each candidate examines a variety of current educational technologies and uses established selection criteria to evaluate materials, for example, multimedia, Internet resources, telecommunications, computer-assisted instruction, and productivity and presentation tools. (See California State guidelines and evaluations.)

Question 7: Evaluation and selection of technological resources

(A) I know little or nothing about evaluating and selecting appropriate technological resources to be used in the classroom

(B) I can describe a variety of technological resources that are said to support student learning of lesson content. I am able to explain why some technologies are more effective in the classroom than others. I occasionally use technological resources in my classroom.

(C) I am familiar with recent technological resources (e.g. handhelds, multimedia, Internet resources, computer-assisted instruction, telecommunications, productivity and production tools) and am able to describe how they are effectively and efficiently used in the classroom to support student learning. I often use technological resources available at my school/district to enhance lessons I present to my students.

(D) My colleagues view me as an "expert" on the latest technological resources in education and knowledgeable about technologies available for use in our school and district. I regularly use technological resources with my students and have instructed my students how to select appropriate technological resources to complete their instructional goals.

Question 8: Knowledge of school and district educational technological resources policies.

(A) I know little or nothing about district policies regarding educational technology hardware and software.

(B) I am able to describe my school's/district's policies regarding the use of educational technologies, hardware and software, although I use educational technologies only occasionally.

(C) I use educational technology resources in accordance with school/district policies.

(D) My students and I regularly follow school/district policy regarding when we use educational technologies, hardware and software, in the classroom.

Question 9: Use of educational technological resources to address student-learning needs.

(A) I know little or nothing about how to use educational technologies to support students with different learning styles and special needs.

(B) Although I only occasionally include technology use in my lessons, I am able to identify educational technologies, hardware and software resources, to meet diverse learning styles of all my students' and that are useful for my students with learn’ng needs.

(C) When I design my lessons I regularly include educational technological resources that will support students with special needs and that will address my students' diverse learning styles.

(D) I teach my students to be able to identify educational technological resources that will assist them to meet their special needs and diverse learning styles.

Sub-Category: Standard 9g
Description: Each candidate chooses software for its relevance, effectiveness, alignment with content standards, and value added to student learning.

Question 10: Evaluation and selection educational software

(A) I know little or nothing about evaluating and selecting software that will support my lesson content.

(B) I am familiar with software applications in my school/district (drill and practice, instructional games, productivity tools such as banner makers, word processors, electronic reference tools) useful in education and am able to distinguish those that will support my lesson content objectives. However, I only occasionally include computer software applications in my classroom lessons.

(C) I am familiar with a variety of software applications (drill and practice, instructional games, productivity tools, electronic reference tools) that align nicely to my curriculum and that meet my students' learning needs. I regularly include the use of software applications in my lessons because they support instructional content and support my students' diverse learning styles.

(D) I prepare my students to evaluate and select software applications that best meet their learning styles and support their learning needs. I design lessons that require my students to select from among a variety of software applications those that best support instructional goals. Software applications I prefer my students to use include simulations, mathematical modeling, mind mapping, virtual realities, and multimedia.

Sub-Category: Standard 9h
Description: Each candidate demonstrates competence in the use of electronic research tools and the ability to assess the authenticity, reliability, and bias of the data gathered.

Question 11: Use of electronic research tools and assessment of data gathered.

(A) I know little or nothing about electronic research tools and information literacy skills needed to use those tools. I rarely or never gather data from electronic research tools.

(B) I am able to identify a variety of electronic research tools useful in the classroom (electronic reference tools, Internet resources, data-bases and spreadsheets, probes) and am able to explain why some data is more reliable than other data. I occasionally include the use of electronic research tools in my lessons.

(C) I use a variety of electronic tools to gather information to use in my classroom. I use resources such as CLRN, ERIC and online Encyclopedia Britannica. I am cautious to select only that information that is authentic, reliable, and unbiased. I select the resources for my students to use in their assignments and am very careful regarding which Internet resources I ask them to use.

(D) I teach my students how to use a variety of electronic research tools and how to evaluate the authenticity, reliability and bias of data they gather using those tools. I design lessons that require them to identify, select and use appropriate electronic research tools and to assess the quality of the information they gather.

Sub-Category: Standard 9i
Description: Each candidate demonstrates knowledge of copyright issues and of privacy, security, safety issues and Acceptable Use Policies.

Question 12: Knowledge of state and federal laws for uses of computer-based technologies

(A) I know little or nothing about state and federal laws regarding use of computer-based technologies.

(B) I am familiar and comply with laws as they relate to the use of technological resources in the classroom that include copyright laws and intellectual property rights although I only occasionally use technology in my classroom.

(C) I regularly use technology in my classroom in accordance with state and federal laws concerning use of computer-based technologies such as: software piracy, plagiarism, electronic media licensing, and copyright laws.

(D) I require my students to select and use computer technologies in accordance with state and federal laws for the use of computer-based technologies.

Question 13: Knowledge of computer and network security and shared resource management.

(A) I know little or nothing about network security and shared resource management.

(B) I am familiar with issues concerning network security and shared resource management such as virus scanning, network access, bandwidth storage space and mobile equipment although I only occasionally use technology in my classroom.

(C) I regularly use technology in my classroom in accordance with best practices of computer and network security and shared resource management.

(D) I require my students to select and use computer technologies in accordance with best practices of computer and network security and shared resource management.

Question 14: Knowledge of Acceptable Use Policies, safety, and health issues.

(A) I know little or nothing about my school's/district's Acceptable Use Policies and safety and health issues related to computer use.

(B) I am familiar with my school's/district's Acceptable Use Policies and safety and health issues related to computer use that include Internet/Intranet and e-mail use, although I only occasionally use technology in my classroom.

(C) I regularly use technology in my classroom in accordance with my school's/district's Acceptable Use Policy and safety and health issues.

(D) I require my students to use computer technologies in accordance with my school's/district's Acceptable Use Policies and safety and health issues.

Category: CCTC Program Standard 16: Using Technology to Support Student Learning
Sub-Category: Standard 16a
Description: Each participating teacher communicates through a variety of electronic media.

Question 15: Communication using a variety of electronic media

(A) I never or seldom use electronic media, such as word processing, publication and presentation software, to prepare classroom lessons.

(B) I am able to describe some advantages and disadvantages of using various electronic media such as word processing, publication and presentation software in the classroom. I use word processing to prepare classroom materials and use e-mail to communicate with colleagues. I do not ask my students to use either a word processor or e-mail to complete lesson goals.

(C) I have adapted my lessons or created new lessons to include a variety of electronic media. I present lesson content using presentation and/or publications software. I ask my students to complete assignments using word processing or publication and/or presentation software. I may occasionally communicate with parents and students through e-mail or my class web page. I may occasionally use spreadsheet or database graphs to compare data.

(D) I design instructional activities that require my students to identify and select electronic media that they believe will best communicate the lesson objective. According to their interests and purposes, they might select to use a single tool, such as a publication software, or a variety of tools that could include charts and graphs, mathematical modeling, mind mapping, and/or multimedia with digitized sound and graphics. Students may also use groupware, listservs and online resources to communicate with experts as they gather data for their projects. Students may keep track of their educational progress and share their products with their peers and parents with electronic portfolios.

Sub-Category: Standard 16b
Description: Each participating teacher interacts and communicates with other professionals through a variety of methods, including the use of computer-based collaborative tools to support technology-enhanced curriculum.

Question 16: Communication with other professionals

(A) I never or seldom communicate with colleagues and other professionals regarding integrating technology into my lessons. I know very little or nothing about computer-based collaborative tools.

(B) I am familiar with computer-based collaborative tools such as newsgroups, listservs, instant messaging and audio/video conferencing. Although I recognize how some of these tools might be useful in the classroom and for collaborating with colleagues and other professionals, I do not feel comfortable yet using them. I do use e-mail to communicate with colleagues.

(C) Because professional collaboration is an important for my professional growth in technology and otherwise, I communicate with professionals around the world through newsgroups, listservs, bulletin boards and occasionally audio/video conferencing. I am also beginning to introduce computer-based collaborative tools to my students

(D) I have identified valuable resources and am using computer-based collaborative tools in my classroom in order to give my students the opportunity to communicate with experts. I have taught my students how to appropriately use e-mail, and other resources such as newsgroups, listservs, and bulletin boards to gather information to complete projects that support instructional goals.

Sub-Category: Standard 16c
Description: Each participating teacher uses technological resources available inside the classroom or in library media centers, computer labs, local and county facilities, and other locations to create technology enhanced lessons aligned with the adopted curriculum.

Question 17: Alignment of technology enhanced lessons with curriculum

(A) I know little or nothing about how technology can improve student learning and never or seldom use technological resources to support my students' learning of lesson content.

(B) I am familiar with how the use of technological resources can, under certain circumstances, improve student learning and am able to describe how technology may be used appropriately and inappropriately in the classroom. Currently, however, I rarely include technological resources in my lesson design.

(C) I use a variety of technological resources in my lessons that support my students' learning of lesson content. I design lessons for which I use technological resources like presentation software to present lesson content to students, and I identify technological resources for students to use to learn and report lesson content (e.g. CD-ROMs Internet web sites, and word processing and publication software).

(D) I prepare my students to identify, evaluate and select technological resources that support their learning needs and lesson goals. I design content-driven lessons in which my students to work in collaborative groups, selecting themselves learning tools that will meet their learning and reporting needs to meet instructional objectives.

Question 18: Use of available technological resources

(A) I am unfamiliar with technological resources available in our school or district.

(B) I am aware of technological resources available in our school, district and community, but never, or rarely use them.

(C) I use a variety of technological resources available to me in my classroom, school, district and community that might include CD-ROM, DVD, electronic encyclopedia, Internet, drill and practice software, tool software, handhelds, digital cameras, etc.

(D) My students and I regularly use technological resources available to us in the classroom, school, district, and community that might include mind mapping, simulations, virtual realities and multimedia software and tools as well as CD-ROM and DVD.

Sub-Category: Standard 16d

Description: Each participating teacher designs, adapts, and uses lessons which address the students' needs to develop information literacy and problem solving skills as tools for lifelong learning.

Question 19: Development of information literacy skills

(A) In my classroom students primarily use printed resources that I select from my classroom or school library. Because I have selected only high quality resources, students do not need to evaluate the quality of information gathered from assigned resources. My students do not access electronic information sources.

(B) Although my students primarily use print resources such as textbooks, encyclopedias, newspapers, and magazines to gather information, I teach them how to evaluate the quality of the information they find.

(C) My students use print, electronic, and online resources I recommend to gather information they need to complete learning goals. They evaluate the quality of the information they gather using criteria I have given them.

(D) I expect my students to identify, locate, and select appropriate print, electronic and online information resources and to evaluate the quality of the information they find based on the criteria I have given them.

Question 20: Development of problem-solving skills

(A) My students never or seldom practice problem-solving skills in my classroom using technology.

(B) Although I seldom use technological resources, I provide my students with some exposure and opportunities to solve real-life problems in a variety of classroom activities involving technology that supports our curriculum content.

(C) I have redesigned my lessons to provide my students with opportunities to use a variety of software tools such as spreadsheets and databases to gather and evaluate information to solve problems related to our curriculum content. They no longer have to organize or calculate data, or draw graphs by hand.

(D) Using technological resources in my classroom is essential for my students as they work to solve real-life problems. They use technological resources such as probes, video, and databases to gather information. They use tools such as mindmapping and multi-media to organize and report information. Students are unable to adequately complete their learning objectives without using a variety of technology tools and resources.

Sub-Category: Standard 16e

Description: Each participating teacher uses technology in lessons to increase students' ability to plan, locate, evaluate, select, and use information to solve problems and draw conclusions. He/she creates or makes use of learning environments that promote effective use of technology aligned with the curriculum inside the classroom, in library media centers or in computer labs.

Question 21: Creation of technology-enhanced learning opportunities

(A) I do not currently redesign my lessons to include technological resources.

(B) I know where to find examples of technology-enhanced lessons that align to our curriculum content standards and occasionally use them with my students.

(C) My lessons incorporate the use of technology tools and resources to cover content required by our curriculum in order to provide students with opportunities to locate, evaluate, select and use information to solve problems and draw conclusions.

(D) I design my lessons to provide diverse learning opportunities for my students that engage them in planning strategies, locating, evaluating, selecting and using information to solve problems and draw conclusions. Students select and use a variety of technology tools and resources to complete their learning objectives.

Question 22: Creation of effective learning environments

(A) Because I never or rarely use technological resources in my classroom, I am unfamiliar with how my classroom should be set up to most effectively use technology.

(B) Although I rarely use technology in my classroom with my students, I am able to describe how set up a classroom to effectively use technology tools and resources to meet learning needs of students.

(C) When I use technology tools and resources in my lessons, I know how to select the most appropriate technologies to present lesson content in a manner that addresses students' individual learning styles. For example, I use presentation software with sound and video for my visual learners. I also am able to manage and schedule my students' computer use so that they can complete my technology-based assignments using computers in my classroom or computer lab.

(D) Because my students often work in teams on collaborative lessons, they are assigned roles that provide them with diverse opportunities to use a variety of technology tools and resources to complete lesson goals. Students take roles that best fit their learning abilities and styles and that allow them contribute to the final group product. I facilitate student groups as they manage their tasks, roles, and use of resources within their groups.

Question 23: Evaluation of technology use and quality of student products

(A) I do not use technology in my classroom; therefore I do not have a plan for evaluating student use of technology and student computer-based products.

(B) Even when I use technology in my classroom and curricula, I am unfamiliar with methods for evaluating student use of technology and student computer-based products.

(C) I regularly use rubrics and check lists or other methods to evaluate my students' use of technology tools and resources. Using these evaluation tools I am able to assess student's technology skills and the appropriateness of their technology use to complete instructional goals.

(D) The scoring guides I use to evaluate my student computer-based products are more complex than simple rubrics and check lists. They are designed to assess students' ability to synthesize information and express new patterns of understanding as well as their knowledge and understanding of lesson content and computer skills.

Sub-Category: Standard 16f

Description: Each participating teacher uses computer applications to manipulate and analyze data as a tool for assessing student learning and for providing feedback to students and their parents.

Question 24: Use of data to assess and communicate student learning

(A) I never or seldom use computer applications to manipulate and analyze data to assess student learning and to provide feedback to students and their parents.

(B) I use computer applications such as grade book programs or spreadsheets to record, calculate and report student learning. I give students and parents’ feedback on student achievement during regularly required grading periods.

(C) I use advanced features of my grade book or spreadsheet program (for example weighting of assignment values) to record, calculate and report student learning. I prepare assessment reports to share with my students and their parents periodically throughout the school year.

(D) I regularly use a variety of computer applications that might include grade books and spreadsheets to provide students and parents with immediate feedback on student progress in my classroom. These tools enable me to assist students setting learning goals and seeing progress made in meeting their goals.

APPENDIX H

Email for Permission to Use Data from Ed Tech Profile

Subject: Re: Request for Permission to Use CTAP EdTech Profile Data
Date: Monday, May 9, 2011 5:58 PM
From: Brian Dunsmore <[redacted]>
To: Cliff Rudnick <[redacted]>, Jenith Mishne <[redacted]>
Cc: Marianne Pack <[redacted]>, Larry Hiuga <[redacted]>
Conversation: Request for Permission to Use CTAP EdTech Profile Data

Hi Jenith:

No problem.

Brian Dunsmore
Director, EdTechProfile
[redacted]

On 5/9/11 8:34 AM, "Cliff Rudnick" <[redacted]> wrote:

Hi Jenith,

It's certainly fine with me.

Cliff Rudnick, Administrator
Education Technology Office
California Department of Education
Ph: [redacted]
FAX: [redacted]

From: Jenith Mishne [mailto:[redacted]]
Sent: Monday, May 09, 2011 7:29 AM
To: Brian Dunsmore; Cliff Rudnick
Cc: Marianne Pack; Larry Hiuga
Subject: Re: Request for Permission to Use CTAP EdTech Profile Data

Brian, Cliff and all,

I am sorry to bother you again...my doctoral research is about to get started, however, my review board noticed that I changed the number of schools that I was studying from 4 to 15 and they want me to make sure with you that this is still ok with you- for using the data from CTAP ETP.
I will also only be using data collected from May - June of 2011.

Thanks so much for your consideration.

Jenith Mishne
Director Educational Technology
Newport-Mesa USD

Subject: Re: Request for Permission to Use CTAP EdTech Profile Data
Date: Wednesday, February 9, 2011 9:54 AM
From: Brian Dunsmore <[redacted]>
To: Jenith Mishne <[redacted]>
Conversation: Request for Permission to Use CTAP EdTech Profile Data

Hi Jenith:

Thanks for your email; it was a pleasure hearing from you.

Yes, you have our permission to use the data from EdTechProfile for your doctoral studies. As you indicated we would very much appreciate a copy of the finished study.

Actually, you are the second person this week to talk to me about using ETP in their doctoral dissertation. Emy Lopez-Phillips at Fresno County office of education is considering doing a study too; I bring it up in case there would be some value in knowing this information.

My only suggestion would be to make sure you are able to extract the kind of data you need using the existing tools in EdTechProfile. Although you have our support, we would not be able to commit to additional support work beyond the existing tools since we are committed to follow priorities agreed to with our LEA.

Anyway, good wishes to you and thank you for getting in touch with us.

Sincerely,
Brian Dunsmore
Director, EdTechProfile
[redacted]

On 2/8/11 10:20 PM, "Jenith Mishne" <[redacted]> wrote:

Dear Mr. Dunsmore,

I am the Director of Education Technology in Newport-Mesa Unified School District as well as a doctoral candidate at Pepperdine University in the EdD in Educational Technology Program.

I am writing to you to request permission to use data from the CTAP Ed Tech Profile, specifically in Standard 9 & 16. I am conducting research within my district at five elementary schools. Four of the schools are involved in the EETT grant, Round 8.

The data will be kept confidential and anonymous. I would like to capture data from last January 2010 through June 2011.

My study is looking at factors that predict effective technology integration. The data in CTAP would be used to define technology use in the classroom. Factors I am looking at are Teacher Self-Efficacy, Teacher Knowledge- Technology, and Teaching Experience as predictors.

I would be happy to share my research with you when complete.

Please let me know if this would be acceptable.

Thanks so much,

Jenith Mishne
Ed.D in Educational Technology Student
Pepperdine University
Email: [redacted]
Mobile: [redacted]

Subject: RE: Request for Permission to Use CTAP EdTech Profile Data
Date: Thursday, February 10, 2011 6:57 AM
From: Cliff Rudnick <[redacted]>
To: Jenith Mishne <[redacted]>
Cc: Larry Hiuga <[redacted]>, Brian Dunsmore
<[redacted]>
Conversation: Request for Permission to Use CTAP EdTech Profile Data

Hi Jenith,

You may indeed use data from Ed Tech Profile. We will not be able to provide any individual student or teacher identifiers and I understand you have already spoken with Brian Dunsmore at Truenorthlogic. Please feel free to work directly with Brian. If you have questions for the Education Technology Office, please contact [redacted], Education Programs Consultant and CTAP/SETS Coordinator at [redacted] or by email at [redacted].

Thank you.

Cliff

Cliff Rudnick, Administrator
Education Technology Office
California Department of Education
Ph: [redacted]
FAX: [redacted]

From: Jenith Mishne [mailto:[redacted]]
Sent: Tuesday, February 08, 2011 9:22 PM
To: Cliff Rudnick
Subject: Request for Permission to Use CTAP EdTech Profile Data

Dear Mr. Rudnick,

I am the Director of Education Technology in Newport-Mesa Unified School District as well as a doctoral candidate at Pepperdine University in the EdD in Educational Technology Program.

I am writing to you to request permission to use data from the CTAP Ed Tech Profile, specifically in Standard 9 & 16. I am conducting research within my district at five elementary schools. Four of the schools are involved in the EETT grant, Round 8.

The data will be kept confidential and anonymous. I would like to capture data from last January 2010 through June 2011.

My study is looking at factors that predict effective technology integration. The data in CTAP would be used to define technology use in the classroom. Factors I am looking at are Teacher Self-Efficacy, Teacher Knowledge- Technology, and Teaching Experience as predictors.

I would be happy to share my research with you when complete.

Please let me know if this would be acceptable.

Thanks so much,

Jenith Mishne
Ed.D in Educational Technology Student
Pepperdine University
Email: [redacted]
Mobile: [redacted]

APPENDIX I

Email for Permission to Use TPACK Survey

From: "İsmail ŞAHİN" <[redacted]>
Date: March 1, 2011 12:56:29 PM PST
To: Jenith Mishne <[redacted]>
Subject: Re: Request Permission to Use TPACK Survey

Dear Jenith,
You can use the survey in your study.
Thanks for your interest.
Ismail Sahin

Ismail Sahin, Ph. D.
Chair and Associate Professor
Department of Computer Education and Instructional Technology
[redacted]
TURKEY
Office Phone: [redacted]
Fax: [redacted]
E-mail: [redacted]

----- Original Message -----
From: Jenith Mishne <[redacted]>
Date: Tuesday, March 1, 2011 9:47 pm
Subject: Request Permission to Use TPACK Survey
To: [redacted]

Dear Dr. Sahin,

My name is Jenith Mishne and I am a Doctoral student at Pepperdine University in California. I am writing to you to request permission to use your TPACK survey in my doctoral study. The purpose of my study is to examine whether teachers' self-efficacy, teacher knowledge (TPACK), and teaching experience influence levels of technology integration in the classroom. The participants would be 85 elementary school teachers. While there are other TPACK surveys available, they are all aligned to a specific content area or environment (ie. Science teachers or online teachers). I would be happy to share the results of my study when it is completed.

Thanks in advance,
Jenith Mishne
Ed.D in Educational Technology Student/Adjunct Faculty
Pepperdine University

APPENDIX J

Email Invitation to Study Participants

Date:

From: Jenith Mishne
Graduate School of Education and Psychology, Pepperdine University

Re: Participation in research project titled: An Investigation of the Relationships between Technology Use in the Classroom and Teachers' Self-Efficacy, Knowledge and Experience

Hello,
I am e-mailing you to ask you to be a voluntary participant in my research to examine how teachers in K-12 classrooms in the Newport-Mesa School District are thinking about and using technology.

I am writing a dissertation at the Pepperdine University and I want to use the information I collect from you and other teachers from the other elementary schools, grades 3-6.

I would like to invite you visit my doctoral research website at https://sites.google.com/site/jmishne/research-study and read the "Informed Consent to Participate form."

If you are willing to participate in this study, complete the first of two surveys no later than (*enter date here*). Each survey will take approximately 30-40 minutes. At the end of Survey 2, you will have the opportunity to enter your email address into a raffle drawing for one of four $50 Amazon.com gift cards as a token of appreciation for your time and feedback.

All identifying personal information will be removed from data I collect. I will be glad to explain the consent form and everything I am asking you to do. If you have questions about data collection and confidentiality before the agreeing to participate, please email or call me and I will answer promptly.

I have received approval from your site principal to invite you to participate in this study. They will not be informed of who is participating in the study.

My e-mail is [redacted]. My telephone number is [[redacted]].

I look forward to hearing from you.

Jenith Mishne
Doctoral Candidate in Learning Technologies
Graduate School of Education & Psychology, Pepperdine University

APPENDIX K

Informed Consent for Participation in Research Activities

Participants will access this form at https://sites.google.com/site/jmishne/research-study

Principal Investigator: Jenith Mishne, doctoral student in the Learning Technologies Program at Pepperdine University, Graduate School of Education and Psychology.

Dr. Linda Polin is supervising this study.

Title of Project: *Teachers, Technology and Risk: An Investigation of the Relationships between Technology Use in the Classroom, Teacher Self-Efficacy, Knowledge and Experience*

The **purpose of this study** is to gather information about teachers, their beliefs (self-efficacy) and skills, and technology use in the classroom. Through this investigation, it will be determined whether a relationship exists between three factors (self-efficacy, teachers' skills, and teaching experience) and use of technology in the classroom. If there is, it will assist in the development of a conceptual framework for empowering teachers to successfully use technology in the classroom.

Participation will involve the following: Participation in two 30-40 minute surveys:

- Survey 1: Technology use in the classroom (CTAP EdTechProfile)
- Survey 2: Teacher self-efficacy, knowledge and experience

The surveys will take about 30 minutes each. They will be administered about 7 days apart.
You will receive an initial email asking for your participation in this study. This will contain information to get started with Survey 1. After the 7 days have passed, you will receive a second email asking for your participation in Survey 2. You will receive a final email 7 days later, thanking you for your participation and announcing the raffle winners.

Participation in this study is *voluntary*. You may choose not to participate or discontinue your participation in the study at any time.

- None of the information will be shared with district or site administrators
- Whether or not you participate in this study has no effect on your employment or job status
- There is no cost to you for participating

You may choose to skip a question at any time in Survey 2. However, Survey 1 questions cannot be manipulated as they are part of a California Department of Education website and the researcher does not have access to change question logic/format. Therefore, you will have to answer the first section called General Skills, although for the purpose of this study, the researcher will only be looking at Standard 9 & 16 of the CTAP EdTechProfile Assessment.

Confidentiality
We will keep your information confidential. All data is stored in a password protected electronic format. Although we are asking for your name, this is only to match responses of the two surveys. Once we match the responses from both surveys, a unique number assigned to you will be the only identifier. To help protect your confidentiality, the survey results will not contain information that will personally identify you. The results of this study will be used for scholarly purposes only.

The data from Survey 1: CTAP EdTech Profile Assessment might be retained on the CTAP website. No one in the school district, other than the researcher, has access to this data. However, the Administrator in the Education Technology Office at the California Department of Education, the Director of the Edtechprofile at the California Technology Assistance Project (CTAP), and the Orange County Department of Education can access the data. This data is only used by these others in accordance with grant requirements, and in an overall summary for CTAP reports. The data is kept in a database online that is password protected. This data resource (CTAP) may maintain a record of assessments in their files. However, participants of this study are identified only by a unique number associated with this study, and thus even if the service provider does keep a copy of the responses, this provides no potential harm to any of the participants nor to their employment.

Risks/Benefits
The biggest foreseeable risks associated with this study are imposition on the participant's time, and possible boredom or fatigue from completing the survey.

Other risks may include the following: This is a reflective exercise intended to encourage participants to think about their performance. As a result of the reflection, participants may identify certain areas of growth. Another area of discomfort may be in disclosing this information to Jenith Mishne, the Director of Education Technology.

The study will be beneficial in that it will help administrators and professional developers understand how to better support teachers and their technology use in the classroom. There are likely no direct benefits to participants.

Incentive
Teachers who complete both surveys have the opportunity to be included in a drawing for one of four $50 Amazon.com Gift Cards. Simply include your email address at the end of Survey 2. Responses will still remain confidential. Email addresses will not be matched in any way with responses.

Contact
If you have any questions at any time about the study or the procedures that are being used, you may contact the researcher, Jenith Mishne at XXXXXX or by telephone at XXXXXX, or Faculty Supervisor/Chair, Linda Polin, at XXXXXX, or Jean Kang, Manager, Graduate and Professional Schools IRB, at XXXXXX or XXXXXX.

This research has been reviewed according to Pepperdine University IRB procedures for research involving human subjects.

APPENDIX L

Website Directions to Participants About Surveys

Survey 1
https://sites.google.com/site/jmishne/research-study/survey-1

Thank you for agreeing to participate in my research study. Your participation in the study may contribute to better understanding of teachers' technology use in the classroom and how to better support it.

As a reminder, participation in this study is voluntary. You may choose not to participate or discontinue your participation in the study at any time. There will be no impact on your current or future employment relationship with the school district if you choose to participate or not. There is no cost to you for participating.

This first survey may or may not be familiar to you. It is the CTAP EdTech Profile Assessment, which some of you may have completed in the past. Since this is a California Department of Education assessment, the researcher cannot control the questions or allow the option to skip questions. The data that will be used for this study will only be from Standard 9 and 16 of the assessment, however, you will have to complete the general skills section of the assessment to get to that part of the assessment.

To access the Survey go to https://sites.google.com/site/jmishne/research-study
(See Quick Guide for step by step directions)

- You will either need to create an account or access your existing account.
- It should talk you approximately 30-40 minutes to complete this survey.
- You can pause at any time and come back to it.

Please complete the survey no later than (*enter date here*). Thank you again for your willingness to participate in this research study.
You will receive another email with the link back to this site for Survey 2 on (*enter date here*).

You do have the opportunity to put your email address into a raffle drawing for a $50 Gift Card to Amazon.com at the end of Survey 2.

If you have any questions, feel free to contact me at XXXXXXXXXXX or XXXXXXXXXX.

Jenith Mishne
Doctoral Candidate in Learning Technologies
Graduate School of Education & Psychology
Pepperdine University

Survey 2

https://sites.google.com/site/jmishne/research-study/survey-2

THIS SURVEY WILL NOT BE AVAILABLE UNTIL SURVEY 1 IS COMPLETED.

Thank you for continuing to participate in my research study. Your participation in the study may contribute to better understanding of teachers' technology use in the classroom and how to support it.

As a reminder, participation in this study is voluntary. You may choose not to participate or discontinue your participation in the study at any time. There will be no impact on your current or future employment relationship with the school district if you choose to participate or not. There is no cost to you for participating. You may also choose to skip a question at any time.

You do have the opportunity to put your email address into a raffle drawing for a $50 Gift Card to Amazon.com at the end of this survey.

You have already completed the CTAP EdTech Profile Assessment, the first of two surveys for this study.

To access Survey 2 go to https://sites.google.com/site/jmishne/research-study/survey-2
This survey has been created in Survey Monkey (you do not need to create an account to complete it.)

It should take you approximately 30-minutes to complete this survey.

Please complete the survey no later than (*enter date here*). Thank you again for your willingness to participate in this research study.

If you choose to give your email address at the end of this survey, you will be entered into a raffle drawing for four $50 Amazon.com gift cards. If your name is selected as a winner, you will receive an email and the gift card will be sent to you via intra-district mail. Your email will not be kept after the drawing.

If you have any questions, feel free to contact me at XXXXXXXXXXXXX or XXXXXXXXX.

Jenith Mishne
Doctoral Candidate in Learning Technologies
Graduate School of Education & Psychology
Pepperdine University

APPENDIX M

Final Email to Participants

Date:
Re: Participation in research project titled: An Investigation of the Relationships between Technology Use in the Classroom and Teachers' Self-Efficacy, Knowledge and Experience

Hello,
Thank you for your participating in my doctoral research study. I really appreciate your time and support during this busy time of year. Your participation in the study may contribute to better understanding of teachers' technology use in the classroom and how to support it.

We had four lucky raffle winners, each winning a $50 Gift Card to Amazon.com. The winners are:

1. Name-School Site
2. Name-School Site
3. Name-School Site
4. Name-School Site

The gift card has already been sent to you via intra-district mail. Happy Reading!

When I have completed this research study, I would be happy to share the results with anyone that is interested. Send me an email if you would like to read the final results.

In the meantime, if you have any questions, please feel free to contact me at XXXXXXXXXXXX or XXXXXXXXXXXXXXX

Thanks again and have a wonderful summer,

Jenith Mishne
Doctoral Candidate in Learning Technologies
Graduate School of Education & Psychology
Pepperdine University

APPENDIX N

Study Participants' Privacy Protection

As part of the application for approval of a research project, I must comply with the Pepperdine University Graduate and Professional Schools Institutional Review Board. I have already obtained permission from Newport-Mesa Unified School District to proceed with the research along with from each of your site principals. Here are a few things I need to clarify with all potential participants in this study:

- All of the information remains confidential. The district, school, and informants will be given pseudonyms in the form of a unique identifying number.
- None of the information will be associated or linked to the district, school, or individuals.
- None of the information will be shared with district or site administrators
- Participation in either of the surveys is strictly voluntary.
- Since this is voluntary, you may decide to withdraw at anytime.
- Whether or not you participate in this study has no effect on your employment or job status.
- Should you choose to withdraw from this study, this decision has no effect on your employment or job status.
- Any survey information completed using CTAP EdTech Profile is password protected and accessible by the researcher, Administrator in the Educational Technology Department at the CA State Dept., CTAP EdTechProfile Director and OCDE. Access to the information will not be shared with anyone in the NMUSD school district.
- Any survey information completed using Survey Monkey, is password protected and accessible only by researcher
- The researcher, Jenith Mishne, will hold all data in a secure location for a period of five years. All data will be properly shredded and disposed.
- All digital data will be stored on the researcher's computer with a back-up copy located in a password protected online resource.
- The data will be properly destroyed at the end of this five-year period.

If you have questions about your rights as a research participant you may contact Dr. Jean Kang, the Manager of the Graduate and Professional Schools IRB, at Pepperdine University, at [redacted], or email at [redacted]; or my Dissertation Chairperson, Dr. Linda Polin at [redacted].

Please feel free to contact me with any questions.
Jenith Mishne, [redacted])

APPENDIX O

District Approval

NEWPORT-MESA Unified School District
2985 Bear Street • Costa Mesa • California 92626 • (714) 424-5000

March 28, 2011

Internal Review Board
Pepperdine University
6100 Center Drive
Los Angeles, CA 90045

Pepperdine University IRB:

I authorize Jenith Mishne, doctoral student under the supervision of Dr. Linda Polin in Pepperdine University's Graduate School of Education and Psychology, to conduct research in Newport-Mesa Unified School District. The study focuses on the impact of teacher self-efficacy, knowledge, and experience as factors that may influence technology use in the classroom. Participants will be recruited from each of the 15 volunteering elementary schools (Adams. California, College Park, Davis Magnet, Eastbluff, Harbor View, Killybrooke, Newport Heights, Newport Coast, Paularino, Pomona, Rea, Sonora, Victoria, Wilson) in Newport-Mesa. Any individual choosing to participate will complete an Informed Consent for Participation in Research Activities form (see attached example). Participation is strictly voluntary and consent may be withdrawn at any time.

I am aware that Jenith Mishne has received her certification of completion in Human Participation Education for Research and that she and Pepperdine University have a commitment to legal and ethical research practices. Pepperdine University requires complete documentation of research procedures to ensure the safety and ethical treatment of human subjects. This research project is subject to review by Pepperdine University's Institutional Review Board. All the procedures used in collecting and analyzing data will protect the anonymity of the district's, its schools, and all personnel. As mentioned previously all subjects' participation is voluntary and they may choose to withdraw at any time.

Data Collection will include:

- Self-Efficacy Survey
- CTAP Ed Tech Profile Assessment
- Technological Pedagogical Content Knowledge (TPACK) Survey
- Demographic Characteristic Survey

Subjects will include Newport-Mesa Unified School District teachers at Adams. California, College Park, Davis Magnet, Eastbluff, Harbor View, Killybrooke, Newport Heights, Newport Coast, Paularino, Pomona, Rea, Sonora, Victoria, Wilson, specifically:

- Teachers (1$^{8)}$. 5th ^{a}nd 6th grade EETT teachers at currently participating in the EETT grant will be asked to participate from Davis Magnet, Killybrooke, Paularino, and Sonora.

I give permission for the above research to take place in Newport-Mesa Unified School district, specifically at the participating elementary schools and the participants in the EETT grant.

Sincerely,

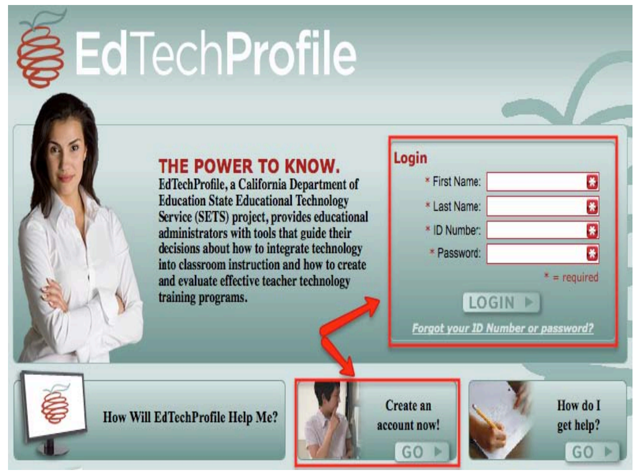
Susan Astarita
Assistant Superintendent of Elementary Education

APPENDIX P

Quickstart guide to CTAP Edtech profile

• Please follow the website link http://www.edtechprofile.org and log in with your name, id number and password.

• If you have forgotten your id or password, try finding your account by clicking the “Forgot your ID Number or password?” link. If you entered hints when you first established your account, they will be given to you. If not, the information will be emailed to you. *(Please do not set up a duplicate account).*



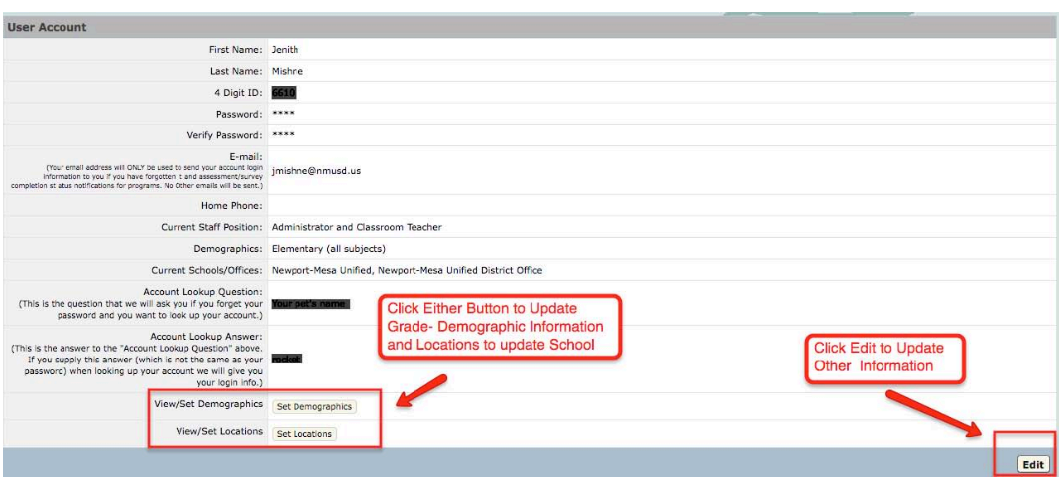
• If this is the **first time** you have taken the Technology Assessment Profile, you will need to establish a new account by clicking the **Create Account Now button** and following the simple screen instructions. You will be asked to select an ID number (arbitrary number) and password. Please be sure to record the information for future reference.

• Once into the system, click on the **My Account** tab and verify that all information is still correct.

• If you have changed schools sites or grade levels since the last time you logged in,

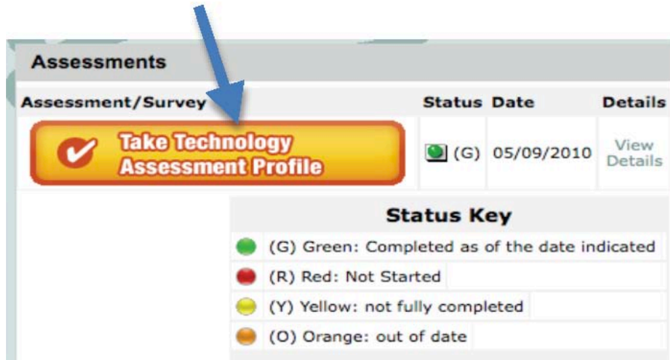
please be sure to change that under My Account.

• After making any changes, in the system, you will need to click the **Save Changes** button.



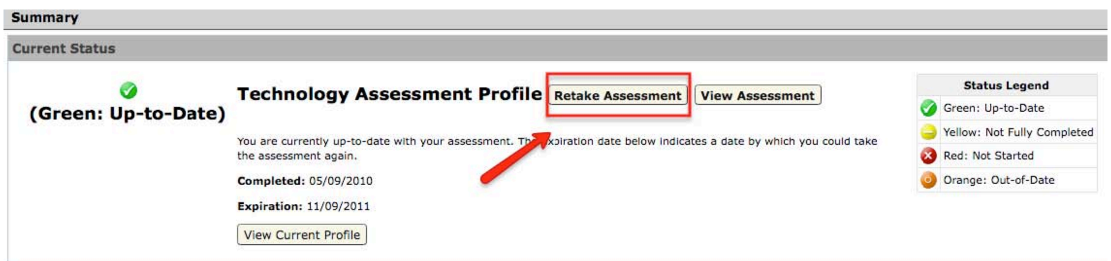
EdtechProfile Assessment

When you are sure that your account information is accurate, you can start to take the assessment by clicking on the My Technology Assessment Profile tab. As you answer the questions on each screen, be sure to click the Save Changes button at the bottom right. When you have completed the survey, you will notice an Assessment completion date.



• **PLEASE NOTE**: If you took the technology assessment within the last year, please go in and update it. **Click on RETAKE ASSESSMENT to update**. Be sure to save changes.

The General Skills section will not be used, however, you have to complete it to get to Standards 9 & 16, which is what this study will be looking at.



AS YOU MOVE THROUGH THE ASSESSMENT, AT THE BOTTOM RIGHT OF THE SCREEN ARE TWO

If you need to pause assessment and come back to it later, click **Record & Return to Menu**. You can pick up where you left off.

Thank you for participating in my research study. If you have any questions, please contact Jenith Mishne at [redacted]

APPENDIX Q

Email to School Principals with Request for Permission

Subject: RE: My Ed.D Research-Request for Permission
Date: Tuesday, March 22, 2011 2:09 PM
From: Linda Tenno <[redacted]>
To: Jenith Mishne <[redacted]>
Conversation: My Ed.D Research-Request for Permission

Absolutely - we are more than happy to help!

Linda Tenno, Ed.D.
Principal
Victoria Elementary School
Newport Mesa Unified School District
[redacted]

Subject: RE: My Ed.D Research Study
Date: Thursday, June 3, 2010 9:17 AM
From: Christine Anderson <[redacted]>
To: Jenith Mishne <[redacted]>
Conversation: My Ed.D Research Study

Sure That's fine
Chris

Subject: RE: My Ed.D Research-Request for Permission
Date: Tuesday, March 22, 2011 2:36 PM
From: Anna Corral <[redacted]>
To: Jenith Mishne <[redacted]>
Conversation: My Ed.D Research-Request for Permission

Absolutely! Whatever you need ☺
Anna

Subject: RE: My Ed.D Research-Request for Permission
Date: Wednesday, March 23, 2011 11:49 AM
From: Stacy J Holmes <[redacted]>
To: Jenith Mishne <[redacted]>
Conversation: My Ed.D Research-Request for Permission

Ok to study my teachers.
A lot doctoral students in psychology study the principal for their dissertations. Nice to have the Pomona teachers get a turn.
S

Subject: RE: My Ed.D Research Study
Date: Monday, June 14, 2010 8:26 AM
From: Stacy deBoom <[redacted]>
To: Jenith Mishne <[redacted]>
Conversation: My Ed.D Research Study

Hi Jenith,
Of course!! Let me know what you need. :)

Stacy de Boom-Howard
Principal
Paularino Elementary School
1060 Paularino Ave
Costa Mesa, CA 92626
[redacted]

Subject: RE: My Ed.D Research-Request for Permission
Date: Tuesday, March 22, 2011 2:00 PM
From: Julie Perron <[redacted]
To: Jenith Mishne <[redacted]
Conversation: My Ed.D Research-Request for Permission

Totally
Julie

Subject: RE: My Ed.D Research-Request for Permission
Date: Tuesday, March 22, 2011 2:06 PM
From: Kurt Suhr <[redacted]
To: Jenith Mishne <[redacted]
Conversation: My Ed.D Research-Request for Permission

I will happily assist and support this!

Kurt

Subject: RE: My Ed.D Research-Request for Permission
Date: Tuesday, March 22, 2011 2:06 PM
From: Duane Cox <[redacted]>
To: Jenith Mishne <[redacted]>
Conversation: My Ed.D Research-Request for Permission

I will certainly support you in this way.
Let me know what I can do.

Duane

Subject: RE: My Ed.D Research Study
Date: Tuesday, March 22, 2011 1:41 PM
From: Katherine M Sanchez <[redacted]>
To: Jenith Mishne <[redacted]>
Conversation: My Ed.D Research Study

Sure!

Kathy Sanchez, Principal
Killybrooke School
3155 Killybrooke Lane
Costa Mesa, CA 92626
([redacted]

Subject: RE: My Ed.D Research-Request for Permission
Date: Tuesday, March 22, 2011 2:41 PM
From: Charlene Metoyer <[redacted]>
To: Jenith Mishne <[redacted]>
Conversation: My Ed.D Research-Request for Permission

That sounds so perfect!!   Count us in and you have my support.
Char

Charlene Metoyer
Principal, Harbor View School
900 Goldenrod Avenue
Corona del Mar, CA 92625
[redacted]

Subject: RE: My Ed.D Research-Request for Permission
Date: Friday, March 25, 2011 2:26 PM
From: Cheryl Beck <[redacted]>
To: Jenith Mishne <[redacted]>
Conversation: My Ed.D Research-Request for Permission

Hi
Yes, it would be our pleasure to participate. Let me know how we can help.

Cheryl Beck
Principal
Eastbluff Elementary
Newport-Mesa Unified School District
[redacted]

Subject: RE: My Ed.D Research Study
Date: Thursday, June 3, 2010 11:30 AM
From: Kevin Rafferty <[redacted]>
To: Jenith Mishne <[redacted]>
Conversation: My Ed.D Research Study

Hi Jenith,

A-OK!!!
Full speed ahead!

Dr. Kevin Rafferty, Principal
Davis Magnet School
Science, Math, and Technology (K-6)
Newport-Mesa Unified School District
[redacted]

Subject: RE: My Ed.D Research-Request for Permission
Date: Tuesday, March 22, 2011 5:26 PM
From: Julie B McCormick <[redacted]>
To: Jenith Mishne <[redacted]>
Conversation: My Ed.D Research-Request for Permission

Yes! Count me in.

Julie McCormick, Principal
[redacted]

Subject: RE: My Ed.D Research-Request for Permission

Date: Tuesday, March 22, 2011 2:24 PM
From: Kelli Smith <[redacted]>
To: Jenith Mishne <[redacted]>
Conversation: My Ed.D Research-Request for Permission

I am totally open to it! Let me know how I can support you!
Kelli

Kelli Smith
Principal
California Elementary School
[redacted]
Subject: RE: My Ed.D Research-Request for Permission
Date: Tuesday, March 22, 2011 3:23 PM
From: Del Real Gabe <[redacted]>
To: Jenith Mishne <[redacted]>
Conversation: My Ed.D Research-Request for Permission

Jenith,

Of course, you have my permission to work with teachers here on your study. We can even provide some time during a staff meeting for teachers to take the survey. Anything to help you out.

I am sure there are one hundred people curious about the same thing...

How did it go with your preliminary defense? I am sure you did an amazing job. We all know you are an expert in your field.

Gabe Del Real
Adams Elementary

From: Jenith Mishne
Sent: Tuesday, March 22, 2011 1:58 PM
To: Kurt Suhr; Gabriel Del Real; Charlene Metoyer; Jane Holm; Duane Cox; Julie B McCormick; Kelli M. Smith; Cheryl Beck; Laura Vlasic; Stacy J Holmes; Anna Corral; Linda Tenno; Julie Perron
Subject: My Ed.D Research-Request for Permission
Hi all,
As most of you know I am working on my Ed.D and am into the dissertation portion of it. My study will be looking at elementary school teachers, innovation and technology in the classroom.

I am really interested in why certain teachers do more with technology than others. Particularly, I am looking at whether teacher self-efficacy, teacher knowledge, and teaching experience are predictors of technology integration. All of my data will be collected through a survey.

Participation in this study will be completely voluntary and there will be full disclosure.

I will be ready to collect the data in May, and while I have the support of Dr. Hubbard and Susan Astarita, I wanted permission and support from each of you to request participation in my study from your teachers. All participants will be protected and responses will only be identifiable by grade and school not by actual teacher name.
Let me know if you would be open to this.

Thanks,
Jenith Mishne Director Educational Technology
Newport-Mesa USD Email: [redacted]

APPENDIX R

Frequency of Use of Various Technologies

Table R1

Frequency of Use of Various Technologies and Percentage of Total

	Frequency of use (Percentage of total)					
Technology	Daily	Weekly	Monthly	Rarely	Never	No Response
Communication						
Email	44 (100.0%)	-	-	-	-	-
Instant Messaging	17 (38.6%)	9 (20.5%)	3 (6.8%)	7 (15.9%)	8 (18.2%)	-
Social Networks	20 (45.5%)	5 (11.4%)	4 (9.1%)	8 (18.2%)	7 (15.9%)	-
Information						
Google search	37 (84.1%)	7 (15.9%)	-	-	-	-
News	28 (84.1%)	10 (22.7%)	3 (6.8%)	3 (6.8%)	-	-
Stocks	4 (9.1%)	-	3 (6.8%)	10 (22.7%)	26 (59.1%)	1 (2.3%)
Online shopping						
Household items	4 (9.1%)	6 (13.6%)	17 (38.6%)	14 (31.8%)	3 (6.8%)	-
Books	2 (4.5%)	5 (11.4%)	21 (47.7%)	14 (31.8%)	2 (4.5%)	-
Travel	4 (9.1%)	15 (34.1%)	20 (45.5%)	4 (9.1%)	1 (2.3%)	-
Clothes	1 (2.3%)	4 (9.1%)	15 (34.1%)	22 (50.0%)	2 (4.5%)	-
Sports	1 (2.3%)	4 (9.1%)	8 (18.2%)	13 (29.5%)	18 (40.9%)	-
Entertainment						
Netflix	3 (6.8%)	14 (31.8%)	6 (13.6%)	3 (6.8%)	18 (40.9%)	-
Sports	1 (4.5%)	7 (15.9%)	6 (13.6%)	9 (20.5%)	20 (45.5%)	-
Online Games	3 (6.8%)	6 (13.6%)	3 (6.8%)	16 (36.4%)	6 (36.4%)	-
YouTube	4 (9.1%)	13 (29.5%)	8 (18.2%)	17 (38.6%)	2 (4.5%)	-

Note. $n = 44$