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TEACHERS' MOTIVATION TO INTEGRATE TECHNOLOGY: A STUDY OF EXPECTANCY-VALUE, PERCEIVED INSTRUMENTALITY, AND PROSOCIAL GOALS

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TEACHERS' MOTIVATION TO INTEGRATE TECHNOLOGY: A STUDY OF EXPECTANCY-VALUE, PERCEIVED INSTRUMENTALITY, AND PROSOCIAL GOALS

A DISSERTATION APPROVED FOR THE
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Abstract

Research suggests that technology integration can improve student achievement and attitudes towards school and learning (Englert, Zhao, Collings, & Romig, 2005; Kulik, 2003; Martindale, Pearson, Curda, & Pilcher, 2005). However, much of the research that has examined technology use in schools has revealed that there is a disappointing lack of integration, and frequent and meaningful technology use is not the norm (Barron, Kemker, Harmes, & Kalaydjian, 2003; Becker, 2006; Wozney, Venkatesh, and Abrami, 2006; Zhao & Frank, 2003). This study used a correlational design and an online self-report survey of 197 PreK-12 teachers to investigate the relationships between teachers' technology use and their motivation to use technology. Teachers' expectancy of success, intrinsic valuing, utility valuing, and perceived instrumentality of technology were related to the frequency of their own use at school. Teachers' expectancy of success with technology and their beliefs about their responsibility for teaching students about technology were related to the frequency of teacher-directed student technology use.

CHAPTER 1

Introduction

For over twenty-five years computers have been recognized as powerful instructional tools in K-12 schools. A synthesis of research suggests that technology integration can improve student achievement, learning, and attitudes towards school and learning (Englert, Zhao, Collings, & Romig, 2005; Koedinger, Anderson, Hadley, & Mark, 1997; Kulik & Kulik, 1994; Mann, Shakeshaft, Becker, & Kottkamp, 1998; Martindale, Pearson, Curda, & Pilcher, 2005; Tamin, Bernard, Borokhovski, Abrami, & Schmid, 2011). With regards to achievement, Wenglinsky (1998) found that the use of computers for higher-order math problem solving was positively related to math achievement in fourth graders. Taylor, Casto, and Walls (2007) found that students made significant gains in test scores when technology was integrated in cross-discipline instructional units compared to students who learned the same subject matter without technology. In a second-order meta-analysis and validation study Tamin et al. (2011) found that in face-to-face classrooms computer technology use increased student achievement by a mean effect size of .33. Moreover, researchers have found that computer use at school improved students' attitudes towards classes and learning (Kulik & Kulik, 1994; Kulik, 2003; Schacter, 1999).

Although the primary argument for technology integration has been that it improves student achievement, technology integration has also been framed as an issue of social equity. Because not all students have access to computers and the Internet at home, technology use at school is viewed as a way to address the "digital divide" and provide opportunities for all students to become proficient with the tools, skills, and resources ubiquitous in business and academia (Hoffman & Novak, 1998; National Center for Education Statistics, 2006; National Telecommunications and Information Administration, 1999). Furthermore, Leu, O'Byrne, Zawilinski, McVerry, and Everett-Cacopardo (2009) have argued that new digital literacies should not be left to chance, as informal technology use and learning may not prepare students with the technical or cognitive skills that are necessary for success in a technical global society. That is, students with access to computers and the Internet at home may be skilled with texting, social networking, and downloading and uploading music and videos, but they may lack skills such as locating and critically evaluating online information, or collaborating on complex problems at a distance. The issue of equity and a digital divide, therefore, extends beyond simple access to digital devices and software, to include access to formal instruction and the application of technology knowledge and skills for academic purposes.

Statement of the Problem

Despite the evidence that technology can lead to beneficial learning outcomes and address the concerns about a digital divide, much of the research that has examined technology use in schools has revealed that there is a disappointing lack of integration (Becker, Ravitz, & Wong, 1999; Cuban, Kirkpatrick, & Peck, 2001; Fabry & Higgs, 1997; Zhao & Frank, 2003). Although there have been various efforts to support the implementation of technology standards (e.g., International Society for Technology Education; National Council for Accreditation of Teacher Education), federal block grants to states for professional development, E-Rate funding, Preparing Tomorrow's Teachers to Use Technology (PT3) grants to colleges, and a dramatic increase in access to computers and networks, researchers have found that frequent and meaningful technology integration is not the norm (Barron, Kemker, Harmes, & Kalaydjian, 2003; Becker, 2000; Levin & Arafeh, 2002; National Center for Education Statistics, 2000). In a study in which 4th through 12th grade teachers in over 4,083 public and private schools from 1,616 school districts participated, Becker et al. (1999) found that during a school year only 27% of teachers assigned activities which required a computer 20 or more times. More recently, a study of National Assessment of Educational Progress (NAEP) data revealed that 58% of fourth graders claimed they "never" or "hardly ever" used computers in their math class (Becker, 2006). In a school district technology needs assessment survey of 479 teachers I found that 39% of the teachers said they integrated technology into student activities and assignments daily or weekly, 22% said that they integrated technology monthly, and 38% said they never or occasionally integrated technology (Nelson, 2007). Similarly, in their study of 764 elementary and secondary public and private school teachers, Wozney, Venkatesh and Abrami (2006) found 39% of the teachers reported integrating technology "rarely" or "not at all."

Unfortunately, it appears that a large number of K-12 teachers only occasionally integrate technology into their instruction. Thus, students may not consistently benefit from new technologies that could increase achievement and have a positive effect on learning. What prevents teachers and schools from realizing the opportunities and potentials of these instructional tools? Furthermore, why do some teachers rise to meet the challenges of technology integration and others do not? What perceptions, values, and beliefs systems support these teachers' continuing motivation to learn, use, and integrate technology?

Related Research on Technology Integration

Over the past two decades researchers have examined the challenges in implementing and sustaining wide-spread technology integration from different perspectives and using different research approaches. One line of research is based on Roger's (1995) theory on the diffusion of innovations, which examines the social process by which innovations are adopted by schools and by teachers. Several different frameworks and models have been used to categorize and study the process of change and development when new technologies, instructional materials, and teaching methods are introduced in an organization. The *Apple Classrooms of Tomorrow* (ACOT) *Adoption Model*, the *Levels of Technology Implementation* (LoTI) Scale, and the *Concerns Based Adoption Model* (CBAM) have each proposed five to seven stages that people move through in the adoption process (Dooley, Metcalf, & Martinez, 1999; Sandholtz, Ringstaff, & Dwyer, 1997; Straub, 2009).

Another approach to the study of technology integration has focused on social and contextual factors such as student and community demographics, access to computers and other resources, equitable distribution of technology, class size, course structure and scheduling, professional development opportunities, school culture, leadership, and the amount and quality of technical and instructional support (e.g., Anderson & Dexter, 2005; Becker, 1991; Becker, 2006; Cuban, Kirkpatrick, & Peck, 2001). A third line of research has investigated teacher-level factors, attempting to identify the characteristics of a "technology-using teacher" (e.g., Becker, 1994; Ertmer, Gopalakrishnan, & Ross, 2001; Russell, O'Dwyer, Bebell, & Tao, 2007; Vannatta & Fordham, 2004). That is, what individual differences, such as demographics, skills, attitudes, and beliefs, distinguish technology-using teachers from teachers who never or rarely use technology?

Purpose of This Study

Although many studies have explored change and diffusion, contextual, and demographic factors that influence technology integration, few studies have investigated in depth how the beliefs and values of educators impact their use of technology, and fewer still have examined these issues using defined theoretical constructs. It is argued that the field of instructional technology lacks a cohesive integrative theoretical framework that can guide research and assist in building useful models and interventions (Lawless & Pellegrino, 2007; Wozney et al., 2006; Zhao & Frank, 2003). Using motivation theory to explore teachers' use of technology could provide valuable insights into relationships between teacher motivation and teacher behaviors. Several promising constructs in motivation are those contained within expectancy-value theory, perceived instrumentality, and prosocial goals (Eccles & Wigfield, 2002; Raynor, 1970; Wentzel, 1998).

I used motivation as a lens for conducting a qualitative study of twelve technology-using teachers (Nelson, 2006). In this study several themes were uncovered, including utility related to teacher efficiency and student engagement, future time orientation, and social responsibility, which may have contributed to teachers' motivation to integrate technology in their classrooms. The themes that emerged from this qualitative study parallel motivation constructs found in expectancy-value theory, perceived instrumentality, and prosocial goals. Since these constructs have not been sufficiently addressed in the technology integration literature, in the present study I examined teachers' motivations regarding instructional technology, and how those motives were related to technology integration at school.

Expectancy-value theory is an achievement motivation theory which posits that people's expectancy for success and their valuing of an activity explains their choices, persistence, and performance regarding the activity (Eccles & Wigfield, 2002; Wigfield & Eccles, 2000). Perceived instrumentality examines how people understand the usefulness of a present task to a distant future goal (Miller, DeBacker, & Greene, 1999), and prosocial goals address motivation that is focused on others, or altruistic reasons for an individual's behavior (Dowson & McInerney, 2003; Wentzel, 1991).

While much research has examined students' choices and achievement in regards to expectancy-value theory (e.g., DeBacker & Nelson, 1999; Greene, DeBacker, Ravindran, & Krows, 1999; Wigfield & Eccles, 2000), perceived instrumentality (e.g., Greene, Miller, Crowson, Duke, & Akey, 2004; Hardré, Crowson, DeBacker, & White, 2007; Miller, Greene, Montalvo, Ravindran, & Nichols, 1996; Raynor, 1970), and prosocial goals (e.g., Dowson & McInerney, 2003; Nelson & DeBacker, 2008; Wentzel, 1998), these constructs have rarely been applied to teachers' perceptions, beliefs, and behaviors and their instructional use of technology. Further evidence that explains how the constructs in expectancy-value theory are related to inservice teachers' technology integration practices could be useful for encouraging more consistent and meaningful technology integration in K-12 schools. Few studies have used achievement goal theory to examine teachers' beliefs about the theoretical constructs of perceived instrumentality and prosocials goals (e.g., social responsibility and social concern) in regards to technology integration. These constructs, which are similar to the themes that emerged from my previous study (Nelson, 2006), could further explain teachers' use of technology for teaching and learning.

The purpose of the present study was to investigate how PreK-12 teachers' expectancies, values, perceived instrumentality, and prosocial goals may affect their decisions to integrate instructional technology. The expectancy-value variables of technology expectancy, intrinsic value, and utility value, the achievement goal construct of perceived instrumentality, and the prosocial goals of social responsibility and social concern were used to examine variance in classroom teachers' use of technology at school, and how they have their students use technology.

Research Questions

1. What are the relationships among teachers' technology use (teachers' own technology use at school, and teacher-directed student use) and the motivation variables of expectancy, intrinsic value, utility value, perceived instrumentality, social responsibility, and social concern?

2. Do the motivation variables of utility value, intrinsic value, perceived instrumentality, social responsibility, and social concern explain significant

variance in PreK-12 classroom teachers' own technology use and teacher-directed student technology use when controlling for expectancy?

Significance

This study benefits the fields of instructional technology, educational leadership, teacher education, and teacher professional development by providing new insights on how motivation affects teachers' choices, which may then stimulate new interventions and approaches to school policy and technology professional development. Using theoretically defined motivational constructs which have not been sufficiently applied to technology integration, this study will clarify if, and which motivation variables are most useful in explaining the wide variations in technology use among teachers and the relationships among those variables. Indeed, it is only after determining significant motivation factors and the interactions among them that effective interventions can be consistently designed, implemented and evaluated.

In addition, this research contributes to the field of motivation by examining an understudied area in the motivation literature: how the relationships between motivation variables are expressed within different populations (Eccles & Wigfield, 2002). The findings of this study add to both expectancy-value theory, perceived instrumentality, and prosocial goal constructs in that the sample participants were adult teachers rather than the more frequently studied adolescents and young adults.

CHAPTER 2

Review of the Literature

This literature review begins with an examination of the historical context related to computer use at schools, including computer access, integration, and expectations for use in K-12 education since the early 1980's. Then, a brief discussion of the universal difficulties that educators experience in keeping up with technology is presented. Next, the research on specific barriers and enablers to technology integration is synthesized. The last part of this chapter provides a review of research on expectancy-value theory, perceived instrumentality, and prosocial goals, which serve as a theoretical framework to guide this study.

Changes in Technology Access and Changes in Expectations for Use

In just a little over 30 years educational computer use in the United States has gone from limited access and use of expensive mainframe computers to global initiatives such as the One Laptop Per Child project (see http://laptop.org/en/). Rapid changes and advances in technology capabilities and access guarantee that the concept of technology integration is a continuously evolving construct. As computers and other digital technologies have become less expensive, more user-friendly, smaller, faster, more powerful and more abundant, the perceived purpose of technology in education has changed, and so have the perceptions of what teachers should be learning, doing, and teaching with technology (Bebell, Russell, & O'Dwyer, 2004; Mandinach, Honey, & Culp, 2005). Government and academic research studies, naturally, have reflected these changes in technologies and priorities.

In 1981 only 18% of American schools had one or more computers, but by 1987, 95% of schools had one or more computers. During this time states began calling for, and in many cases mandating, computer literacy requirements. These requirements focused on learning *about* computers, and the computer integration curriculum usually covered the history of computing, basic operating system procedures, programming languages, and keyboarding proficiency. At the same time, many K-12 schools invested in educational games and began implementing instructional learning systems (ILS) for individualized adaptive instruction in order for students to learn from computers (Becker, 2001; Chipman, 1993; Pelgrum, Reinen, & Plomp, 1993; Roblyer, 2006).

By 1989 nearly all schools in the United States were using computers for instruction (Pelgrum et al., 1993). However, from data gathered in 1992 Pelgrum and colleagues discovered that although 95% of U.S. students were using computers at school, only a small percentage of these students were using computers ten or more times in a year for the subject areas of math, science, language arts, or social studies. They inferred from this that learning *about* computers was still more prevalent than learning new content *from* computers.

From 1993 to 2006 the computer-to-student ratio in American schools decreased from 1 to 53 to less than 1 to 4 (Chapter II: Educational Technologies Part G, 1993; U.S. Department of Education, 2006). Two events in the mid and late 1990's contributed to this dramatic increase in school computer access: 1) the growth in the Internet and networked computers (i.e., the World Wide Web), and 2) the enactment of the U.S. Federal Communications Commission's Universal Service Fund for Schools and Libraries – commonly referred to as E-Rate (National Coalition for Technology in Education, 2007). During this same time the argument emerged that computers were best employed as cognitive tools, rather than as intelligent tutors. In other words, the purpose of computer use should be to learn *with* the technology, rather than simply learn *from* the technology (Derry & Lojoie, 1993; Jonassen, 1995; Jonassen, 2000). However, these new expectations for technology integration were not immediately translated into a change in practice. In a national survey of over 4,000 teachers, Becker (2001) found that at school students used computers mainly in four contexts: in computer education courses, in vocational courses, for word processing, and in elementary schools for exploratory activities. Data also showed that the only teachers reporting weekly computer use were computer and business education teachers (Becker). These findings were supported by Russell, Bebell, O'Dwyer, and O'Conner (2003) who, in their study of 2,894 teachers in 22 Massachusetts districts, found that although teachers often used technology for preparation and professional email, they infrequently used technology in the classroom with students. Further evidence was provided by a survey of 3,665 teachers across the U.S. which revealed that 45% of teachers reported their students spent less than fifteen minutes a week using a computer at school, and 25% reported their students never used the Internet at school (Norris, Sullivan, Poirot, & Soloway, 2003).

By the fall of 2003 nearly 100% of American public schools and 94% of instructional classrooms had Internet access, and the computer-to-student ratio in U.S. schools was less than 1 to 4 (National Center for Education Statistics 2006). The increase in access at school has been mirrored by an increase outside of school, and according to recent statistics, 74% of American adults and 93% of American youth between the ages of 12 and 17 use the Internet (Jones & Fox, 2009). As the growth of wireless access, portable devices, "smart" phones and Internet based applications has dramatically changed how people interact with information and with others (Horrigan, 2009), some educators have argued that communication, collaboration, and creativity should now be the focus of technology integration in instruction (Courtney, 2007; Greenhow, 2007; Rollett, Lux, Strohmaier, Dösinger, & Tochtermann, 2007; Solomon & Schrum, 2007). In 2009 The Horizon Report: 2009 K-12 Edition projected that by 2014 schools will have adopted collaborative environments and online communication tools, mobile devices, cloud computing, smart objects, and the personal web (The New Media Consortium, 2009).

Unfortunately, these new technologies and expectations for instructional use may have little impact on how teachers teach and how students learn. Data gathered in the last few years has shown that despite increased access at school and at home, computer use and integration is still low. A school district survey of 479 K-12 teachers (Nelson, 2007) revealed that although there was a 1 to 5 computer-student ratio in the schools 38% of teachers said they "never" or "occasionally" integrated technology. This number is nearly identical to the 39% of K-12 teachers (N = 764) who integrated technology "rarely" or "not at all," as reported by Wozney and colleagues (2006). In a study of 279 K-12 teachers Vannatta (2009) found that while teachers used a computer to send email, take attendance and grades, and create handouts or assessments, most teachers had their students use computers only once or twice a semester.

It must be acknowledged that it takes much time and effort for teachers to keep up and stay current with technological advances and continuously changing expectations. In addition to desktop computers, teacher are now expected to use and manage digital projectors, document cameras, mobile laptop labs, interactive whiteboards, wireless slates and tablet computers, sound and amplification systems, digital cameras, and wireless student response systems. On top of this, districts are rapidly implementing cloud-based productivity applications, digital textbooks, online student and course management systems, on-demand video content, subscription research databases, online tutoring and test preparation, and benchmark testing (Oklahoma State Department of Education, 2009). Even educators with the best intentions may feel overwhelmed by the time and effort involved in constantly learning new hardware and software and then accessing new resources, evaluating, and adapting instruction to take advantage of those emerging technologies. While some might perceive that keeping up with technology is an impossible task, it is also true that many teachers do integrate technology. How are these teachers different from teachers who rarely or only minimally integrate technology? What factors influence a teacher's use and classroom integration of technology?

Barriers and Enablers to Technology Integration

In the technology integration literature many researchers make a distinction between first order barriers and second order barriers (Ertmer, Addison, Lane, Ross, &

Woods, 1999; Ertmer, Ottenbreit-Leftwich, & York, 2006; Hernandez-Ramos, 2005; Levine, 2004; Russell et al., 2003; Sugar & Wilson, 2005), and define first order barriers as extrinsic institutional factors such as lack of resources, time, and support. Second order barriers are defined as personal factors intrinsic to teachers that stand in the way of incorporating technology, and include teacher beliefs about teaching and computers, self-efficacy, and their willingness to change.

Technology integration research has suggested that there is an interaction between first-order barriers and second-order barriers, as external barriers are perceived differently by teachers according to their internal beliefs about students, learning, and the purpose of technology (Ertmer et al., 1999; Ertmer et al., 2006; Levine, 2004). Ertmer et al. (1999) reported that teachers working in the same school environment perceived barriers to technology integration differently, based upon their valuing of technology for student learning and their confidence in using computers. They found that teachers' beliefs about the importance and purpose of computers in education "reduce or magnify the effects of first-order barriers" (p. 55). Similar findings have been reported by Hernandez-Ramos (2005), Russell et al (2003), and Sugar & Wilson (2005). In O'Dwyer, Russell, and Bebell's (2005) study of 1,404 middle and high school teachers, they concluded that "…some teachers find it awkward, challenging, or without merit, to incorporate technology into their curriculum and lessons" and that "...teachers' lack of technology use for instruction and with students seems to emanate from difficulties incorporating technology into their teaching rather than from problems with the available technology or student characteristics" (p. 390).

Teacher characteristics and beliefs can also act as second order enablers. Teachers with more technology knowledge and skills (Becker, 1994; Guha, 2001; Hernandez-Ramos, 2005; Nelson, 2006 Zhao, Pugh, Sheldon, & Byers, 2002) and perceived higher self-efficacy (Guha, 2001; Nelson, 2006) tend to integrate technology more frequently. In a qualitative study of twelve teachers who regularly integrated technology, I found that these teachers valued efficiency, convenience, student motivation and engagement, preparing students for the future, and their own role as an instructional leader and technology advocate (Nelson, 2006). These findings are similar to those by other researchers (e.g., Hadley & Sheingold, 1993; Sandholtz et al., 1997), who found that teachers' belief in the educational value of technology for their students and their commitment to their own development motivated them to spend considerable time and effort learning new skills and integrating technology into their instruction.

Although the barriers to technology integration have been studied for many years (Becker, 1994; Becker, 2000; Butler & Sellbom, 2002; Cuban et al., 2001; Ertmer et al., 1999; Hadley & Sheingold, 1993; Higgins & Russell, 2003; Sandholtz, Ringstaff, & Dwyer, 1997; Zhao et al., 2002), in most cases this research has not been conducted using a theoretical lens. Few technology integration studies have made use of any motivation theory other than vague references to constructivist teaching methods and social learning theory. There is a scarcity of technology integration studies that have used well-established constructs from social cognitive theoretical frameworks because, as Lawless and Pellegrino (2007) stated, "…many researchers used data as a vehicle for developing the direction of the research inquiry rather than allowing the theoretical rationale from the literature to direct the evaluation" (p. 599).

Because the research on second order barriers such as teacher motivation and beliefs is weak, and the need to conduct such research is supported by the themes that emerged from my previous qualitative research, I focused this study on teacher motivational factors that appear to promote or constrain technology integration. I propose that motivation constructs in expectancy-value theory, perceived instrumentality, and prosocial goals could help to explain why some teachers frequently integrate technology in their classroom while others do not.

Motivation and Expectancy-value Theory

Expectancy-value theory is an achievement motivational theory which proposes that people's choice, persistence, and performance can be explained by their beliefs about their ability to be successful at an activity, and the degree to which they value the activity. In Eccles' 1983 model, expectancy for success and subjective task value are hypothesized to directly influence choice. In expectancy-value theory the construct of expectancy combines ability beliefs and expectations for future success. Wigfield and Eccles (2000) have defined ability beliefs as one's beliefs about his/her current ability to do a task, while expectancies were defined as one's beliefs about his/her ability to do a task in the future. In expectancy-value theory expectancies are usually measured at a domain-specific level rather than a global level (Wigfield & Eccles, 2000). Wigfield and Eccles found in their research with young children and adolescents that ability beliefs and expectancies are the strongest predictors of performance (2000).

The value construct in the expectancy-value model is measured via four facets of the subjective task value: attainment value (personal importance), intrinsic value (personal interest), utility value (usefulness for the future or “task fit”), and cost (effort, emotional cost, what must be given up to do the task). Wigfield and Eccles (2000) explain that intrinsic value is synonymous with other researchers’ constructs of interest and intrinsic motivation, and that utility value taps a more extrinsic type of valuing. In other words, one does not have to be intrinsically interested in a task in order for it to be perceived as useful and having value. Utility value has been shown to predict intentions, effort, persistence, performance, and achievement (Vansteenkiste, Simons, Lens, Soenens, Matos, & Lacante, 2004). Scales measuring the expectancy-value constructs of attainment value and cost are often not used due to poor psychometric properties. Previous studies have shown that attainment value items factor together with utility value (DeBacker & Nelson, 1999; Greene et al., 1999; Lubin, 2009), and that expectancy-value cost items do not load together on one factor (DeBacker & Nelson, 1999).

Where Wigfield and Eccles (2000) found that expectancies were most predictive of performance, they found that subjective task values were the strongest predictor of intention and action to continue studying a subject. However, Bong (2001), in a study of 168 Korean female undergraduate education majors, found that task value was a stronger predictor of both performance scores and course enrollment intentions than expectancies.

In a study of 1,404 middle and high school teachers O'Dwyer et al. (2005) found that technology self-confidence was the strongest positive predictor of teachers' use of technology for communication (email), for preparing instruction, and for delivering instruction. In addition, teacher beliefs about the positive impact of technology for students were significant positive predictors of in-class student use of technology and teacher-directed student technology projects.

Russell et al. (2003), who surveyed 2,894 K-12 elementary, science, language arts, math, and social studies teachers found that teacher beliefs about the importance of technology for teaching was the strongest predictor of overall frequency of use of technology, technology use for instructional delivery, and for teacher-directed student use of technology. Teachers' confidence with technology was a predictor of the use of technology for preparation and for delivery of instruction.

In Kellenberger and Hendricks' study of 80 in-service teachers (2003) they found that while technology self-confidence was a significant predictor of personal technology use and technology use for teaching, and teaching with technology efficacy was a significant predictor of teacher-directed student use of technology, only value factors emerged as a significant predictor for all three types of computer use examined.

Wozney and colleagues (2006) used the expectancy-value constructs of expectancy, value, and cost in their study of 764 elementary and secondary teachers. In this study the expectancy construct measured teachers' technology self-efficacy, and teachers' expectancy of success based on the classroom environment and student characteristics. Value was operationalized as how beneficial teachers perceived a technology innovation to be for themselves and for their students. They found that expectancy of success and perceived value were the most important variables in differentiating levels of computer use among teachers, but that cost was not a significant predictor of use.

From the studies described above, it appears that expectancy-value theory can be valuable in predicting how teachers will use technology in teaching. However, based on the findings of my previously discussed qualitative study I believe that the motivation constructs of perceived instrumentality, and the prosocial goals of social concern and social responsibility may explain additional variance in technology integration behaviors.

Empirical evidence has established that perceived instrumentality is important because it helps individuals develop a system of proximal subgoals, and provides incentives for action when the present tasks are perceived as useful for attaining future goals (Miller et al., 1999). Research has also shown that there are positive correlations between perceived instrumentality and future goal value, and that learners who develop proximal subgoals leading to a future goal exhibit increased effort and persistence (Simons,Vansteenkiste, Lens, & Lacante, 2004).

Perceived Instrumentality

Perceived instrumentality is one's perception of how instrumental a specific present task is to a distant but valued future goal. It is a situational perception in that whether one perceives a task as instrumental depends upon the content or nature of the task and upon one's long-term goals (Husman & Lens, 1999; Husman et al., 2007). For example, if a high school student has a future goal of becoming an engineer, they are likely to understand the instrumentality of studying and doing well in their physics classes, even if physics is not intrinsically motivating. Likewise, if a science teacher has a future goal of implementing an open-ended problem-based curriculum which requires students to critically analyze and interpret quantitative data, the teacher will likely understand the instrumentality of becoming proficient in manipulating and displaying data in spreadsheet and graphing software. In relation to expectancy-value theory, the construct of perceived instrumentality is nearly synonymous with utility value, except that utility value has no explicit time perspective (Husman, Derryberry, Crowson, & Lomax, 2004), while perceived instrumentality is relative to a distal goal.

In regards to motivational effect, perceived instrumentality will only have an influence if the path to the future goal is perceived as a contingent path. In a contingent path the tasks are logically connected to each other and each builds on the last, so that doing well at each task along the path is important. If tasks are perceived as disconnected and not logically connected (non-contingent path), they will not be perceived as instrumental to realizing a future goal (Husman & Lens, 1999). For example, if teachers believe that being competent with a piece of software is totally unrelated to whether they will be competent and successful in the future, then the task of learning that software will not be perceived as instrumental.

Prosocial Goals

A category of goals sometimes included in achievement motivation studies are social goals. Social goals are goals that relate to our interactions with others and include constructs such as social affiliation, belongingness, social desirability, social status, moral responsibility, social responsibility, social obligation, and social concern (Ames & Ames, 1984; Anderman & Anderman, 1999; Dowson & McInerney, 2003; Ford & Smith, 2007; Husman & Lens, 1999; Nelson & Debacker, 2008; Wentzel, 1991). Research has shown that students hold multiple academic achievement and social goals (Dowson & McInerney, 2003; Nelson & DeBacker, 2008; Wentzel, Filisetti, & Looney, 2007), and it is reasonable to assume that teachers also hold multiple goals (Wentzel, 1991). In the achievement motivation literature prosocial and socially responsible behavior has been shown to be associated with academic engagement and achievement (Anderman & Anderman, 1999; Wentzel, 1991). It has also been argued that our educational system itself is a prosocial enterprise, with a major goal of socializing children through actively teaching social norms and expectations such as respect for others, interpersonal competence, and moral development (Wentzel, 1991). In this study I was interested in how teachers' beliefs about social responsibility and social concern might influence their decisions to integrate or not integrate technology in their classrooms, and the interrelationships between teachers' social goals and the constructs within expectancy-value theory and perceived instrumentality.

Social responsibility. The goal of social responsibility encompasses social rules and role expectations, and personal commitments to other individuals (Wentzel, 1991), and confers a sense of obligation towards others. For example, Dowson and McInerney (2003) defined social responsibility as "Wanting to achieve academically out of sense of responsibility to others, or to meet social role obligations, or to follow social and moral 'rules'" (p. 100), while Ford and Smith (2007) defined it as "Keeping interpersonal commitments, meeting social role obligations, and conforming to social and moral rules; avoiding social transgressions and unethical or illegal conduct" (p. 157). The present study operationalizes social responsibility as the belief that one has a personal responsibility to help others. A teacher who subscribes to social responsibility as a goal might think to himself "*If teachers don't model and teach appropriate ways to use technology, then who will? This is one of my duties as a teacher*."

Social concern. Another prosocial goal that is sometimes combined with social responsibility is social concern, which reflects a more intrinsic valuing than the construct of social responsibility. In Dowson and McInerney's (2003) study of adolescent students they operationalized social concern as "Wanting to achieve academically to be able to assist others in their academic or personal development" (p. 100). Ford and Smith (2007) named the construct equity and operationalized it as "Promoting fairness, justice, or equality; avoiding unfair or inequitable actions" (p. 157). Kasser and Ryan's Aspirations Index (1993) contains a community contribution category which reflects the idea of social concern and contains items such as "To work for the betterment of society," "To assist people who need it, asking nothing in return," "To work to make the world a better place," "To help others improve their lives" and "To help people in need" (p. 422). Watt and Richardson (2008) called this construct social utility value, which is the desire to make a social contribution, enhance social equity, and shape the future. The present study operationalizes social concern as a desire to help students achieve social justice, equity, and well-being. A teacher who adopts social concern as a goal might say "*Teachers can have an important impact on the digital divide and prepare all students for a digital future*."

As mentioned previously, there are hints in the technology integration literature that teachers' beliefs about the importance of students' use of technology may significantly influence their instructional use of computers and other technologies (Kellenberger & Hendricks, 2003; O'Dwyer et al., 2005; Wozney et al., 2006). In the present study I was interested in exploring this altruistic valuing of instructional technology and its relationships with other motivation variables, and determining if social responsibility and social concern could be practically used as two separate constructs.

Conclusion

The few technology integration studies which have examined teacher technology confidence, expectancy, importance, and valuing of technology suggest that expectancy-value theory can be useful in predicting teachers' technology use. However, based upon my earlier qualitative study of twelve teachers (Nelson, 2006), I believe that additional variables that capture teachers' perceptions of the instrumentality of technology, and beliefs about social responsibility and social concern could explain additional variance in teachers' technology use and integration. In this study I examined the individual and combined contributions of each variable (expectancy, intrinsic value, utility value, perceived instrumentality, social responsibility, social concern) and how the variables were related to each other. Findings from this study may assist professional development educators in targeting messages, strategies, and interventions to promote higher and more consistent levels of technology integration in schools.

CHAPTER 3

Methodology

This study used a correlation design and a self-report questionnaire to gather data from PreK-12 teachers to investigate their motivation to use and integrate technology, using the constructs in expectancy-value theory (Eccles & Wigfield, 2002; Wigfield & Eccles, 2000), perceived instrumentality (Husman & Lens, 1999; Raynor, 1970), and prosocial goals (Dowson & McInerney, 2003; Wentzel, 1991). A correlational study allowed me to examine relationships among and between defined variables and measure the statistical and practical significance of those relationships, and was, therefore, an appropriate research method for the questions investigated (Tabachnick & Fidell, 1996).

The research questions for the current study are:

1. What are the relationships among teachers' technology use (teachers' own technology use at school, and teacher-directed student use) and the motivation variables of expectancy, intrinsic value, utility value, perceived instrumentality, social responsibility, and social concern?

2. Do the motivation variables of utility value, intrinsic value, perceived instrumentality, social responsibility, and social concern explain significant variance in PreK-12 classroom teachers' own technology use and teacher-directed student technology use when controlling for expectancy?

Participants and Context

The participants for this study were PreK-12 public school teachers in the Mid-South United States, ranging from 22 to 70 years of age. All the teachers worked in the same school district in a small city, where 42% of the students qualified for free or reduced lunch. Student enrollment for the district was approximately 14,363, and 938 teachers were employed by the district. The overall student to teacher ratio was 15:1 (National Center for Education Statistics, 2009-2010). Teachers in this district had an average of 12 years experience, and 42% held graduate degrees. The computer to student ratio was 1:5 and every teacher had a desktop computer with standard productivity software (i.e., Microsoft Office), district gradebook software, and Internet access in their classroom. All school sites had wireless Internet access, and at least one computer lab and one mobile laptop lab. The average per pupil expenditure was $6,680.00. This district had a director of instructional technology, a director of information systems, and approximately 20 technology staff, of whom six worked directly with teachers. Bond issues regularly included technology, parent-teacher organizations often purchased computers and other hardware for schools, and an educational foundation provided small grants to teachers to fund technology purchases. Half of the schools in the district had applied for and received competitive technology grants which provided additional hardware and professional development. Technology professional development was on-going throughout the school year, the district offered a wide variety of summer technology workshops, and teachers received incentives such as stipends or computer peripherals for attending these off-contract time workshops.

In this study the participant pool was all the PreK-12 certified classroom teachers in the school district, excluding teachers who taught in a computer lab (i.e., technology education and business teachers). This study included classroom teachers from all grade levels, pre-kindergarten to 12th grade, all certification areas, and all school sites, including alternative education sites, but excluded teachers who regularly taught in a computer lab (i.e., computer education, journalism, business education).

Measures

The instrument for this study was a three-part self-report questionnaire (see Appendix B), delivered online using a Google form. Part one of the questionnaire contained demographic questions about gender, age, grades and subject taught, years of teaching experience, and educational attainment. Part two of the questionnaire measured the frequency of teachers' own technology use and teacher-directed student use of technology, with one end of the six-point scale labeled "never" and the other end labeled "daily" (e.g., I use a computer and other digital technologies to develop instructional materials.). The third part of the questionnaire also used a six-point Likert scale to measure expectancy-value, perceived instrumentality, social responsibility, and social concern, with one end of the scale labeled "strongly disagree" and the other end labeled "strongly agree" (e.g., I can be more efficient when I use a computer.).

The survey consisted of drop down selections to collect demographic data, and single choice radio buttons for the Likert-type items. The technology use items were grouped together on the survey, following the demographic questions. The items for the constructs of intrinsic value, utility value, perceived instrumentality and prosocial goals were distributed in the survey, and seventeen of the items were negatively worded. Although some researchers advise against using negatively worded items (DeVellis, 2003), negative items can encourage participants to actually read and comprehend the survey questions. In addition, after data collection, participant records which showed no variation in the response to items would be easier to identify and remove from the dataset. In the following sections I describe the scales developed for this study, and then the pilot study which was used to refine the scales.

Description of Scales

The criterion variables for this study were Teacher Technology Use and Teacher-directed Student Technology Use, which measured a range of functional purposes and the frequency of that use. The items for these variables assessed the reason or purpose for using technology, rather than a specific technology tool or software application. The items were developed based on a critical review of other instruments (O'Dwyer et al., 2005; Use, Support, and Effect of Instructional Technology Report, 2009; Vannatta & Bannister, 2009; Watts, 2009), and standards, including the International Society for Technology in Education National Educational Technology Standards for Teachers (ISTE NETS, 2008), and the International Society for Technology in Education National Educational Technology Standards for Students (ISTE, 2007). It should be pointed out that the items selected for use in the current study were not an exhaustive list of instructional technology uses, but instead were more general categories of use. In addition, some categories of technology use were not included because their use was already a required element of employment. For example, an item asking about the use of a digital grade book was not included in this scale because the teachers recruited for this sample are required to use a district-adopted grade book and attendance system daily.

Six motivation scales were used in this survey. Three scales were developed to measure the expectancy-value theory constructs of expectancy, intrinsic value, and utility value. One scale was developed to measure perceived instrumentality, and two scales were developed to measure the prosocial goals of social responsibility and social concern. For these scales only the ends of the 6-point Likert scale were labeled, as Strongly disagree (1), and Strongly agree (6).

Teacher Technology Use. Facets of the Teacher Technology Use measure included how often a teacher used technology for professional use (3 items), to prepare instruction (3 items), and for instructional delivery (4 items). Professional use measured how often teachers used technology to communicate with other educators and parents, research educational issues, and to collaborate with other teachers. Preparing instruction examined how often a teacher used technology to find and create instructional materials. Instructional delivery measured how often a teacher used technology for presenting instruction to students, to individualize instruction for students, and to assess student learning.

Teacher-directed Student Technology Use. Seven items were used to measure Teacher-directed Student Technology Use, which measured how often a teacher had their students use technology for various functional purposes such as learning new content, practicing skills, creating products, and communicating with other students. In both technology use measures only the ends of the 6-point Likert scale were labeled, as Never (1), and Daily (6).

Expectancy-value Scales. Expectancy was measured with ten items that ascertained participants' confidence to be successful with general categories of technology use relevant to schools and instruction. This construct was measured at the domain-specific level (e.g., *I am confident that can use technology to modify instruction for students.*). Six items were used to measure the construct of intrinsic value, which measured personal interest and enjoyment of technology (e.g., *I like the challenge of learning new technologies.*). Sixteen items assessed utility value, which measured perceptions of usefulness of technology for teaching and for student learning (e.g., *I am more efficient when I use a computer and other digital technologies; Students can learn concepts and skills faster when they use computers and other digital technologies*.). Items for expectancy, intrinsic value, and utility value were selected and adapted from the Intrinsic Valuing subscale (Miller et al., 1999), the Survey of Attitudes and Acceptance of Technology for Teaching (Watts, 2009), and the Technology Implementation Questionnaire (Wozney et al., 2006).

Perceived Instrumentality. Nine items were initially written to assess whether participants believed that learning and using technology in the present would help them or their students be successful in the distant future. Items for Perceived Instrumentality were adapted from the Perceived Instrumentality subscale of the Approaches to Learning instrument (Greene et al., 2004). The items were reworded for the population of classroom teachers and for the goal of technology use and integration (e.g., *Understanding computers and technology is important for becoming the teacher I want to be; Learning about technology now will help me be successful later in life*).

Social Responsibility and Social Concern Scales. Ten items were written to assess teachers' feelings about their responsibility, obligation, or duty to integrate technology into their instruction (e.g., *I have an obligation to help students become proficient with technology.*). Another ten items gauged how concerned teachers were about issues of equity and quality of life in relation to technology and their students, and society in general (e.g., *It is important that future generations are technologically literate.*). Because there was no appropriate measure for the constructs of social responsibility or social concern for teachers in the area of technology integration, the twenty items for these two scales were developed in consultation with Dr. Raymond Miller, a researcher in the field of motivation.

To check for content validity, the survey items were reviewed by a panel of experts. Two reviewers were practicing technology-using public school teachers. Three reviewers were university professors in the area of educational psychology, all three with K-12 teaching experience. Each reviewer was given a hard-copy of the survey items, which were grouped by theorized construct, with a definition of the construct included. Reviewers were asked to mark items which they thought did not fit the construct or should be rewritten. Space was left for comments and notes beside each item. Based on recommendations from these reviewers, the wording of several items was changed slightly. Additionally, the response options were changed from a 5-point to a 6-point Likert scale in order to increase sensitivity to variance.

In addition to measuring the criterion and predictor variables, demographic data including teaching experience, gender, age, subject area, education, school site, and grade level taught was gathered in order to describe the sample participants.

Pilot Study

Because the instrument in this study had not been used previously, and because several of the theorized constructs have not been measured with PreK-12 public school teachers, a pilot study was first performed to test the psychometric properties of the survey instrument. The participants for the pilot study were drawn from teachers in the school district previously described. A sample size of approximately 100 participants was needed for the pilot study (Osborne & Costello, 2004). After receiving approval from the Institutional Research Board and from the school district, a random number generator was used to select the names of one-hundred and fifty elementary and 150 secondary teachers for the pilot study. These teachers received an email explaining the study and a link to the online survey. The questionnaire was completed by teachers in one sitting, at their convenience. Before responding to the survey items participants were presented with an informed consent page and then clicked a "Continue" button to proceed to the survey. One hundred and twenty teachers out of the 300 solicited for the pilot study completed the survey.

Item-level Inspection and Missing Data. Survey data was downloaded in the Excel file format and examined for irregularities such as duplicate records, empty records, and records with no variation. After examination one record was removed due to lack of variation in this individual's responses. No duplicate or empty records were found. The data was imported into the software Statistical Package for Social Sciences (SPSS 14), and new variables were created for the negatively worded items, which were reverse coded, and the demographic (categorical) data was dummy coded. Descriptive statistics analyses were conducted to examine the dataset for impossible values (e.g., 8 in a 6-point Likert scale), and to check that correlations among variables were in the expected direction based on theory and previous research. No errors were found in the data.

Participant Sample. Of the 119 teachers whose data was retained in the pilot study, 95 (80%) were female and 16 (13%) were male. Eight participants (7%) did not indicate their gender. Fifty-six percent of respondents had a bachelor's degree or better, 43.2% had a master's degree or better, and one person (.08%) had a doctorate. Elementary school teachers made up 44% of the respondents, and 56% were secondary teachers. Teachers between the ages of 21 and 40 made up 44% of respondents, and 55% were over the age of 40. Thirty-seven percent of participants had one to ten years of teaching experience, 36 % had eleven to twenty years experience, and 27% had twenty-one or more years of experience teaching.

Scale Reliabilities. Scale reliabilities were computed for the motivation scales. Cronbach's alpha reliability coefficient and corrected item-total correlations were used to determine the internal consistency of items in a scale, and items whose removal would increase scale reliability were eliminated (DeVellis, 2003; Thorkildsen, 2005). Although initial scale reliabilities were generally acceptable (greater than .70), I felt it was important at this stage of instrument development to strive for very high alphas, as reliability may decrease when the instrument is used on a different sample. More reliable scales will increase the statistical power relative to less reliable scales, which in turn will increase the likelihood of finding statistical significance with a smaller sample size (DeVellis, 2003). In all, twenty-one of the motivation items were removed from the instrument, resulting in a total of forty-one remaining motivation items. Of the twenty-one removed items, twelve were negatively worded and four items, although not negatively worded, expressed a somewhat negative or pessimistic outlook (e.g., *I am worried, I am concerned, I am troubled*). Of the 41 motivation items retained for the main study, seven were negatively worded, and exhibited acceptable corrected item-total correlations in their respective scales. A list of the scales with all retained and removed items, and scale reliabilities, can be found in Appendix A. All the ten items for the criterion variable of Teacher Technology Use, and all the seven items measuring Teacher-directed Student Technology Use were left in the survey, as they were the outcome measures of teachers' frequency of technology use and integration.

Factor Analysis. Although reliability coefficients are important in determining the strength of relationship between items in a scale, this is not necessarily an indication that all the items are measuring the same latent construct (Clark & Watson, 1995; DeVellis, 2003). In order to determine if items were measuring the intended construct, I used principal components analyses (PCA) to examine the dimensionality of the expectancy, intrinsic value, utility value, perceived instrumentality, social concern, and social responsibility scales. PCA is an exploratory factor analysis method which examines the variation and covariation among measurement items, and groups measurement items according to their intercorrelations. It is used to explore underlying latent psychological constructs, and also as an item analysis procedure to determine if items are correlated with the theorized latent construct in a scale. I used the standard Eigenvalue of 1.0, Varimax rotation, and examined scree plots to determine how many factors to retain (Green & Salkind, 2005).

Two of the expectancy-value scales exhibited multidimensionality: Expectancy and Utility Value. Intrinsic Value loaded on one factor, as did Perceived Instrumentality. Factor one for Expectancy contained seven items which accounted for 55.6% of the variance, and factor two contained two items which accounted for 11.2% of the variance. The two items in this second factor were worded the same as the other items in the scale, but asked respondents how confident they felt about using technologies that were more complex than the technologies in factor one. I examined the scree plot and determined that a one factor solution was appropriate. I re-ran the factor analysis, forcing the items to a one-factor solution and found that all the loadings were above the recommended loading of $|.40|$ (Costello & Osborne, 2005).

Factor one for Utility Value contained six items expressing the utility of technology for student learning, and accounted for 50.8% of the variance. The second factor contained five items which measured perceptions of the utility of technology for teaching, and accounted for 9.8% of the variance. However, the rotated component matrix showed high cross-loading on five factors, and in my examination of the scree plot, I determined that a one factor solution was a better fit for this data. I re-ran the factor analyses, forcing the items to a one-factor solution, and found that the loadings all met the criteria of $\geq |.40|$.

Because the items for Social Responsibility and Social Concern were new and untested I wanted to ascertain if there was empirical support for two conceptually similar constructs. A principal components analysis with Oblimin rotation provided the most interpretable factor structure. Although two factors emerged, the items from each originally developed scale did not all load on the intended factor. That is, the five items that made up factor one contained three concern items and two responsibility items, and the five items that made up factor two contained one concern item. After examining the content of the items in each factor, I found that the items did fit with the theorized constructs (see Table 1). Factor one captured a more global concern about teachers as role models and the importance of student technology use, and factor two captured a sense of personal responsibility to help students learn to use technology.

Table 1

Factor Analysis of Social Concern and Social Responsibility Goals

Item	Factor 1	Factor 2
concern27 It is important that girls, minorities, and disadvantaged students have solid technology skills and knowledge.	.891	-.124
concern40 It is important that future generations are technologically literate.	.873	.003
responsibility33 Educators need to keep up with advances in technology.	.839	.043
concern35 Technology knowledge and skills can help students reach their full potential.	.768	.064
responsibility12 Teachers should serve as models for good technology use.	.696	.182
responsibility26R It's not my responsibility to teach students about computers and technology.	-.119	.912
responsibility49 It is my duty to prepare students for the next level of technology use.	-.029	.869
responsibility41 I have an obligation to help students become proficient with technology.	.032	.838
concern48R Being technologically proficient is not that important for some students.	.132	.591
responsibility18 It is important that my students see me using technology for academic purposes.	.288	.557

Factor 1 = Social Concern, Factor 2 = Social Responsibility

Main study

After the survey questionnaire was revised by removing 21 items, district teachers were invited to participate in the main study via email. This time all district classroom teachers – excluding teachers who regularly taught in a computer lab, counselors, and administrators – received an email explaining the study and a link to the online survey. The email questionnaire was sent to a total of 912 teachers in the school district. Because I was concerned about low participation rates, I added a gift certificate incentive (four randomly selected gift certificates) for participation, which was approved by the University of Oklahoma Institutional Review Board. An additional question was added to the beginning of the survey, which asked participants if they had completed the pilot study questionnaire. If they responded “Yes”, they were presented with the option of registering for the gift certificate. In other words, these teachers did not complete the survey again. Teachers who responded “No” were directed to the survey, and at the end of the survey was a link to the gift certificate registration. Eighty-four teachers responded to the questionnaire administered for the main study, and a total of fifty-five teachers registered for the gift certificates.

Item-level Inspection and Missing Data. Survey data was downloaded in the Excel file format and examined for irregularities such as duplicate records, empty records, and records with no variation. No duplicate, empty, or non-varying records were found. However, after examining the demographic data five cases were removed, as these secondary level teachers had marked computer education, journalism, or business education as their teaching assignment. The data was then imported into the software Statistical Package for Social Sciences (SPSS 14), the same variables names were given as for the Pilot Study data, negatively worded items were reverse coded, and the demographic (categorical) data was dummy coded. Descriptive statistics analyses were conducted to examine the dataset for impossible values and to check that correlations among variables were in the expected direction based on theory and previous research. Based on visual inspection of several scatterplots – and then confirmed with stem and leaf and boxplots – I identified one case as an outlier. Using the Cook's Distance statistic and linear regression analyses I found that this one case fell three standard deviations below the mean. This individual scored extremely high on all the motivation variables – except for expectancy – and extremely low on Teacher Technology Use and Teacher-directed Student Technology Use. As this outlier could have a substantial effect on the regression analyses, it was removed from the dataset, resulting in an N of seventy-eight.

Main Study Sample. Of the seventy-eight participant records retained in the second round of data gathering, 87% were female, 8% were male, and 5% did not report their gender. Sixty-three percent of respondents had a Bachelor's degree or better, 33% had a Master's degree or better, and three teachers (4%) had a doctoral degree. Fifty-one percent of the teachers were between the ages of 21-40 and 49% were 41 and older. Elementary school teachers made up 55% of the respondents, and 44% were secondary teachers. Fifty-one percent of participants had one to ten years of teaching experience, 32 % had eleven to twenty years experience, and 17% had twenty-one or more years of teaching experience. In comparison with the pilot study sample, the main study sample was younger, with fewer years of education and teaching experience, and these teachers also taught younger students.

Sample Used in Analyses. Because of a low response to the second request for participation, and because none of the items had been reworded, no items had been added to the survey, and the survey methodology remained the same, the data from the pilot study was combined with the main study. A larger sample size was a better representation of the district, and would improve the generalizability of the results of the study. With six independent variables, the sample of 197 teachers who responded provided an acceptable number of cases to detect a medium effect size in a regression analysis. This number is based on recommendations for regression analysis where N = 50 + 8P, where P = the number of predictor variables, and power analysis recommendations (Green, 1991). In addition, the sample size for this study is consistent with similar research (e.g., DeBacker & Nelson, 1999; Miller et al., 1999; Husman et al., 2004).

CHAPTER 4

Results

The purpose of this study was to investigate the motivations of PreK-12 teachers to use and integrate technology at school. This chapter describes the results of descriptive statistics, scale properties, factor analyses, correlations among the variables, and results of regression analyses.

Descriptive Statistics

Of the 197 cases retained in this study, 50% were elementary teachers, and 50% were secondary teachers. Eighty-nine (89%) were female and 11% were male. Forty-eight percent (48%) of the teachers were 21 to 40 years of age, and 52% were 41 years of age or older. Forty-four percent (44%) of the teachers had one to ten years of teaching experience, 34% had eleven to twenty years of experience, and 22% had more than twenty years of teaching experience. Fifty-nine percent (59%) of the teachers had a Bachelor's degree or better, while 41% had a Master's degree or better. See Table 2 for a more detailed view of this data.

To identify how teachers were using technology I graphed the overall item means for both Teacher Technology Use and Teacher-directed Student Technology Use (see Figures 1 and 2). To investigate how technology use might differ by academic level, I sorted the data by elementary and secondary teachers, and graphed the item means for both Teacher Technology Use and the Teacher-directed Student Technology Use (see Figures 3 and 4).

Table 2

Demographic frequencies (N=197)

Grade level		Years of teaching	
PreK-2nd	20.4%	1-5	21.5%
3rd-5th	17.3%	6-10	22.6%
PreK-5th	12.2%	11-15	14.4%
6th-8th	23.5%	16-20	20.0%
9th-12th	24.5%	21-25	9.7%
6th-12th	2.0%	26-30	6.7%
		30+	5.1%
Age range		**Education attainment**	
21-30	18.9%	Bachelor's degree	32.1%
31-40	29.1%	Bachelor's plus	27.0%
41-50	28.1%	Master's degree	24.5%
51-60	20.9%	Master's plus	14.3%
60+	3.1%	PhD or EdD	2.0%

Note: Bachelor's plus and Master's plus indicates that the participant has additional graduate hours or multiple degrees.

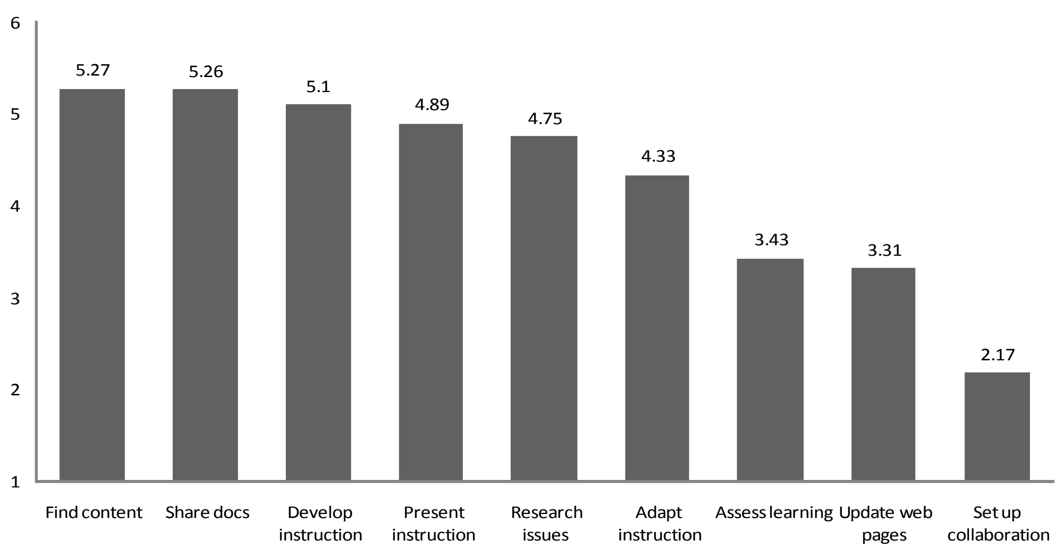


Figure 1: Teacher Technology Use (1 = Never; 6 = Daily)

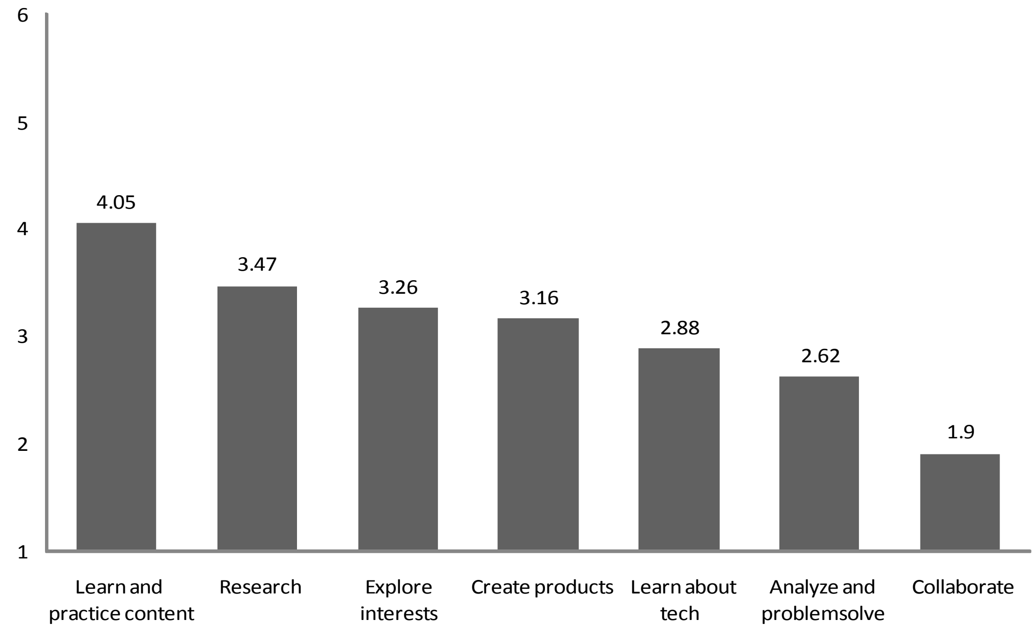


Figure 2: Teacher-directed Student Technology Use (1 = *Never*; 6 = *Daily*)

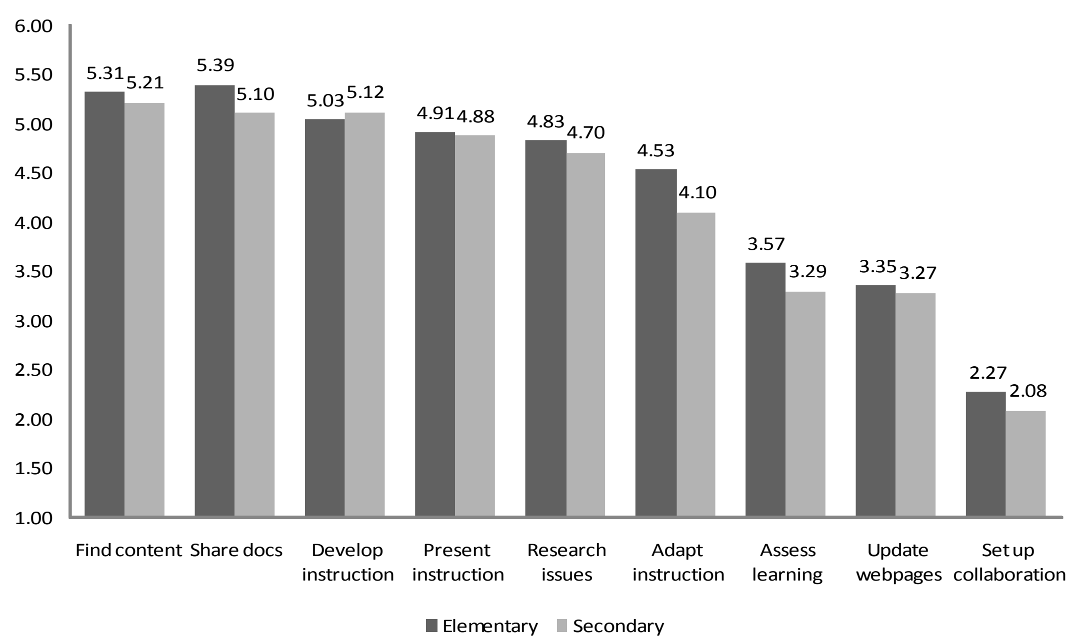


Figure 3: Teacher Technology Use by Academic Level (1 = *Never*; 6 = *Daily*)

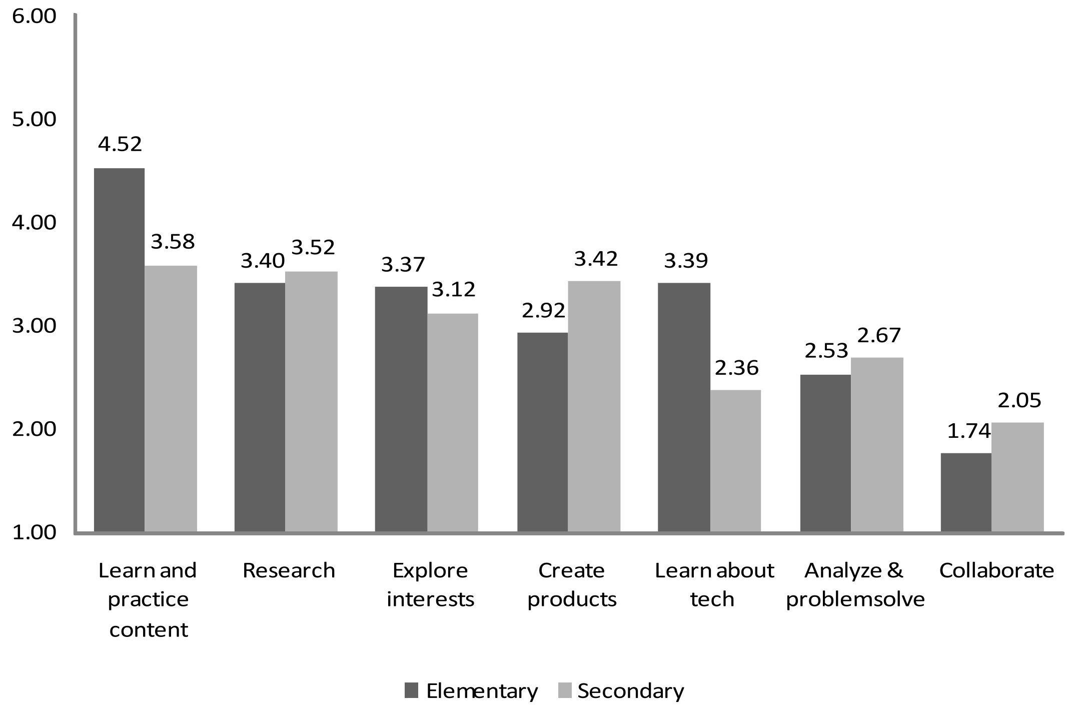
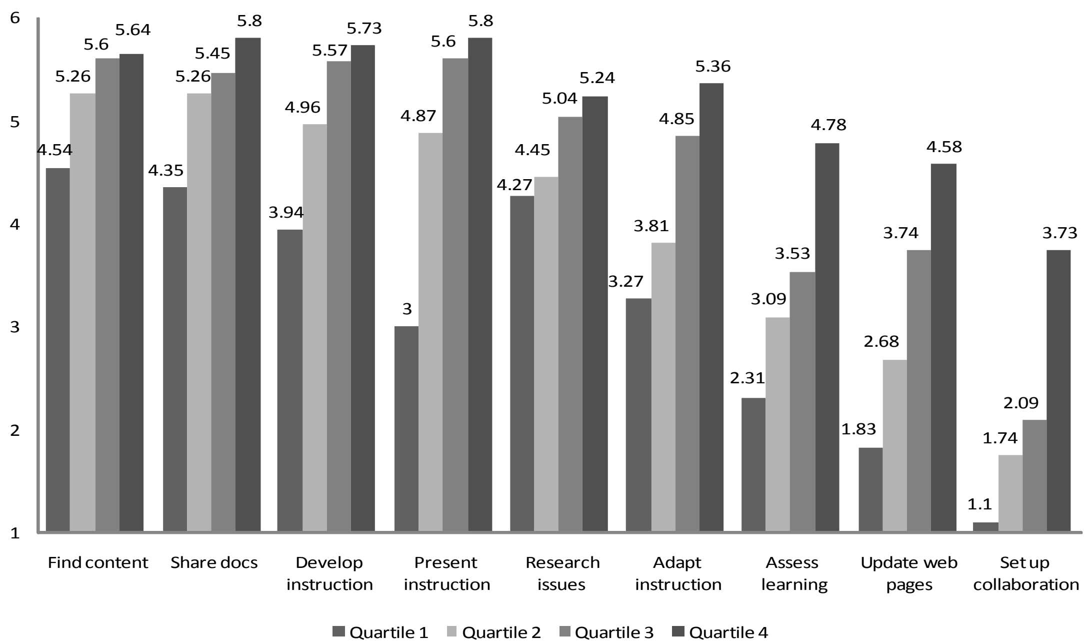


Figure 4: Teacher-directed Student Technology Use by Academic Level
(1 = *Never*; 6 = *Daily*)

To examine how an individual's overall total score for the outcome variables of Teacher Technology Use and Teacher-directed Student Technology Use related to their pattern of technology use, I created sum score variables, sorted and labeled cases by quartiles, and then compared the means of each respective quartile on all of the Teacher Technology Use items, and all the Teacher-directed Students Technology Use items. I did this in order the answer the question "If a teacher had a high sum score for Teacher Technology Use, did that mean they used some types of technology daily and others none at all? Or did it indicate that they used all types of technology fairly frequently?" For both Teacher Technology Use and Teacher-directed Student Technology Use, as the overall sum score increased, the mean for each item in each quartile also increased (see

Figures 5 and 6). This indicates that teachers with a high total score for Teacher Technology Use tend to use all types and functions of technology at a higher rate than teachers with a lower total score. This finding also holds true for Teacher-directed Student Technology Use. That is, teachers who have a high total score for Teacher-directed Student Technology Use tend to have their students use all types and functions



at a higher rate than teachers with a lower total score.

Figure 5: Teacher Technology Use by Summed Score Quartile (1 = *Never*; 6 = *Daily*)

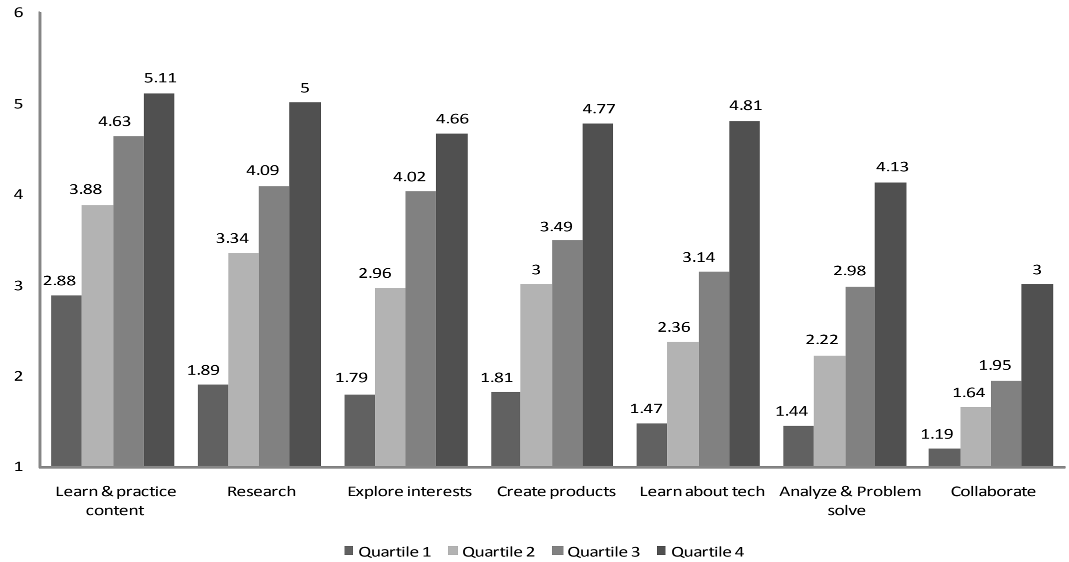


Figure 6: Teacher-directed Student Technology Use by Summed Score Quartile (1 = *Never*; 6 = *Daily*)

Scale Properties

Scale reliabilities and item descriptive statistics for the combined samples were examined to check for normality, and one item was removed from the Teacher Technology Use scale: *I use a computer and other digital technologies to communicate with other educators and parents*. This item, which essentially measured email use, exhibited a ceiling effect, with a mean of 5.90 in a 6-point scale. It also had a high negative skew (Skewness = - 4.691) and extreme kurtosis (kurtosis = 25.799). The mean for the outcome variable Teacher Technology Use – based on a 6-point scale where 1 was equal to Never, and 6 was equal to Daily – was 4.24. The mean for Teacher-directed Student Technology Use was 3.02. The standard deviation for Teacher-directed Student Technology Use was higher than that for Teacher Technology Use (1.059; 0.763), indicating that there was more variation in participants' responses. The means for the motivation variables, based on a 6-point scale, were moderately high, with Social Responsibility exhibiting the lowest mean (4.85) and Perceived Instrumentality exhibiting the highest mean (5.49).The six motivation scales demonstrated acceptable internal consistency (see Table 3).

Table 3

Motivation Scales Statistics

Scale	# of items	Mean	*SD*	Alpha
Expectancy	9	5.02	.855	.862
Intrinsic Value	5	5.32	.810	.851
Utility Value	11	4.94	.762	.889
P. Instrumentality	6	5.49	.673	.879
Soc. Concern	5	5.48	.684	.881
Soc. Responsibility	5	4.85	.965	.832

Note: N = 197

Motivation variables. I performed a principal axis factor analysis with Varimax rotation on all the motivation scales (see Tables 4, 5, 6, 7, and 8). An examination of the scree plots for Expectancy and Utility Value indicated that a one-factor solution was appropriate. The combined social goals of Social Concern and Social Responsibility again factored out in the same manner. In Table 8 Factor 1 represents Social Concern, and Factor 2 represents Social Responsibility.

Table 4

Factor Loadings for Expectancy

Item	Factor
I am confident that I can present instruction to students using a computer and other digital technologies.	.834
I am confident that I can develop instructional materials and resources using computers and other digital technologies.	.796
I am confident that I can find appropriate online resources for my lessons and instruction.	.747
I am confident that I can use technology to modify instruction for students.	.733
I am confident that I can setup and manage an online collaboration tool (e.g., wiki, discussion group, Google Docs, Moodle, etc.).	.707
I am confident that I can learn how to use new classroom technologies that the district provides in the future.	.690
I am confident that I can create and update a class web page, or blog, or Moodle course.	.658
I am confident that I can use a computer to research educational issues.	.658
I am confident that I can use a computer to share documents and collaborate with other educators.	.632

Table 5

Factor Loadings for Utility Value

Item Factor	
Computers and other digital technologies help me improve the quality of my instruction.	.789
I am more efficient when I use a computer and other digital technologies.	.781
Computers and other digital technologies are valuable instructional tools.	.757
Integrating technology is a low priority for me.	.741
Students have a better attitude towards school when technology is integrated into instruction.	.718
Students produce higher quality work when they use computers and other digital technologies.	.708
Computers and other digital technologies make it easier to individualized instruction for my students.	.705
Students' use of computers and digital technologies at school does not increase their academic achievement.	.672
Students can learn concepts and skills faster when they use computers and other digital technologies.	.650
Students learn less when they use computers and other digital technologies in a lesson or assignment.	.579
Integrating technology takes time away from more important learning.	.438

Table 6

Factor Loadings for Intrinsic Value

Item	Factor
I find it personally satisfying to use technology in my teaching.	.869
I like the challenge of learning new technologies.	.851
I'm interested in learning as much as I can about technology.	.844
I get excited when I learn how to do new things on the computer.	.843
I am not interested in computers and other digital technologies.	.540

Table 7

Factor Loadings for Perceived Instrumentality

Item	Factor
Learning about technology now will help me be successful later in life.	.859
Understanding computers and technology is important for becoming the teacher I want to be.	.835
Being proficient with technology in the present will help me in the future.	.775
Things I learn now about technology will help me learn new technologies five years from now.	.774
Technology proficiency is becoming more critical for students' future success.	.774
Learning about technology now will benefit students after they graduate and get jobs.	.734

Table 8

Factor Loadings for Prosocial Goals

Item	Factor	
	1	2
It is important that future generations are technologically literate.	.831	.284
Educators need to keep up with advances in technology.	.809	.311
It is important that girls, minorities, and disadvantaged students have solid technology skills and knowledge.	.795	.138
Teachers should serve as models for good technology use.	.757	.305
Technology knowledge and skills can help students reach their full potential.	.754	.321
It's not my responsibility to teach students about computers and technology.	.126	.829
It is my duty to prepare students for the next level of technology use.	.237	.826
I have an obligation to help students become proficient with technology.	.334	.770
It is important that my students see me using technology for academic purposes.	.489	.592
Being technologically proficient is not that important for some students.	.286	.544

Factor 1 = Social Concern, Factor 2 = Social Responsibility

Measures of Central Tendency and Normality

I used bivariate scatterplots of variable pairs chosen at random to check for linearity and found no curvilinear relationships nor violations of normality in the residual error scatterplots. I examined variable descriptive statistics and distributions to analyze skewness and kurtosis, which were within acceptable ranges. The skewness for the motivation variables was negative, indicating that a large majority of the participants scored on the high end of the Likert scale: Expectancy (Skewness = -.917), Intrinsic Value (Skewness = -1.541), Utility Value (Skewness = -.931), Perceived Instrumentality (Skewness = -1.712), Social Responsibility (Skewness = -.930), Social Concern (Skewness = -1.731). Teacher Technology Use had a slightly negative skew (Skewness = -.276), and Teacher-directed Student Technology Use had a slightly positive skew (Skewness = .208).

Kurtosis for the motivation variables ranged from .475 to 3.286: Expectancy (kurtosis = .475), Intrinsic Value (kurtosis = 2.541), Utility Value (kurtosis = .665), Perceived Instrumentality (kurtosis = 3.286), Social Responsibility (kurtosis = .994), Social Concern (kurtosis = 2.755). Both of the criterion variables had slightly negative kurtosis: Teacher Technology Use (kurtosis = -.537), Teacher-directed Student Technology Use (kurtosis = -.341).

Zero-order Correlations

Research question one investigated the relationships among teachers'4e technology use and the motivation variables of Expectancy, Utility Value, Intrinsic Value, Perceived Instrumentality, Social Responsibility, and Social Concern. I used

Pearson's product-moment correlation to examine the relationships between all the variables in the study (see Table 9).

Table 9

Pearson Product-Moment Correlations

Variable	1	2	3	4	5	6	7	8
1. Teacher Tech Use	-							
2. Teacher-directed Student Tech Use	.561	-						
3. Expectancy	.597	.429	-					
4. Intrinsic Value	.514	.304	.550	-				
5. Utility Value	.534	.363	.558	.804	-			
6. P. Instrumentality	.399	.230	.509	.818	.802	-		
7. Soc. Responsibility	.443	.353	.451	.607	.776	.662	-	
8. Soc. Concern	.408	.237	.463	.793	.807	.871	.650	-

Note: All correlations are significant at $p < 0.01$, two-tailed.

All the technology use and motivation variables (Expectancy, Intrinsic Value, Utility Value, Perceived Instrumentality, Social Responsibility, Social Concern) were positively and significantly correlated at $p < 0.01$.

Regression Analyses

To answer the second research question, "Do the motivation variables of Utility Value, Intrinsic Value, Perceived Instrumentality, Social Responsibility goals, and

Social Concern goals explain significant variance in the technology integration behaviors of PreK-12 classroom teachers when controlling for Expectancy?", Teacher Technology Use and Teacher-directed Student Technology Use were each regressed on the motivation variables of Expectancy, Intrinsic Value, Utility Value, Perceived Instrumentality, Social Responsibility, and Social Concern. Squared multiple correlations, beta weights, and squared semi-partial correlations for the motivation variables are reported in Table 10 and Table 11. Model 1 in Table 10 and Table 11 shows main effects when Expectancy is entered in the first step of the model, and Model 2 shows main effects when the other motivation variables are added in step two of the analysis.

Table 10

Multiple Regression Results for Teacher Technology Use

Variable	B	SE B	β	*p*	sr^2
Step 1					
(Constant)	1.705	.270		.000	
Expectancy	.505	.053	.562	.000	.316
Step 2					
(Constant)	1.306	.371		.001	
Expectancy	.348	.061	.387	.000	.102
Intrinsic Value	0.26	.091	.285	.005	.026
Utility Value	0.22	.108	.214	.047	.013
Instrumentality	-.268	.128	-.243	.037	.014
Soc. Concern	-.036	.123	-.033	.771	.000
Soc. Responsibility	0.08	.063	.107	.193	0.005

Note: R^2 = .316 for Step 1. R^2 change = .088. R^2 = .405 for Step 2.

Expectancy as a predictor of Teacher Technology Use was statistically significant, R^2 = .316, $F(1, 195) = 90.234$, $p < .001$. The addition of all the other motivation variables in step two of the analysis was also significant, R^2 = .405, $F(5, 190) = 5.630$, $p < .001$, accounting for another 8.8% of the variance. Intrinsic Value (p =

.005), Utility Value (*p* = .047), and Perceived Instrumentality (*p* = .037) emerged as significant predictors of unique variance for Teacher Technology Use.

Table 11

Multiple Regression Results for Teacher-directed Student Technology Use

Variable	B	SE B	β	*p*	sr^2
Step 1					
(Constant)	.429	.427		.316	
Expectancy	.515	.084	.403	.000	.162
Step 2					
(Constant)	.527	.605		.385	
Expectancy	.385	.100	.301	.000	.075
Intrinsic Value	.139	.149	.106	.352	.004
Utility Value	.288	.177	.200	.105	.011
Instrumentality	-.290	.208	-.184	.166	.008
Soc. Concern	-.210	.200	-.136	.295	.004
Soc. Responsibility	.235	.103	.214	.024	.021

Note: R^2 = .162 for Step 1. R^2 change = .059. R^2 = .221 for Step 2.

Expectancy was a significant predictor of Teacher-directed Student Technology Use, $R^2 = .162$, $F(1, 195) = 37.175$, $p < .001$. The addition of the other motivation variables in step two of the analysis was significant for Teacher-directed Student

Technology Use, R^2 = .221, $F(5, 190)$ = 2.852, p = .017, accounting for another 5.9% of the variance. Other than Expectancy, only Social Responsibility (p = .024) was a significant predictors of unique variance.

The results of the regression analyses showed that when controlling for Expectancy the variables of Intrinsic Value, Utility Value, Perceived Instrumentality, Social Responsibility, and Social Concern explained significant variance in teachers' technology use at school and in how they have their students use technology. These findings will be discussed further in Chapter 5.

CHAPTER 5

Discussion

The purpose of this study was to investigate the relationships among teachers' technology integration behaviors and the theoretically defined constructs of expectancy-value (Eccles & Wigfield, 2002; Wigfield & Eccles, 2000), perceived instrumentality (Husman & Lens, 1999; Raynor, 1970), social responsibility, and social concern (Dowson & McInerney, 2003; Ford & Smith, 2007; Wentzel, 1991). Of special interest was the question of whether the predictor variables would explain significant variance in teachers' technology use and teacher-directed student technology use when controlling for expectancy. Though expectancy-value theory has been used in other technology integration studies, perceived instrumentality, social concern, and social responsibility have rarely, if ever, been employed to explain teachers' motivation to use technology.

The results of this study showed that when controlling for expectancy teachers' self-reported perceptions of intrinsic value, utility value, perceived instrumentality, social responsibility, and social concern do explain significant variance in their technology use at school and in how they have their students use technology. However, the individual predictor variables performed differently between Teacher Technology Use and Teacher-directed Student Technology Use. The findings of the current study seem to suggest that while expectancy-value theory and perceived instrumentality are useful in predicting teacher's own use of technology, the addition of the construct of social responsibility may be helpful in understanding why teachers facilitate their students' use of technology. This chapter will proceed with a review of the findings, followed by a summary of this study's limitations, and then a discussion of the implications for technology professional development and research.

Descriptive Patterns of Technology Use

The two outcome variables, Teacher Technology Use and Teacher-directed Student Technology Use, both measured a range of technology uses that regularly occur in school settings. The patterns of reported teacher technology use in this study conformed to my expectations, and aligned with similar research (National Center for Education Statistics, 2009; Nelson, 2007; Sipila, 2011; Wozney et al., 2006; Zhao & Frank, 2003). In the present study teachers reported frequent use of well-established technologies such as email and looking for instructional materials on the Internet, and infrequent use of relatively new technologies such as online collaboration tools. A comparison of teachers' use based on quartiles of summed Teacher Technology Use items demonstrated that these patterns held true for teachers at each level. That is, "high use" teachers in the 4th quartile used technology in the same way as teachers in the lower quartiles, they just used it more frequently. Comparing teachers' own technology use by grade level groups revealed that there was little difference in how teachers at elementary and secondary schools use technology.

The patterns of Teacher-directed Student Technology Use were also consistent with my expectations and previous research (Gray, Thomas, & Lewis, 2010; Nelson, 2007; Zhao & Frank, 2003). The teachers in this sample had students use technology somewhat frequently to learn new content, research topics, and explore their own interests, occasionally to create products and learn about technology, but rarely to analyze data or communicate and collaborate. The patterns of Teacher-directed Student Technology Use did differ by grade levels. Teachers of younger students were more likely to have their students use technology to learn new content and learn about technology than create products, or collaborate with technology.

Teacher-directed Student Technology Use occurred less frequently than Teacher Technology Use, which was not unexpected. After all, every teacher in this district has a desktop computer on their desk, but for students to use a computer, a lab or laptop cart must be reserved by the teacher, sometimes weeks in advance. It is likely that more convenient and higher-density access to computers for students would result in higher means for Teacher-directed Student Technology Use.

Relationships Among Predictor and Criterion Variables

The positive correlations among the motivation variables in this study were consistent with previous research that examined expectancy-value theory and perceived instrumentality (DeBacker & Nelson, 1999; Greene et al., 1999; Miller et al., 1999), and similar technology integration research (O'Dwyer et al., 2005; Wozney et al., 2006). The high means for these variables with this sample suggest that the teachers in this district have mostly positive perceptions of their own abilities in using technology and the value of technology use in education. The low variance for most of these variables also indicates that the teachers in this sample are, as a group, quite consistent in their valuing of technology for both their own use, and for student use.

Results of the regression analyses indicated that when controlling for Expectancy, as a group the motivation variables of Utility Value, Intrinsic Value, Perceived Instrumentality, Social Responsibility, and Social Concern explained a small but significant amount of variance in both Teacher Technology Use (8.8%) and Teacher-Directed Student Technology Use (5.9%). The best predictors of teachers' own frequent use of technology at school were teachers' Expectancy when using the technology, their Intrinsic Value of the technology, their perceptions of the Utility Value of technology, and their Perceived Instrumentality of technology. On the other hand, for Teacher-directed Student Technology Use, only Expectancy and Social Responsibility emerged as individual predictors contributing significant unique variance. Below I discuss the findings in greater detail.

Expectancy. Overall, teachers' expectancy – or confidence – in using technology was high, with a mean of 5.02. As anticipated based on previous research (Becker, 2001; Kellenberger & Hendricks, 2003; Russell et al., 2003; Wozney et al., 2006), teachers' perception of their own technology self-efficacy, or expectancy, was found to explain a large amount of variance in Teacher Technology Use (31.6%), and a moderate amount of variance in Teacher-directed Student Technology Use (16.2%), and was the strongest predictor of both types of technology use. In this study it was apparent that the more confidence a teacher had with technology the more likely they were to use it themselves and assign student activities.

Intrinsic Value. Although Intrinsic Value was moderately correlated with Teacher Technology Use and was a significant predictor for that outcome in the present study, it was weakly correlated with and not a significant predictor of Teacher-directed Student Technology Use. As evident by the high mean for this variable (5.32), the teachers in this sample appear to enjoy and have a strong interest in technology which had an influence on their personal use, yet this interest had little impact on how frequently they had their students use technology.

Utility Value. As was true for Intrinsic Value, Utility Value had a high mean (4.94), and was even more strongly correlated with Intrinsic Value, Perceived Instrumentality, Social Responsibility, and Social Concern than was Intrinsic Value. Likewise, it was also a significant predictor of Teacher Technology Use, showing that the more useful teachers believed technology to be for teaching and learning, the more often they used it themselves.

Perceived Instrumentality. In this study Perceived Instrumentality exhibited the highest mean (5.49) and the lowest variance of all the variables. It also had the lowest correlations with Teacher Technology Use and Teacher-directed Student Technology use. It seems obvious that the teachers in this sample – regardless of how frequently they used technology themselves or had their students use technology – were nearly unanimous in their belief that it would be instrumental to future success. Given the rapid growth in digital and Internet access worldwide, it might be hard to find people who believe that computers and other digital technologies are a passing fad with little importance for learning, career, and daily functioning (International Telecommunications Union, 2011; Internet World Stats, 2011).

In the Teacher Technology Use regression analysis Perceived Instrumentality emerged as a significant predictor, but its negative beta weight and partial and semi-partial correlation was an indication that it was having a suppressor effect. A suppressor is a variable that typically has a weak correlation with the criterion, but is correlated to another predictor or set of predictors. The suppressor variable improves the prediction by controlling for irrelevant variance – i.e., unspecified variables (Pedhazur, 1997). To examine this suppressor effect I ran the regression again with Perceived Instrumentality removed from the second step, and found that the beta weights of both Intrinsic Value and Utility Value decreased. In other words, while Perceived Instrumentality had a moderate correlation with Teacher Technology Use, it was strongly correlated with both Intrinsic Value and Utility Value, and its inclusion improved the prediction of the model.

In the present study Perceived Instrumentality and Utility Value – closely related constructs – both emerged as significant predictors for Teacher Technology Use, which supports other researchers' claims that measuring perceptions of the future – Perceived Instrumentality, future time perspective, future goals, or future utility – can be useful for explaining behavior, decision-making, and motivation (Hardré, Crowson, DeBacker, & White, 2007). Perceived Instrumentality and Utility Value explained almost equal unique variance in Teacher Technology Use (.118 and .112). This suggests that Perceived Instrumentality is tapping a future-time utility that is different from Utility Value. One could speculate that some teachers may be more focused on future utility than present utility (*I'm not sure how useful this is for me right now, but I know*

I'm going to need it in the future.). Miller and Brickman (2004) have suggested that future-oriented goals, rather than proximal goals, may in some cases be the most compelling reasons for engaging in academic tasks.

Social Concern. Social Concern exhibited a high mean (.548) and low variance almost identical to Perceived Instrumentality and a moderate zero-order correlation with Teacher Technology Use, but it had a very weak zero-order correlation with Teacher-directed Student Technology Use. The teachers in this sample were in close agreement that technology can improve one's quality of life, and that all students should have access to technology skills and knowledge. However, that belief had little influence on whether or not they had their students use technology frequently. It is interesting to note that Social Concern was more highly correlated with Perceived Instrumentality, Utility Value, and Intrinsic Value, than it was with the theoretically similar Social Responsibility.

Even though Social Concern had a negative sign for its beta weights and its partial and semi-partial correlations, it performed differently from Perceived Instrumentality in the regression model. Virtually all of its variance was shared with other predictor variables, and it had practically no unique variance with the outcome variables. When I removed Social Concern from the Teacher-directed Student Technology Use regression it had negligible effect on the amount of variance accounted for in the model, but its removal increased the unique variance explained by Perceived Instrumentality so that it became a significant predictor. Although Perceived Instrumentality and Social Concern are two theoretically distinct constructs – one measuring future utility and the other measuring prosocial goals – based on the data in this study there is reason to suspect that they were, for all practical purposes, measuring the same latent variable.

Social Responsibility. Social Responsibility, although not a significant predictor of Teacher Technology Use, was the only individually significant predictor of Teacher-directed Student Technology Use when controlling for Expectancy. Of all the motivation variables, Social Responsibility had the lowest mean and the highest variance. The classroom teachers in this sample were apparently not in agreement as to their responsibility to teach students how to use technology for academic purposes. As you may recall, none of the teachers in this sample taught computer education, business, journalism, or computer programming.

It is unclear why teachers may or may not feel responsible to teach their students how to use technology based on the data from this study. One explanation is that in this district teachers are encouraged but not required to have their students use technology. There is no prescribed or even suggested technology curriculum nor scope and sequence for grade levels or subject areas, and students are not formally assessed on their technology knowledge or skills (except in secondary-level computer education courses). Also, teachers are not formally assessed on their technology knowledge and skills, and formal evaluations on teachers' use and integration of technology is left to the discretion of each school principal. In other words, the social norms and role obligations for technology use are vague and inconsistent.

It could also be that the interaction of beliefs about the utility value and instrumentality of technology affects attitudes towards responsibility. In this sample, Social Responsibility was strongly correlated with Utility Value and moderately to Perceived Instrumentality. A high agreement with Social Responsibility may in part be a reflection of a teacher's belief that technology is useful for learning the content they teach, and is therefore something for which they are responsible. Conversely, a low agreement with the Social Responsibility measure may reflect a teacher's belief that technology use is not especially useful for their subject domain (i.e., irrelevant, developmentally inappropriate, inefficient), and they should not be expected to teach it. In addition, other factors not examined in this study, such as school culture, instructional leadership, belongingness and professional identity may impact teachers' beliefs about their responsibility for teaching and integrating technology.

The results of the present study support previous motivation research that has examined expectancy-value theory and perceived instrumentality. The inclusion of prosocial constructs, especially social responsibility, adds a new dimension to technology integration and motivation research. There is evidence in this study that suggests that teachers who do believe that integrating technology into student activities and assignments is their duty, obligation, and responsibility tend to create opportunities for their students to use technology more frequently.

Limitations of the Study

There are several limitations in the present study which should be noted. The first limitation to this study concerns the design of the survey instrument. The measurement instrument was developed and tested on a rather homogeneous sample of teachers, all teaching in the same school district. It is possible that these items and scales would have performed differently with a more diverse population – teachers from inner-city, underfunded school districts and from rural districts where classes are smaller but resources are fewer. Therefore, the generalizability of this study is limited to similar large urban school districts.

A second limitation to this study has to do with the nature of anonymous, voluntary, self-report surveys and the context/timing of the survey administration. Because the questionnaire was voluntary, teachers who rarely use technology may have been reluctant to participate. If that were true, then the data in this study may paint a rosier picture of this districts' teachers' expectancy, values, perceived instrumentality and social responsibility and concern than in fact really exists. On the other hand, a more diverse data set with more variability may have resulted in more significant findings. In addition, the second round of data gathering the participant questionnaire had a poor return rate of 10.6%, perhaps a result of "technology fatigue" due to the fact that immediately preceding the second survey distribution, nearly half of this district's teachers received a substantial influx of technology in their classroom, which was accompanied by several half-days of training. Teachers who received this hardware, software, and training may have felt overwhelmed, panicked, or irritated about responding to one more questionnaire. Somewhat related to the previous point, it could also be that participants' responses to items were affected by social desirability bias (Podsakoff, MacKenzie, & Lee, 2003). That is, even though the questionnaire was completely anonymous, participants may have felt the need to respond in a manner which would reflect well upon the school district and its teachers, especially since the schools had just received a significant amount of technology hardware. To remedy to these limitations it would be advisable to survey a larger and more diverse number of teachers, from different school districts and even other countries, and to have several rounds of data gathering spread throughout the school year.

A third limitation to this study is that I made no attempt to control for school site contextual factors and the rather nebulous concept of "access to technology." As discussed in Chapter 2, teachers' perception of how much access they and students have, and the barriers to that access, are influenced by their own beliefs about the importance and purpose of technology in schools. At the time this data was gathered, individual schools and teachers did not have identical access to technology. However, in this district there was at least one computer in every classroom, and at every school there was access to an open lab, several carts of laptop computers, wireless Internet throughout, and various technologies for check-out – projectors, student response clickers, interactive whiteboards, digital cameras, document cameras, wireless slates, etc. Furthermore, all staff in this district had access to on-going workshops, just-in-time help, and an experienced technical support staff. However, that being said, it should be acknowledged that teachers who have easier access to technology are also more likely to use technology with their students daily. To control for teacher and student access to technology a scale could be developed and then entered in the first step of a regression analysis, or one could only survey teachers and classrooms that had the same hardware and software.

Implications for Professional Practice

The first point to be made should come as no surprise. A teachers' perception of how successful they are with technology is the best predictor of personal use and teacher-directed student technology use. No one, especially an adult with a responsibility towards students, wants to waste time, embarrass themselves, or lose control of a rowdy group of student by fumbling around with a piece of hardware or software. I believe this indicates that as more digital devices and software applications are introduced into schools, high-quality on-going technology training, mentoring, and support needs will likely increase. Although there is a general perception that young teachers enter the classroom with more technology skills and confidence than older teachers, they quickly find themselves hard-pressed to keep up with advances in technology while also mastering their curriculum and classroom management (Lei, 2009; Russell et al., 2003). Those who suggest that teachers and students together can solve technology problems as they go along probably do not have a grasp of the intricacies of school networks and the variety of technologies teacher are expected to use. Only a teacher who has very high technology expectancy would be willing to take the risk of "figuring it out" on the fly with their students. Technology professional development and training will continue to be a critical factor in increasing and maintaining teachers' technology expectancy, which then has the most influence on teacher-directed student technology use.

Secondly, if schools wish to fully realize the benefits of technology for learning, then all teachers – or at least a large majority – must perceive that having students use technology for learning is an important part of their teaching responsibility. This will require school systems to do more than give teachers technology tools and encouragement, and then proclaim that they are responsible for helping students learn to use technology. In order to have all teachers integrate technology more frequently and consistently there must be reasonable and clearly articulated expectations for use, and lessons, tools, and strategies specific to the content domains. To advance and support teachers' sense of responsibility, teachers have to feel that the technology activities they assign are intimately related to the content and skills their students need in a subject area, and are tied to significant and measurable content objectives. On the part of educational institutions, this process of defining and developing these measureable objectives will be more effortful than simply giving teachers an interactive whiteboard, iPad, webcam, or Google Apps for Education account. Furthermore, because technology changes rapidly, this process of aligning content objectives with technology use will need to be continuous and reiterative.

Implications for Future Research

This study and previous research has established that expectancy-value theory can be useful in understanding teachers' motivation to use technology. Additionally, the results of the present study suggest that perceived instrumentality and prosocial variables may also play a role in teachers' technology integration behaviors. Future research should explore in greater detail how teachers' perceptions of technology's instrumentality, and their beliefs about social responsibility and social concern are related to other motivation constructs such as social affiliation and belongingness, as well as contextual factors such as district curricular goals and instructional leadership. A large-scale intervention study with longitudinal data might be able to reveal how motivation changes when new expectations and norms are implemented, and how these variables play out by categorical groups – i.e., elementary and secondary teachers, by educational attainment, and by subject area. Another research need in the area of technology integration is an examination of the nature of the instruction. In the present study the criterion variable was based on frequency of technology use, not on how well it was used. In the future, a mixed-method design should consider how various motivation variables might affect the quality of teachers' technology use and integration.

Summary and Conclusion

This study provides empirical evidence that teachers' expectancy for success, intrinsic interest, perceptions of utility and instrumentality, and beliefs about social responsibility and social concern help to explain their own use of technology, and how frequently they have their students use technology for academic work. For instructional leaders these results underscore the need for continuous growth and training with instructional technologies, and also the need for shared expectations for academic use. Further research is necessary to understand how these motivations are related to other cognitive and social factors in the context of instruction and schools.

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APPENDIX A

Scales

Note: Items in italics were removed from the scales.

Expectancy

1. I am confident that I can use a computer to share documents and collaborate with other educators.
2. I am confident that I can use a computer to research educational issues.
3. I am confident that I can find appropriate online resources for my lessons and instruction.
4. I am confident that I can develop instructional materials and resources using computers and other digital technologies (e.g., clickers, digital cameras, interactive whiteboards, etc.).
5. I am confident that I can use technology to modify instruction for students.
6. I am confident that I can present instruction to students using a computer and other digital technologies.
7. I am confident that I can create and update a class web page, or blog, or Moodle course.
8. I am confident that I can setup and manage an online collaboration tool (e.g., wiki, discussion group, Google Docs, Moodle, etc.).
9. I am confident that I can learn how to use new classroom technologies that the district provides in the future.
10. *I am confident that I can use a computer to communicate with other educators and parents.*

Intrinsic Value

1. I'm interested in learning as much as I can about technology.
2. I get excited when I learn how to do new things on the computer.
3. I like the challenge of learning new technologies.

4. I find it personally satisfying to use technology in my teaching.
5. I am not interested in computers and other digital technologies.
6. *I am not interested in integrating technology into my teaching.*

Utility Value

1. Integrating technology is a low priority for me.
2. Computers and other digital technologies make it easier to individualized instruction for my students.
3. I am more efficient when I use a computer and other digital technologies.
4. Students have a better attitude towards school when technology is integrated into instruction.
5. Students learn less when they use computers and other digital technologies in a lesson or assignment.
6. Students produce higher quality work when they use computers and other digital technologies.
7. Students' use of computers and digital technologies at school does not increase their academic achievement.
8. Students can learn concepts and skills faster when they use computers and other digital technologies.
9. Computers and other digital technologies are valuable instructional tools.
10. Computers and other digital technologies help me improve the quality of my instruction.
11. Integrating technology takes time away from more important learning.
12. *Integrating technology makes it difficult to cover the curriculum I teach.*
13. *Students are more engaged and on-task when they use computers and other digital technologies.*
14. *Technology in the classroom distracts students from important learning.*

15. *Student management software makes record-keeping more convenient.*

16. *Integrating technology makes classroom management more difficult.*

Perceived Instrumentality

1. Being proficient with technology in the present will help me in the future.
2. Understanding computers and technology is important for becoming the teacher I want to be.
3. Things I learn now about technology will help me learn new technologies five years from now.
4. Technology proficiency is becoming more critical for students' future success.
5. Learning about technology now will benefit students after they graduate and get jobs.
6. Learning about technology now will help me be successful later in life.
7. *What I'm learning to do with technology now probably won't be useful in five years.*
8. *The technology activities students do now will have little impact on whether they are successful in the future.*
9. *Because technology changes so quickly, it is a waste to spend much time teaching students how to use technology.*

Social Responsibility

1. It is important that my students see me using technology for academic purposes.
2. It's not my responsibility to teach students about computers and technology.
3. I have an obligation to help students become proficient with technology.
4. Being technologically proficient is not that important for some students.*
5. It is my duty to prepare students for the next level of technology use.
6. *Teachers shouldn't be expected to integrate technology.*

7. *Students will pick up all the technology skills they need in other classes.*
8. *Students will pick up all the technology skills they need outside of school.*
9. *I am troubled that PreK-12 education is not keeping up with advances in technology.*

* This item was originally developed for the Social Concern scale.

Social Concern

1. Teachers should serve as models for good technology use.*
2. It is important that girls, minorities, and disadvantaged students have solid technology skills and knowledge.
3. Educators need to keep up with advances in technology.*
4. Technology knowledge and skills can help students reach their full potential.
5. It is important that future generations are technologically literate.
6. *Technology helps level the playing field for many students.*
7. *Some students only need basic computer technology skills.*
8. *I am concerned that some students may not have the opportunity to learn technology skills and concepts.*
9. *Technology proficiency is not going to make a difference in some students' lives.*
10. *I am worried that some students are graduating without essential technology knowledge and skills.*
11. *I am concerned that some students may not be learning critical technology skills and concepts.*

* These items were originally developed for the Social Responsibility scale.

Teacher Technology Use

1. *I use a computer and other digital technologies to communicate with other educators and parents.*

2. I use a computer and other digital technologies to research educational issues.

3. I use a computer and other digital technologies to share documents and collaborate with other educators.

4. I use a computer and other digital technologies to find instructional content and resources.

5. I use a computer and other digital technologies to update my class web page(s), blog, or Moodle course.

6. I use a computer and other digital technologies to develop instructional materials.

7. I use a computer and other digital technologies to adapt or individualize instruction for students.

8. I use a computer and other digital technologies to present instruction to students (e.g., using a projector, interactive whiteboard, wireless slate, student response clickers, etc.)

9. I use a computer and other digital technologies to assess student learning (e.g., student response clickers, online quizzes, benchmark testing, etc.).

10. I use a computer and other digital technologies to set up online communication and collaborative spaces for students (discussion forums, email, chat, blogs, wikis, Google Docs, etc.).

Teacher-directed Student Technology Use

1. I have my students use computers and other digital technologies to explore their own interests.

2. I have my students use computers and other digital technologies to learn about computers and technology (e.g., computer literacy and skills, keyboarding).

3. I have my students use computers and other digital technologies to learn or practice new content (e.g., computer tutorials, games and simulations, read online text, view online video, use SuccessMaker, etc.).

4. I have my students use computers and other digital technologies to research topics and information (e.g., Internet, CD-ROM, databases).

5. I have my students use computers and other digital technologies to create products (e.g., reports, publications, presentations, audio, video, graphics).

6. I have my students use computers and other digital technologies to analyze and solve complex problems (e.g., plan, gather, organize and analyze data and information).

7. I have my students use computers and other digital technologies to communicate and collaborate (e.g., discussion forums, email, chat, blogs, wikis, Google Docs, etc.).

APPENDIX B

Survey Instrument

Technology Use and Perceptions Survey

What is your main teaching assignment grade level? [▾]

What is your gender? [▾]

What is your age range? [▾]

How many years of teaching experience do you have? [▾]

What is the highest level of education you have attained? [▾]

What subject areas do you currently teach? Please check all that apply.

- ☐ Language Arts/English
- ☐ Reading
- ☐ Mathematics
- ☐ Science
- ☐ Social Studies
- ☐ Foreign Language
- ☐ PE/Health
- ☐ Music
- ☐ Art
- ☐ Media/Journalism
- ☐ Business/Marketing
- ☐ Computer Education
- ☐ Speech/Drama
- ☐ Library Media
- ☐ Resource/Special Education
- ☐ Gifted &Talented
- ☐ ELL

- ☐ Family & Consumer Science
- ☐ Voc Ag
- ☐ Other: ______

Teacher use of technology

Read each question carefully and select the number which corresponds with how often you use technology. The numbers indicate your frequency of use, from Never to Daily.

1. I use a computer and other digital technologies to communicate with other educators and parents.

	1	2	3	4	5	6	
Never	○	○	○	○	○	○	Daily

2. I use a computer and other digital technologies to research educational issues

	1	2	3	4	5	6	
Never	○	○	○	○	○	○	Daily

3. I use a computer and other digital technologies to share documents and collaborate with other educators.

	1	2	3	4	5	6	
Never	○	○	○	○	○	○	Daily

4. I use a computer and other digital technologies to find instructional content and resources.

	1	2	3	4	5	6	
Never	○	○	○	○	○	○	Daily

5. I use a computer and other digital technologies to update my class web page(s), blog, or Moodle course.

	1	2	3	4	5	6	
Never	○	○	○	○	○	○	Daily

6. I use a computer and other digital technologies to develop instructional materials.

	1	2	3	4	5	6	
Never	○	○	○	○	○	○	Daily

7. I use a computer and other digital technologies to adapt or individualize instruction for students.

	1	2	3	4	5	6	
Never	◯	◯	◯	◯	◯	◯	Daily

8. I use a computer and other digital technologies to present instruction to students (e.g., using a projector, interactive whiteboard, wireless slate, student response clickers, etc.)

	1	2	3	4	5	6	
Never	◯	◯	◯	◯	◯	◯	Daily

9. I use a computer and other digital technologies to assess student learning (e.g., student response clickers, online quizzes, benchmark testing, etc.).

	1	2	3	4	5	6	
Never	◯	◯	◯	◯	◯	◯	Daily

10. I use a computer and other digital technologies to set up online communication and collaborative spaces for students (discussion forums, email, chat, blogs, wikis, Google Docs, etc.).

	1	2	3	4	5	6	
Never	◯	◯	◯	◯	◯	◯	Daily

Student use of technology

Read each question carefully and select the number which corresponds with how often you have your students use technology. The numbers indicate the frequency of use, from Never to Daily.

1. I have my students use computers and other digital technologies to explore their own interests.

	1	2	3	4	5	6	
Never	◯	◯	◯	◯	◯	◯	Daily

2. I have my students use computers and other digital technologies to learn about computers and technology (e.g., computer literacy and skills, keyboarding).

	1	2	3	4	5	6	
Never	◯	◯	◯	◯	◯	◯	Daily

3. I have my students use computers and other digital technologies to learn or practice new content (e.g., computer tutorials, games and simulations, read online text, view online video, use SuccessMaker, etc.).

	1	2	3	4	5	6	
Never	○	○	○	○	○	○	Daily

4. I have my students use computers and other digital technologies to research topics and information (e.g., Internet, CD-ROM, databases).

	1	2	3	4	5	6	
Never	○	○	○	○	○	○	Daily

5. I have my students use computers and other digital technologies to create products (e.g., reports, publications, presentations, audio, video, graphics).

	1	2	3	4	5	6	
Never	○	○	○	○	○	○	Daily

6. I have my students use computers and other digital technologies to analyze and solve complex problems (e.g., plan, gather, organize and analyze data and information).

	1	2	3	4	5	6	
Never	○	○	○	○	○	○	Daily

7. I have my students use computers and other digital technologies to communicate and collaborate (e.g., discussion forums, email, chat, blogs, wikis, Google Docs, etc.).

	1	2	3	4	5	6	
Never	○	○	○	○	○	○	Daily

Technology confidence

Read each question carefully and select the number which corresponds with how closely you agree with the statement.

1. I am confident that I can use a computer for administrative purposes such as attendance, grades, and other record-keeping.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

2. I am confident that I can use a computer to communicate with other educators and parents.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

3. I am confident that I can use a computer to share documents and collaborate with other educators.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

4. I am confident that I can use a computer to research educational issues.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

5. I am confident that I can find appropriate online resources for my lessons and instruction.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

6. I am confident that I can develop instructional materials and resources using computers and other digital technologies (e.g., clickers, digital cameras, interactive whiteboards, etc.).

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

7. I am confident that I can use technology to modify instruction for students.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

8. I am confident that I can present instruction to students using a computer and other digital technologies.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

9. I am confident that I can create and update a class web page, or blog, or Moodle course.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

10. I am confident that I can setup and manage an online collaboration tool (e.g., wiki, discussion group, Google Docs, Moodle, etc.).

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

11. I am confident that I can learn how to use new classroom technologies that the district provides in the future.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

Perceptions and beliefs related to technology

Please read each question carefully and select the number which corresponds with how closely you agree with the statement.

I'm interested in learning as much as I can about technology.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

Integrating technology makes it difficult to cover the curriculum I teach.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

Integrating technology is a low priority for me.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

Students are more engaged and on-task when they use computers and other digital technologies.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

I am troubled that PreK-12 education is not keeping up with advances in technology.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

Being proficient with technology in the present will help me in the future.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

Teachers shouldn't be expected to integrate technology.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

I get excited when I learn how to do new things on the computer.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

Computers and other digital technologies make it easier to individualized instruction for my students.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

Technology in the classroom distracts students from important learning.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

What I'm learning to do with technology now probably won't be useful in five years.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

Teachers should serve as models for good technology use.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

Technology helps level the playing field for many students.

	1	2	3	4	5	6	
Strongly disagree	○	○	○	○	○	○	Strongly agree

Students will pick up all the technology skills they need in other classes.

	1	2	3	4	5	6

Strongly disagree ○ ○ ○ ○ ○ ○ Strongly agree

I am more efficient when I use a computer and other digital technologies.

1 2 3 4 5 6

Strongly disagree ○ ○ ○ ○ ○ ○ Strongly agree

I like the challenge of learning new technologies.

1 2 3 4 5 6

Strongly disagree ○ ○ ○ ○ ○ ○ Strongly agree

Students have a better attitude towards school when technology is integrated into instruction.

1 2 3 4 5 6

Strongly disagree ○ ○ ○ ○ ○ ○ Strongly agree

It is important that my students see me using technology for academic purposes.

1 2 3 4 5 6

Strongly disagree ○ ○ ○ ○ ○ ○ Strongly agree

The technology activities students do now will have little impact on whether they are successful in the future.

1 2 3 4 5 6

Strongly disagree ○ ○ ○ ○ ○ ○ Strongly agree

Some students only need basic computer technology skills.

1 2 3 4 5 6

Strongly disagree ○ ○ ○ ○ ○ ○ Strongly agree

Because technology changes so quickly, it is a waste to spend much time teaching students how to use technology.

1 2 3 4 5 6

Strongly disagree ○ ○ ○ ○ ○ ○ Strongly agree

Understanding computers and technology is important for becoming the teacher I want to be.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

Students learn less when they use computers and other digital technologies in a lesson or assignment.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

I find it personally satisfying to use technology in my teaching.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

Student management software makes record-keeping more convenient.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

It's not my responsibility to teach students about computers and technology.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

It is important that girls, minorities, and disadvantaged students have solid technology skills and knowledge.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

Things I learn now about technology will help me learn new technologies five years from now.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

Students produce higher quality work when they use computers and other digital technologies.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

I am not interested in computers and other digital technologies.

1 2 3 4 5 6

Strongly disagree ○ ○ ○ ○ ○ ○ Strongly agree

Students' use of computers and digital technologies at school does not increase their academic achievement.

1 2 3 4 5 6

Strongly disagree ○ ○ ○ ○ ○ ○ Strongly agree

Technology proficiency is becoming more critical for students' future success.

1 2 3 4 5 6

Strongly disagree ○ ○ ○ ○ ○ ○ Strongly agree

Educators need to keep up with advances in technology.

1 2 3 4 5 6

Strongly disagree ○ ○ ○ ○ ○ ○ Strongly agree

Students will pick up all the technology skills they need outside of school.

1 2 3 4 5 6

Strongly disagree ○ ○ ○ ○ ○ ○ Strongly agree

Technology knowledge and skills can help students reach their full potential.

1 2 3 4 5 6

Strongly disagree ○ ○ ○ ○ ○ ○ Strongly agree

I am concerned that some students may not have the opportunity to learn technology skills and concepts.

1 2 3 4 5 6

Strongly disagree ○ ○ ○ ○ ○ ○ Strongly agree

Integrating technology makes classroom management more difficult.

1 2 3 4 5 6

Strongly disagree ○ ○ ○ ○ ○ ○ Strongly agree

Students can learn concepts and skills faster when they use computers and other digital technologies.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

Computers and other digital technologies are valuable instructional tools.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

It is important that future generations are technologically literate.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

I have an obligation to help students become proficient with technology.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

Technology proficiency is not going to make a difference in some students' lives.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

Computers and other digital technologies help me improve the quality of my instruction.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

Learning about technology now will benefit students after they graduate and get jobs.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

I am not interested in integrating technology into my teaching.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

I am worried that some students are graduating without essential technology knowledge and skills.

1 2 3 4 5 6

Strongly disagree ◯ ◯ ◯ ◯ ◯ ◯ Strongly agree

Integrating technology takes time away from more important learning.

	1	2	3	4	5	6	
Strongly disagree	◯	◯	◯	◯	◯	◯	Strongly agree

Being technologically proficient is not that important for some students.

	1	2	3	4	5	6	
Strongly disagree	◯	◯	◯	◯	◯	◯	Strongly agree

It is my duty to prepare students for the next level of technology use.

	1	2	3	4	5	6	
Strongly disagree	◯	◯	◯	◯	◯	◯	Strongly agree

I am concerned that some students may not be learning critical technology skills and concepts.

	1	2	3	4	5	6	
Strongly disagree	◯	◯	◯	◯	◯	◯	Strongly agree

Learning about technology now will help me be successful later in life.

	1	2	3	4	5	6	
Strongly disagree	◯	◯	◯	◯	◯	◯	Strongly agree