

**Self-Directed Learning: A Potential Predictor for Technology Integration among
K-12 Teachers**

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DEDICATION

This work is dedicated to my husband,

Andrew,

who has spent the last four and a half years

helping me to get through my program.

He has been not only supportive, but encouraging

as well as inspirational.

I also dedicate this work to my unborn daughter,

Kathryn,

though she might not know it,

she has spent the last nine months with me

working and stressing to get this done!

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ABSTRACT

The purpose of this study was to investigate the relationship between technology integration and self-directed learning readiness among K-12 teachers in one large southeastern school district. The intent was to determine the extent to which self-directed learning might predict the level of technology integration. In this study, the *Levels of Teaching Innovation (LoTi)* (Moersch, 2010) instrument was utilized to measure the level of technology integration (Technology Integration), current instructional practices (CIP), and personal computer use (PCU) of K-12 teachers. Additionally, the *Self-Directed Learning Readiness Scale (SDLRS)* (Guglielmino, 1977) was employed to measure self-directed learning readiness in K-12 teachers.

To conduct this study, one large, southeastern K-12 school district was chosen as the population. Of this population, 15 schools agreed to participate, 10 elementary schools, four middle schools, and one high school. Of these 15 schools, 722 teachers were contacted and 135 responded. Analysis was conducted to investigate the relationships between the major variables of self-directed learning readiness, levels of technology integration, current instructional practices, and personal computer use. Demographic variables of age, experience, grade level, and subject area also were examined.

This study revealed that self-directed learning readiness has both a significant relationship with and is a predictor of levels of technology integration and current instructional practices, two of the three factors of teaching innovation. Additionally the study showed that elementary teachers have higher levels of current instructional practices, which means they are more likely to utilize student-centered learning activities,

than their secondary counterparts. Finally, the results of the study showed that personal computer use had no significant relationship with other variables, indicating that the age of the user and the comfort level of the user have no bearing on their level of self-direction in using technology. Thus, the major significance of this study is that self-directed learning is a predictor, though a weak model, of teaching innovation and therefore professional development in schools should focus more on self-directed learning when trying to integrate technology.

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CHAPTER 1

INTRODUCTION TO THE STUDY

Research over the last 10 years has shown that K-12 students learn differently now than they did in the past (Ahlfeld, 2010; Baylor & Ritchie, 2002; Kopcha, 2010; Mandell, Sorge & Russell, 2002). Students are engaging in the use of technology, television, and cell phones outside of school walls. Research has suggested that education, therefore, should emulate technological changes in our society (Javeri & Persichitte, 2007). Because not all teachers have embraced the notion of integrating technology into the classroom, there is potentially a growing gap between how teachers teach and how students learn. To close this gap and increase student engagement and ultimately student achievement, teachers and administrators feel pressure to integrate technology in their classrooms (Baylor & Ritchie, 2002). This pressure comes from the students themselves, as well as parents, administration, and especially state and national standards.

The International Society for Technology in Education (ISTE) has national standards for technology integration in the classroom for teachers, students and administrators. ISTE's hope is that teachers will become better prepared to integrate technology in the classroom for the purpose of increasing student engagement and achievement (International Society for Technology in Education, 2008). Technology integration is not only a national standard, but states have followed suit by requiring or encouraging technology integration. For example, the current evaluation process used by the state of Tennessee, which is based on research involving best practices in teaching, includes technology and multimedia use in the classroom as one of the descriptors on the

instructional rubric (Tennessee State Department of Education, 2011). Additionally, technology has been shown to increase test scores and student engagement in schools across the nation (National Education Association, 2011; Middleton & Murray, 1999; Norris, Sullivan, Poirot & Soloway, 2003), particularly for students in economically disadvantaged subpopulations (Bashara, 2008).

Technology integration, for the purpose of this study, refers to the teachers' and students' use of technology during a lesson to enhance student learning. It does not refer to the simple use of technology in the classroom, for administrative purposes—such as checking email—but the deliberate use of technology for enhancing student achievement and learning in the instruction of a lesson. The technology standards brought about by ISTE and incorporated into evaluations in various states include *instructional use* of technology in the classroom, not just *use* of technology in the classroom. While only one word separates these two definitions, the word *instructional* is very important as it is the key to identifying the type of technology integration that increases student achievement and is the intended measure of the technology integration variable for this study. Instruction signifies that the teachers as well as the students are utilizing the technology in a manner that enhances student learning. For this to be the case, the teacher must integrate technology, instruct in a student-centered learning environment, and have knowledge of the technology he or she is using.

With newer technology standards in place, K-12 teachers might be more aware that technology integration within the classroom is necessary for student achievement. However, evidence shows that “educators are often resistant to using computer technology in the classroom” (Christensen, 2002, p. 412). Researchers who have

investigated technology integration in K-12 environments have discovered that technology has not been integrated to the level that it could be (Bauer & Kenton, 2005; Eteokleous, 2008; Groff & Mouza, 2008; Gulbahar, 2007; Norris et al., 2003; Rowe, 2009; Russell, Bebell, & O'Dwyer, 2004; Zhao & Bryant, 2005). Specifically, technology is “often poorly integrated with other classroom instructional activities” (Lawless & Pellegrino, 2007, p. 580) and teacher access to technology “does not necessarily lead to its more widespread classroom use” (Wozney, Venkatesh, & Abrami, 2006, p. 176).

In addition to the literature on this subject, through personal observation as a Curriculum and Technology Integration Facilitator, the researcher has noted an inconsistency in technology integration among K-12 teachers in one small, southeastern school district. As shown from the literature discussed above and from personal observation, many teachers who have not had extensive formal training and one-to-one attention tend to be resistant to technology integration. However, some teachers thrive on integrating technology in the classroom. Those who integrate more technology have, from observation, a tendency to learn the technology on their own and overcome some of the struggles of technology without oversight from administration. Because of these noted characteristics, it is possible that these teachers who integrate more technology have higher levels of self-directed learning readiness.

Statement of the Problem

There is a substantial body of research indicating that technology integration is imperative to student growth and achievement (Bashara, 2008; Middleton & Murray, 1999; National Education Association, 2011; Norris, et al., 2003). However, there is a

gap in the literature related to the concept of teaching innovation, which incorporates technology integration and factors that support it (i.e., personal computer use and current instructional practices) and how teachers operationalize the learning of technology. These factors might explain why teachers are not integrating technology as well as they could be. The concept of teaching innovation includes not only technology integration but also how and to what level it is integrated; parts of the process that often are not addressed in research surrounding technology integration, but that are a necessary component of the definition of technology integration.

The gap that exists in the literature on teaching innovation also includes the component of the teacher as a learner. The components of teaching innovation might be more easily integrated if teachers understood themselves as learners of technology and how they operationalize their learning. This study fills this gap in the literature by investigating the correlation between technology integration, measured through teaching innovation, and self-directed learning, one way teachers might operationalize or approach learning technology.

Purpose of the Study

The purpose of this study was to investigate the relationship between technology integration and self-directed learning readiness among K-12 teachers in one large southeastern school district. The intent was to determine the extent to which self-directed learning might predict the level of teaching innovation. In this study, the *Levels of Teaching Innovation (LoTi)* (Moersch, 2010) instrument was employed to measure the level of technology integration (Technology Integration), current instructional practices (CIP), and personal computer use (PCU) of K-12 teachers. Additionally, the *Self-*

Directed Learning Readiness Scale (SDLRS) (Guglielmino, 1977) was utilized to measure self-directed learning readiness in K-12 teachers. These two instruments provided the information important to the study. Additional demographic variables also were analyzed, including age, experience, grade level, and subject area of each K-12 teacher. Incorporating these additional demographic variables helped to identify more precisely which variables were the strongest predictors of teaching innovation among K-12 teachers.

Research Questions

One of the instruments utilized in this study, *LoTi*, does not provide a single score for teaching innovation. So that each factor of the teaching innovation variable could be properly correlated to the other variables of the study, a large number of research questions were developed. They include the following:

1. Is there a significant relationship between self-directed learning readiness and the factors of teaching innovation: levels of technology integration (TI), current instructional practices (CIP), and personal computer use (PCU) among K-12 teachers?
2. Is there a significant relationship between teacher age and years of experience and the factors of teaching innovation (TI, CIP, and PCU) and self-directed learning readiness among K-12 teachers?
3. Are there significant differences between self-directed learning readiness and TI, CIP, and PCU among elementary versus secondary grade level teachers?
4. Are there significant differences between self-directed learning readiness and TI, CIP, and PCU among different subject areas taught by K-12 teachers?

5. To what extent does the combination of self-directed learning readiness and other demographic variables predict the three factors of teaching innovation?

Conceptual Framework

In research on technology integration, various studies have included professional development, or the lack thereof, as a variable related to how teachers learn technology. For example, Inan and Lowther (2010a) conducted a study of 379 teachers in which they correlated teacher readiness to technology integration. Inan and Lowther's (2010a) study included, within the teacher readiness variable, how the teachers were prepared for technology use, but the preparation only focused on formal professional development opportunities that were provided by the district. Having the teachers use a self-directed method to prepare themselves was not considered in their study. Yet, self-direction also might be a factor related to technology integration. The Inan and Lowther (2010a) study sets the groundwork for this investigation into the possibility of using self-directed learning as a way for K-12 teachers to learn technology. The concept for the current study was self-directed learning readiness as a possible indicator of how teachers learn and integrate technology.

Self-Directed Learning Readiness

Self-directed learning readiness is based on the concept of self-directed learning and was first introduced in 1977 by Lucy Guglielmino when she developed the *Self-Directed Learning Readiness Scale* (SDLRS). The purpose of the SDLRS is to identify and measure a person's level of readiness for self-directed learning based on personality characteristics and skills as a learner. The goal of the SDLRS is to foster self-directed learning in all learners, to help institutions and teachers better understand self-directed

learning, and to help self-directed learners better understand themselves (Guglielmino, 1977). The characteristics of a person who has high levels of self-directed learning readiness are as follows: “(1) the features that allow individuals to be in control of their own learning, (2) to seek learning tasks that fit their needs, and (3) to understand the importance of learning” (Guglielmino, 1977, p. 73). According to Knowles (1975), adults are self-directed in areas of their lives outside of learning; for example, in the workplace, family life, and maintaining a home. Adults often prefer to learn in a self-directed manner, therefore, it is reasonable to assume that K-12 teachers might exhibit some level of self-directed learning readiness. The magnitude of this level of readiness could be a predictor of the level of technology integration in the classroom.

Technology Integration

Technology integration involves teachers using technology in their classrooms as a teaching and learning tool for increasing student achievement. This is a more in-depth use of technology than simply performing administrative tasks, such as sending email messages. It involves planning for the use of technology in a lesson designed to teach a learning objective. According to the National Educational Technology Standards for Teachers (NETS-T), which is part of ISTE, teachers must meet five standards regarding technology in the classroom: “(a) facilitate and inspire student learning and creativity, (b) design and develop digital-age learning experiences and assessments, (c) model digital-age work and learning, (d) promote and model digital citizenship and responsibility, and (e) engage in professional growth and leadership” (International Society for Technology in Education, 2008, p. 1). The integration of technology in the classroom involves more than simply using it in the classroom. According to Earle (2002),

Integrating technology is not about technology—it is primarily about content and effective instructional practices. Technology involves the tools with which we deliver content and integrate practices in better ways. Its focus must be on curriculum and learning. Integration is defined not by the amount or type of technology used, but by how and why it is used. (p. 7)

The level of technology integration in the classroom is a phenomenon that is often hard to measure because the pure use of technology does not necessarily equal technology integration, as evidenced by the NETS-T standards and Earle's (2002) assertions. According to Moersch (2010), in order for technology integration to be effective, a learner-centered environment, as opposed to a teacher-centered environment, must exist. This type of environment includes instructional practices that enable the teacher to be a facilitator instead of a presenter. Additionally, a teacher's personal computer use or their confidence and competence with a computer needs to be sufficient, so that the technology can be used as a classroom tool easily. All three factors—technology integration, current instructional practices, and personal computer use—need to be present in a classroom in order for technology integration to be effective. In 1994, Moersch created an instrument called the *LoTi* scale, or Levels of Technology Integration. This scale measures the components of technology integration, current instructional practices, and personal computer use. At that time, Moersch (1994) felt that all three components should be investigated to measure technology integration fully.

In 2010, Moersch changed the instrument's acronym to mean "Levels of Teaching Innovation" in order to capture the instructional changes in the classroom learning

environment that were and still are necessary for full technology integration. According to Moersch (2010), this adjustment to the scale more accurately measures what is truly necessary for an effective technology integrated classroom. “Powerful learning and teaching” should be an emphasis in an effective technology integrated classroom, as well as “the use of digital tools and resources” (p. 20). Because of this necessary combination of teaching innovation and technology integration, it is important to look not only at the level of technology integration in a classroom, but also the way the teacher instructs. Thus, the level of technology integration, current instructional practices, and personal computer use are all important variables to consider when measuring technology integration. Therefore, in this study, teaching innovation was the umbrella used to correlate factors of technology integration to self-directed learning readiness in order to include all parts of technology integration. By investigating whether there is a correlation between teaching innovation and self-directed learning readiness, this study contributes to the literature as well as to the work of practicing K-12 teachers.

Significance of the Study

Schools are consistently attempting to increase student growth and achievement, which will benefit society as a whole. Because of research that shows that increases in technology integration promote student growth, school districts are pouring funding into technology purchases (Gulbahar, 2007; Lawless & Pelligrino, 2007; Norris et al., 2003; Wozney et al., 2007). However, research also has shown that professional development programs for increasing technology integration among teachers are lacking (Inan & Lowther, 2010a; Johnson, 2006). Therefore, teachers as learners might need to find a

different way to approach learning technology in order to integrate it into their classrooms.

Noting the trends above, this study is significant in three ways. Initially, this study adds to the body of literature surrounding technology integration. Researchers have conducted studies that relate technology integration to many different types of variables not related to technology, such as teacher readiness (Inan & Lowther, 2010a), teacher dispositions (Vannatta & Fordham, 2004) and teacher openness to change (Baylor & Ritchie, 2002); however, self-directed learning readiness has not been one of them. Therefore, a study that correlates the variables of self-directed learning readiness and technology integration with the goal of helping teachers integrate technology more effectively builds on previous research. This knowledge might lead to a better understanding of how teachers learn technology, which has both conceptual and practical implications.

The second significant factor is the conceptual implication of how teachers learn technology. This study contributes to research on adult learning (specifically, teachers as adult learners and self-directed learning), through an investigation of how teachers operationalize the learning of technology. With this knowledge, a better understanding of the teacher learner is developed, which allows the teacher to realize his or her own learning style or to become self-aware. Additionally, administrators and professional development coordinators can recognize the learning styles of teachers they instruct. This understanding leads to very practical implications for this study, the third significant factor.

The correlation between self-directed learning readiness and levels of teaching innovation can help teachers, professional development program directors, and administrators better understand how to effectively integrate technology in their schools. The results of this study are intended to provide a clearer understanding of how educators operationalize learning related to technology, which helps program developers create more effective programs for teaching technology integration and allows school districts to use professional development funds for this purpose. It also allows the teachers working in these school districts to understand how they learn, which might help them improve their methods of integrating technology in their classrooms.

Assumptions

The following were assumptions of the researcher related to both the participants of the study and the study's design:

- A web survey was sufficient for this study and provided identical results to a paper survey.
- All participants had access to a computer and understood how to manipulate an online survey.
- Quantitative data were sufficient to describe the correlation between self-directed learning and technology integration.
- All participants responded honestly and to the best of their ability.

Delimitations

The following were delimitations that the researcher defined as parameters for the current study:

- In order to ensure manageability of the results of the study, multiple choice survey instruments were selected as opposed to open-ended or qualitative methods of inquiry.
- In order to ensure manageability of the study, only one school district was chosen to participate in the study.
- To encourage participation, the researcher offered as an incentive an iPad to one member of the population via a drawing at the end of the study period. This may have encouraged more highly skilled teachers who would be more likely to use an iPad to respond.

Limitations

The current study contained the following limitations, which could have influenced the results or generalizability of the research:

- The instruments used in this study (*LoTi* and *SDLRS*) rely on self-reported data from K-12 teachers and were subject to the limitations of any self-reporting instrument.
- Because only one school district participated in the study, the results may not be generalizable beyond that district.
- Professional development opportunities were not controlled as a variable in this study, although it is possible that these types of opportunities might have an effect on the integration of technology in the classroom.

Definition of Terms

Current Instructional Practices (CIP)—“classroom teachers’ instructional practices relating to a subject matter versus a learner-based instructional approach in the classroom” (Moersch, 2010, p. 20)

Personal Computer Usage (PCU)—“classroom teachers’ fluency level in using digital tools and resources for student learning” (Moersch, 2010, p. 20)

Self-directed learning—the adult learner taking control of their own learning (Knowles, 1980)

Self-directed learning readiness—the variable utilized in this study to measure self-directed learning (Guglielmino, 1977)

Teaching Innovation—“powerful learning and teaching as well as the use of digital tools and resources in the classroom”; includes: Technology Integration, CIP and PCU (Moersch, 2010, p. 20)

Technology—computer-based tools, including hardware and software, the internet, media, and other devices that enhance student learning in a digital way

Technology integration—the use of technology—by the teacher and students—during a lesson to enhance student learning

Outline of the Study

The current study intended to discover the potential correlation between teaching innovation and self-directed learning readiness. In the remaining body of this dissertation, Chapter II provides an analysis of current research regarding teaching innovation as well as self-directed learning readiness and studies that have included these variables. Chapter III provides detail related to the process of participant selection,

instrumentation, data collection procedure, and data analysis. Chapter IV reveals the results of the current research. Finally, Chapter V provides a reflection and conclusions based on the findings.

CHAPTER 2

LITERATURE REVIEW

For many years, self-directed learning has been a subject of research in adult education. Technology integration in the K-12 environment also has been the focus of a different group of researchers in recent years as K-12 schools continue to change and integrate more technology in the classroom. The relationship between self-directed learning and technology integration in a K-12 environment, however, has not been studied specifically. This literature review investigates the existing body of knowledge related to how K-12 teachers integrate technology and self-directed learning readiness. The chapter is divided into three sections: literature related to technology integration, which will incorporate the *LoTi* and demographic variables; literature related to self-directed learning with emphasis on the SDLRS and adults as learners; and literature that indirectly combines components of self-directed learning and technology integration through factors that are similar and relevant to this study.

Studies Related to Technology Integration

In most research studies related to technology integration, the literature review begins with a discussion of the Office of Technology Assessment's 1995 report, which showed that at that time, schools had made significant progress in integrating technology and helping teachers to use basic technology. However, the report also revealed that schools still struggled with integrating that technology in the curriculum (Office of Technology Assessment, 1995). The age of this study might be questionable as to its current relevance, but reviewing the 1995 status of technology integration first can still be useful today because current research shows that technology integration has changed

little. The technology has evolved and the teaching force has turned over slightly, but the same obstacles of technology integration are still evident today. An additional study in the same time frame as the OTA (Hooper & Rieber, 1999) explained five phases of technology integration: familiarization, utilization, integration, reorientation, and evolution. Their study indicated that most teachers did not move past the utilization stage. The reasons stated for this lack of progression were that teachers became comfortable with limited technology usage and abandoned efforts as soon as technology malfunctioned.

There are more recent studies conducted in the 21st century that highlight more current struggles with technology integration in the classroom. For example, in a study by Zhao and Bryant (2005), 53% of teachers surveyed did not routinely utilize technology in the classroom. Referenced in this study was research done in 2005 by a major retailer for educational technology products (CDW-G) who found that 80% of K-12 teachers were regularly using computers; however, they used them primarily for administrative tasks. CDW-G's survey showed that only a little more than 50% of teachers claimed to be using computers for routine instruction. Zhao and Bryant (2005) suggested that the reason for this large amount of administrative and infrequent integration in classroom instruction was directly related to a lack of continuous training in a school setting.

Continuing the trend in literature related to a lack of technology integration, a study by Bauer and Kenton (2005) employed a mixed-methods approach to investigate 30 identified high technology integrating teachers in one school district. From their observations and survey results, they found that teachers' higher confidence levels with

technology correlated with higher technology integration during classroom instruction. These teachers also were asked to identify obstacles that they had to overcome in order to have the confidence in using technology that led them to more integration. The two most common obstacles were learning the equipment and finding the time to learn and plan ways to integrate the technology. The overall results of Bauer and Kenton's study demonstrated that integration of the technology into classroom instruction did not really occur, even though the top 30 technology savvy teachers were chosen for their study. They found that only 6% of the teachers used technology more than 75% of the time during instruction.

Gulbahar's (2007) study of 105 teachers and 67 students using a mixed methods approach produced similar results. He took a unique approach by asking students questions to verify their teachers' claims regarding technology integration. The teachers who were interviewed were adamant about computer usage in the classroom, with 87% agreeing that it was beneficial. However, only 56% of the students could claim that they were competent in the use of technology. This study offers evidence that teachers know and understand that it is important to integrate technology in the classroom; however, the student responses indicated that technology integration during the lesson was not happening at the level necessary for student growth and achievement. Eteokleous (2008) confirmed the lack of technology integration in a case study at an elementary school. He found that teachers utilized technology during a lesson "in a sporadic fashion" and not for more than a "glorified chalk board" (p. 671). These more recent studies illustrate that the use of technology during instruction has not changed significantly since the original OTA study in 1995.

The literature reviewed thus far supports the view that school districts are not integrating technology as well as they could. Mentioned in each study was a lack of formal training, with no mention of other means of learning technology. Perhaps more than simply measuring computer use, finding the root of this problem may be necessary. The *LoTi Digital Age Survey* includes factors that dig a little deeper into the “why” behind teachers’ integration of technology and teaching innovation (Moersch, 2010).

Studies Related to the *LoTi* and its Subscales

This section of the literature review examines studies that employed the *LoTi* survey and studies that relate to the three subscales of the *LoTi* survey, levels of technology integration, current instructional practices, and personal computer use. According to Moersch (2010), the level of technology integration is only one component of a technology integrated classroom. The teachers’ current instructional practices (CIP), namely a learner-centered (or student-centered) versus teacher-centered a environment, as well as personal computer use (PCU), which includes a teacher’s comfort level with technology, are also key components to measuring overall technology integration.

Many school districts in the nation have begun to assess the levels of technology integration in their districts by using the Level of Teaching Innovation Scale (*LoTi*), which is based on the NETS-T standards presented in the introduction section (Johnson, 2006; Orlando, 2005; Rakes, et al., 2006) . The *LoTi* was developed by Moersch in 1994. Originally titled the *Level of Technology Integration Scale*, it was updated in 2010 to the *Level of Teaching Innovation Digital Age Survey*, to incorporate teaching innovation, a component of instruction that, according to Moersch, must be present for teachers to integrate technology effectively (Moersch, 2010). The *LoTi* measures three domains of

teaching innovation: level of technology integration (TI), personal computer use (PCU), and current instructional practices (CIP). The *LoTi Digital Age Survey* consists of 50 “I” statement questions measured on a Likert scale. The *LoTi* framework consists of six levels of technology integration that assess technology use as it ties to classroom instruction and student learning. The levels are: (0) non-use, (1) awareness, (2) exploration, (3) infusion, (4) mechanical integration and routine integration, (5) expansion, and (6) refinement. Levels 1 through 3 indicate that the teacher might be using technology but this use does not fully meet the NETS-T standards. Levels 4 through 6 show a full integration of technology at four different stages. Several studies have been conducted that employ the *LoTi* to measure the status of teachers’ current levels of technology integration, current instructional practices, and personal computer use. The *LoTi* has been used to measure the general technology status of teachers, professional development program quality, school leadership, and various areas related to teachers’ instructional practices.

One example that has been studied using the *LoTi* is the leadership styles of school administrators. Moses (2006) investigated the relationship between technology integration and leadership. The results of the study revealed that teachers who worked for principals who participated in the daily curriculum and instruction of the schools had higher levels of TI and PCU than those whose participation levels in the curriculum were lower. Teachers who worked for principals who demonstrated weaker leadership styles scored lower in PCU and CIP. Moses’s study shows that the leadership styles of school administrations potentially have an effect on teachers’ levels of TI, CIP, and PCU.

Additional studies utilizing the *LoTi* have been conducted where emphasis is on the CIP and PCU subscales.

Current Instructional Practices Subscale. An additional area of literature involving the *LoTi* investigates teacher instructional practices. Instructional practices of a teacher relate to whether the teacher teaches in a learner-centered manner or a teacher-centered manner. As discussed in Chapter 1 and in conjunction with Moersch's (2010) definition of teaching innovation, learner or student-centered instruction is key to the level of technology integration necessary to increase student learning and achievement. The definition of a learner-centered environment, given by McCombs, is the "perspective that couples a focus on individual learners, the best available knowledge of learning, and how it occurs and about teaching practices that are most effective in promoting the highest levels of motivation, learning and achievement for all learners" (2000, p. 4). This is different from teacher-centered in that teacher-centered involves mostly lecture based instruction and instruction of all students in the same manner, without regard to their individual learning preferences.

Research conducted by Barron, Kemker, Harmes, and Kalaydijian (2003) investigated 2,156 teachers and their level of technology integration. It was found that 50% of the teachers surveyed utilized technology as purely a communication tool, such as for email and to enhance lecture. According to the NETS standards, discussed in Chapter 1, real technology integration occurs when technology is utilized for students to problem solve, research, and communicate with each other. The survey utilized in this study was created based on the NETS standards. The authors found that roughly once per week, 20% of the teachers were actually utilizing technology in a student-centered manner for

students to problem solve, research, and communicate. The authors argue that the teachers in this district have a long way to go in integrating technology the way the NETS standards suggest, which involves the student, not just the teacher enhancing his or her communication.

According to Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur and Sendurur, there is a requirement for technology integration that the technology be placed in the hands of students so that they can be taught the same as professionals, so they can “communicate, collaborate, and solve problems” (2012, p. 424). Their study was focused on barriers to technology integration; however, a portion of their study did investigate teacher’s pedagogical beliefs in relation to technology integration. They found that the beliefs and practices of “award-winning technology-using teachers” were those that felt the technology needed to be in the hands of students and was best used “for collaborative purposes and for student choice” (p. 432). This supports the notion that a student-centered learning environment is most conducive to technology integration.

Investigating the Current Instructional Practices component of the *LoTi* expands on this notion of a student-centered environment. A study by Orlando (2005) investigated fourth and fifth grade classrooms using the *LoTi* and the Classroom Culture Inventory. She found computer use in the classroom to be centered mostly on communication, with parents and other teachers. While evidence of CIP was found in this study, the relationship was insignificant. TI, therefore, was weak in that it was mostly used for communication and the teachers also did not teach in student-centered environments, showing the correlation between the two subscales.

Another study by Rakes, Fields and Cox (2006) examined fourth and eighth grade teachers in 11 school districts regarding the correlation between their levels of TI, CIP, PCU and constructivist instructional practices. The teachers who were studied predominately self-scored themselves into a Level 0 on the TI subscale. This means that they were at the lowest possible level of technology integration. Despite their low Technology Integration levels, the participants indicated a moderate level of PCU. Results for the CIP section of the study produced an average of a 3 on a 7-point scale. This finding illustrates that teachers had not reached, on average, the level of a learner-centered environment, which was one reason why they did not score well on the TI subscale. Within the *LoTi* instrument itself, the authors found that the CIP score can be predicted by a combination of the TI score and the PCU score.

Personal Computer Use Subscale. Personal computer use refers to the teachers' confidence level with the technology they are integrating in their classroom. Other terms for this would be technology expertise, technology knowledge, technology self-efficacy, and even technology skill. Many studies incorporate a component of personal computer use. Earle (2002) identifies teacher expertise as a significant barrier to technology integration. Rakes, Fields, and Cox (2006) found significant relationships between TI and PCU with constructivist instructional practices. These two studies provide evidence that higher levels of technology integration, coupled with stronger personal computer usage, can indeed produce higher levels of teaching innovation.

Johnson (2006) compared teachers' *LoTi* levels to their computer self-efficacy (CUSE) levels, and investigated their level of satisfaction with the InTech program, a 50-hour instructional technology education professional development program that is

required of all Georgia licensed educators. Johnson's hypothesis was that educators who participated in the InTech training program would have higher levels of technology integration and computer self-efficacy as a result of the program. The results of the study indicated that 69% of the teachers surveyed scored a Level 2 on the six level TI subscale; 77% of the teachers utilized instruction that was learner-based; and 89% of the teachers were comfortable with and capable of using computers. These results showed that the CIP and the PCU factors were very high, which might signify a high level of TI. However, the TI level was low (Level 2). Therefore, the hypothesis was not supported by the findings of the study, suggesting that there was another cause for the low level of TI outside of the professional development program. This section reviewed the subscales of the *LoTi* survey. All three subscales are incorporated into the definition of technology integration that is utilized in this study.

Criticisms of the *LoTi*. While specific criticisms of the *LoTi* survey could not be found, one study in particular offers evidence that contradicts the research related to the *LoTi*. Much of the research surrounding the *LoTi* indicates that all three factors—technology integration, current instructional practices, and personal computer use—should correlate in an efficiently integrated classroom. However, in contrast to what much research about the *LoTi* suggests, Underwood (2008) examined the *LoTi* scores of 440 suburban high school teachers. She found that the teachers she studied had TI scores ranging mostly from Level 3 to Level 6, which are very high. Despite these high levels, the teachers only had moderate levels of the PCU indicator. Underwood (2008) also found that the CIP component of the *LoTi* instrument did not correlate to the TI and PCU indicators as Moersch's (2010) research would say that it should. The teachers scored

very low on the CIP, moderately on the PCU, and high on the TI subscale. Underwood found no significant correlation between the CIP and the PCU or the TI subscales. This study does not suggest that a teacher's instructional practices should be learner-centered in order to have high levels of technology integration. While this is an interesting contradiction, most literature regarding the *LoTi* supports the correlation of all three factors in a highly efficient technology integrated classroom.

The studies reviewed above involve the *LoTi* as it compares to many variables that could affect technology integration as well as a review of its subscales. None of the variables compared to the *LoTi* found here relate to teacher learning in a self-directed manner, a potential variable that could be related to technology integration; however, they are beneficial because all but one of the studies reviewed show the correlation among the three subscales of the *LoTi* scale.

The next portion of the literature review explores demographic variables in the current study as they relate to technology integration. The demographic variables of age/experience and grade level/subject area are reviewed, followed by two sections related to, first, self-directed learning, and second, self-directed learning as it relates to technology integration.

Age/Experience Related to Technology Integration

When thinking about the different ages and experience levels of teachers in a typical K-12 school, one might conclude that the older the teacher, the less he or she integrates technology. However, the more time the teacher spends with the technology the more comfortable they might become using it. These are contradictions, yet both make sense when exploring teacher age and experience. The literature related to age and

experience in regard to technology integration reveals mixed results. Studies showing that age and/or experience are irrelevant to technology integration levels exist as well as studies that claim significant differences between them. For example, according to a survey used to measure age and experience related to technology integration, “conversely, and contrary to conventional wisdom, teacher characteristics and demographics (e.g. time on the job) were of relatively little consequence in predicting technology use” (Norris, et al., 2003, p. 20). This survey shows that the reasons teachers do or do not integrate technology have little or nothing to do with their years of experience and thus, their age.

Russell et al.’s (2004) study contradicted Norris et al.’s results. Russell et al. showed that, overall, there was actually no significant difference related to age when measuring technology integration. However, their study measured different levels of technology integration, including student use. A closer examination of student use in particular revealed that veteran teachers were more likely to incorporate technology for student use than younger teachers. Eteokleous (2008) conducted a study that supported this age and experience using technology. He found that teacher age did have a significant relationship with technology integration in a classroom lesson. Eteokleous’s study also demonstrated a positive relationship between technology integration and teacher experience, meaning that more experienced teachers tended to integrate technology more often than less experienced teachers. These two studies support the view that age or experience could predict technology integration whereas the first study that was reviewed revealed no significant difference in age or experience in technology integration overall. There also is one other angle related to age and experience.

Inan and Lowther (2010b) conducted a study related to technology integration with 54 schools in the state of Tennessee. They hypothesized that age and experience would have a negative relationship with technology integration. An interesting result of this study was that their hypothesis was confirmed with regard to experience, as “when teachers’ years of experience increase, their feelings of readiness to integrate technology decreases” (p. 145). However, they did not find any significant correlation between teachers’ age and technology integration. This type of contradiction was not unique.

Lee and Tsai (2010) found a similar phenomenon with experience and age discrepancies. They studied 558 teachers in Taiwan and found that overall, both age and experience had a negative correlation with technology integration. They found that the older the teacher, the lower his or her confidence level in using technology. However, the interesting part of their findings was that those who had more experience in using technology, and not just more experience in general actually had higher self-efficacy scores related to technology integration; thus, teachers who tried to use technology and gained more experience with it tended to integrate it more often, creating a positive correlation between years of technology experience and technology integration. Without this experience, the correlation between experience and technology integration was negative. Therefore, Lee and Tsai’s (2010) study and the Inan and Lowther’s (2010b) study show that age and experience potentially have a negative correlation with technology integration unless a teacher has gained experience with technology.

The studies related to technology integration and age and/or experience that were reviewed above provide a vast and controversial demonstration of the findings of research comparing these two variables. There also does not appear to be a trend or

pattern in location or time related to these studies. The overall consensus is that perhaps the age or experience of the individual is insignificant. Naturally, teachers with more technology experience would be more confident and use more of it in their classrooms for instruction. However, with such a mixture of results, it would be difficult to reach the conclusion that older or more experienced teachers utilize more or less technology than younger, less experienced teachers. To contribute more definitive findings to the body of knowledge on technology integration the current study too considers age and experience.

Grade Level/Subject Area Related to Technology Integration

Several studies include information related to grade level and subject area as variables in technology integration. As stated previously in the definitions section, elementary relates to grades K-6 and secondary relates to grades 7-12. Barron et al. (2003) conducted a major study in which they created their own survey about teachers' use of technology in the classroom. This survey was developed based on the National Education Technology Standards- for Students, NETS-S, standards derived from ISTE (International Society for Technology in Education, 2008). Their study measured teachers' use of technology in the classroom to encourage meeting the NETS-S for technology integration for students. Barron et al. found that elementary teachers were twice as likely to incorporate technology into the classroom as secondary teachers. Additionally, elementary teachers were one and a half times more likely to use technology as a communication tool in the classroom as secondary teachers.

A second study supporting Barron et al.'s findings (Wozney, et al., 2006) showed that elementary teachers utilized computers more frequently in "instructional, recreational, creative, expressive, and informative ways" while secondary teachers used

them more in “analytic” ways (p. 187). Russell, et al. (2004) also concluded that elementary teachers use technology more frequently than secondary teachers, particularly when instructing students. They stated that secondary teachers use technology more for support, such as grading.

Conversely, however, Vannatta and Fordham (2004) found no significant difference between elementary teachers and secondary teachers related to their level of technology integration. The education-based television station Public Broadcasting System, PBS, conducted a survey among teachers and noted that all levels of K-12 teachers employed technology virtually to the same degree, but with different technology tools. For example, elementary teachers tended to prefer interactive white boards, while secondary teachers tended to allow students to use more portable/individual devices (Lippincott & Grunwald, 2011). These studies revealed a similar trend that was found in the age and experience review above. The definition of technology integration used determined how the variables correlated. It appears from the first two studies that elementary teachers use more technology, but the second two studies contradict these findings, showing that perhaps all levels utilize technology in instruction to the same degree, but their methods are different. Since elementary teachers teach all subject areas, an investigation of the subject areas division of the secondary level is necessary as well.

With regard to subject area, Barron et al.’s (2003) study found that science teachers were three times as likely to integrate technology as a research tool than any other discipline. Interestingly, Zhao and Bryant’s study (2005) supports these findings indirectly by focusing attention on the lowest subject for technology integration—social studies. In their study, social studies teachers were found to be much less likely to

integrate technology in the classroom than other subject areas. Even when social studies teachers did integrate technology, they used it more for themselves than their students. Additionally when social studies teachers participated in technology training, Zhao and Bryant (2005) found that they did not apply what they had learned. An additional study by Russell et al. (2004) revealed that math teachers employed technology less frequently than science and language arts teachers. Therefore, from these three studies, a tentative ranking of subjects could be identified, where science is the highest technology integrator, followed by math, then social studies. The literature reviewed did not clearly show where Language Arts and Reading teachers ranked. Special area (e.g., physical education and art) teachers were not investigated in these studies.

The definition of technology integration in the literature varies, so it is difficult to compare them directly. In studies that illustrate that one grade level or subject area incorporates technology more than another, the authors use different terms to define technology integration. For example, in the studies that show grade levels and subject areas to be very similar in technology integration, the authors explored computer use in general, which does not rule out more administrative types of tasks. Another observation is that the instruments used in these studies to measure technology integration were very different. This literature demonstrates the importance of defining technology integration fully, because the definition can be very broad.

The literature above was presented as a point of reference for the demographic variables in the study. Varied findings related to age and experience make the current study an important addition to the literature. The subject area and grade level literature presented here revealed a little controversy in grade level, but in subject area, a tentative

listing could be formed. However, it is still necessary to determine whether the current study will support science as the highest technology integrating subject and elementary as the highest integrating grade level. The major variable of the current study, however, and the concentration for the rest of this literature review is self-directed learning.

Self-Directed Learning

Self-directed learning is the conceptual framework for this study and was discussed briefly in the introduction. Various adult learning researchers and theorists have discussed and studied self-directed learning in adults since the 1960s. It is a concept involving the adult learning in various forms and includes learning activities that adults perform at will—projects, continuing education and voluntarily returning to school. Self-directed learning accounts for roughly 70-80% of adult learning (Brockett, 2008). In this section, literature related to the general field of self-directed learning is reviewed and categorized into the definition(s) of self-directed learning, the history of research on self-directed learning, and the models of self-directed learning, including the SDLRS (Guglielmino, 1977), which is the instrument employed in this study.

The Definition of Self-Directed Learning

Self-directedness or self-directed learning is defined in many different ways. The definition given by Malcolm Knowles (1975) is “a process in which individuals take the initiative, without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and integrating appropriate learning strategies, and evaluating learning outcomes” (p. 18). The control of the learning situation is the theme of self-directed learning. Merriam and Brockett (2007) provide a more simplistic and practical definition: Self-directed learning

involves “adults assuming control of their learning” (p. 137). This refers to the structure, the method, and sometimes the content. In these two definitions, the main focus of self-directed learning is on the control that individuals have on their learning agenda and content.

Looking at it from another angle, Brookfield (1985) states that self-directed learning is a method by which adults learn that focuses on the content of their choice and the manner of their choice, but includes social resources as well. Self-directed learners have “control over the planning and execution of learning” (p. 9). Brookfield reminds us, however, that self-directed learning, or any learning cannot be completed in solitude. Brookfield expresses that a successful self-directed learner is one that is “placed in a social context, and other people are cited as the most important learning resource. Peers and fellow learners provide information, serve as skills models, and act as reinforcers of learning and as counselors at times of crisis” (p. 9). Brookfield’s definition varies from those presented in the previous paragraph in that he adds the social aspect of self-directed learning, or the means by which one learns.

Brockett and Hiemstra (1991) suggest further that self-directed learning is both an intended teaching technique and an internal, personal characteristic that one can possess. They assert that self-directed learning is “a combination of forces both within and outside the individual that stress the learner accepting ever-increasing responsibility for decisions associated with the learning process” (p. 9). For the purposes of this study, self-directed learning is analyzed as a characteristic of the adult learner. To explain the characteristics of a self-directed individual further, Guglielmino (1977) provided very detailed explanation in her work on the SDLRS:

A highly self-directed learner is one who exhibits initiative, independence, and persistence in learning; one who accepts responsibility for his or her own learning and views problems as challenges, not obstacles; one who is capable of self-discipline and has a high degree of curiosity; one who has a strong desire to learn or change and is self-confident; one who is able to use basic study skills, organize his or her time and set an appropriate pace for learning, and to develop a plan for completing work; one who enjoys and has a tendency to be goal-oriented. (p. 73)

The purpose of presenting various definitions in this section is to show that many facets make up self-directed learning. One definition is that a self-directed learner is one who takes control over the environment and content of their learning. Another definition involves utilizing resources, including social and collaborative opportunities, as a key component of self-directed learning. Finally, the characteristics of a self-directed learner are important because the focus of this study is on the individual self-directed learner's characteristics as they relate to technology integration in the classroom. All three facets of the definition of self-directed learning are integral to this study because it is a complex concept. The remainder of this section contains previous research that adopted these definitions of self-directed learning.

History of Research on Self-Directed Learning

In 1961, Cyril Houle wrote *The Inquiring Mind*, which was one of the pivotal pieces of self-directed learning research in the field, although he did not use the term self-directed learning at that time. In this book, he interviewed adults who continued learning for various reasons and found that all adults have a desire to learn, but that it is not an

equal desire. Also, he found that adults who continued to learn “all had goals they wished to achieve, they all found the process of learning enjoyable or significant, and they all felt that learning was worth-while for its own sake” (p. 15). Houle divided adult continuing learners into three categories: goal oriented, activity oriented, and learning oriented. He found that adults who continued to learn all had a stimulus, either internal or external, which led them to want to continue to learn, and that it was stronger in some than in others.

Following Houle’s (1961) work, Tough (1971) conducted the *Adults’ Learning Projects*, a research study in which 66 adults were interviewed regarding their high desire to learn in a self-directed manner. He discovered that adults spend roughly 10% of their life learning something, or 700 hours per year. In this percentage of time, adults prefer to plan and direct their own learning activities. Tough (1971) found that 68% of the adults he surveyed self-planned their learning activities and the average number of self-planned projects these adults completed in their lifetime was 82. Adult learning projects are “to gain and retain knowledge” (p. 2) on a variety of things from simple home tasks to returning to school for academic credit. Tough states that continuing learning is both “the goal of human life” and helps people “...to cope with changes in a job, technology, and values” (p. 4) more effectively. With this strong pull toward self-directed learning, Tough reminds institutions that provide a learning venue to keep in mind when planning adult education the ways adults learn throughout their lives.

These two pivotal pieces of historic literature on self-directed learning emphasize that many adults tend to learn in a self-directed manner. Additionally, these two studies show that adults have varied levels of self-directedness, depending on the person. This is

important for the study at hand because varying levels of self-direction could predict technology integration. From these initial works, two models have emerged as ways to measure self-directed learning in adults.

Measuring Self-Directed Learning: *The Self-Directed Learning Readiness Scale*

There are several instruments used today that measure self-directed learning among individuals in various learning environments. One of the first instruments developed to measure self-directed learning, and still the most widely accepted, is Guglielmino's (1977) *Self-Directed Learning Readiness Scale* (SDLRS). Oddi's (1986) *Continuing Learning Inventory* (OCLI), which measures self-directed continued learning, has not been employed as widely since the early 1990s. Additionally, Confessore and Confessore (1994) developed the *Learner Autonomy Profile* (LAP), a multi-scale instrument that focuses on a learner's behavioral intentions. Finally, Stockdale (Stockdale & Brockett, 2011) developed the *Personal Responsibility Orientation to Self-Direction in Learning Scale*, PRO-SDLS, based on Brockett and Hiemstra's (1991) PRO model. It is designed specifically for use in the higher education classroom. All of these instruments have their place in the field of self-directed learning; however, the instrument used in this study is the SDLRS (Guglielmino, 1977).

The *Self-Directed Learning Readiness Scale* (SDLRS), a 58-item self-reporting Likert scale, was developed by Guglielmino (1977) to measure self-directed learning readiness. Specifically, this scale assesses personality characteristics to determine readiness for managing one's own learning. Guglielmino's (1977) reasoning for creating this scale stemmed from her knowledge of the research, or lack thereof, related to self-directed learning and the immediate need for "a clear consensus on the predominant

characteristics involved in self-direction in learning” (p. 29). No instrument had been created to properly measure self-directed learning at that time and the theory of self-directed learning was growing. Therefore, the SDLRS was her response to this void. Her major goal for the scale was:

to develop an instrument that can be used by educational institutions or individual learning facilitators in their efforts to select suitable learners for programs requiring self-direction in learning and to screen learners to determine their strengths and weaknesses in self-direction in learning in an attempt to guide them into situations in which they can best utilize and develop their potential in this area. (p. 29)

Guglielmino believed that there were certain personality characteristics that highly functioning self-directed learners possessed that others did not and that she could measure those characteristics both to identify those who were highly self-directed as well as to learn how to foster self-direction in those who did not score as high. The use of this instrument was designed both for formal and non-formal learning environments. In fact, this scale has been adopted by more than 500 organizations around the world, has been translated into over 19 different languages, and has been used in over 90 doctoral dissertations (Learning Preference Assessment, 2011). Long (1991) states that “it is likely that the greatest boost to the study of self-directed learning was provided by Lucy Guglielmino's [SDLRS]" (p. 12). Additionally, Guglielmino's (1977) dissertation is the most cited work in all of the articles of the *International Journal of Self-Directed Learning* (Kirk, Shih, Smeltzer, Holt, & Brockett, 2012). Thus, the SDLRS is the premier scale employed in self-directed learning related research and is a very important

standard in the field of adult education. The SDLRS was chosen for in this study because of its usefulness in non-formal learning environments.

Studies Utilizing the SDLRS

As stated previously, the SDLRS has been used by many different organizations and in many different environments to measure self-directed learning readiness. This section of the literature review focuses on a summary of studies that are related to adults in general, but that show the substantial contribution of the instrument to the field and the validity of the instrument throughout its 40 years of use.

Selected General Studies. Researchers have applied the SDLRS to compare self-directed learning readiness to factors such as: creativity (Cox, 2002; Torrance & Mourad, 1978), computer anxiety (Rakes, 1991), computer competency (Barrett, 1991), cross-cultural adaptability (Chuprina, 2001), distance education (Anderson, 1994), learning projects (Hassan, 1981), learning styles (Canipe, 2001), life satisfaction (Brockett, 1985), instructional strategy (Kasworm, 1983), job performance (Durr, Guglielmino, & Guglielmino, 1996; Guglielmino & Guglielmino, 1988), professional development (Guglielmino & Nowocien, 1998), college level programs (Long, 1991), resilience (Robinson, 2003) and school reform (Dodds-Urban, 2000; Posner, 1991). These studies cover a vast range of professions and environments. While none of them involve the teacher as a learner directly, still, it is important to note the wide use of the instrument in the field. A review of studies related to K-12 teachers is important as well.

Studies Related to K-12 Teachers and Self-Directed Learning. A majority of research that relates self-directed learning to the K-12 environment discusses the use of or the fostering of self-directed learning as a teaching technique for the development of

self-directed learning in K-12 students. As mentioned in the conceptual framework section of this paper, self-directed learning relates to the personality characteristics of the teacher learner. With that in mind, a few studies have focused on K-12 teachers and self-directed learning and are reviewed below. Although some of the literature in this section is from a higher education perspective, it is still relevant to this study with respect to the teacher as learner because higher education teachers and K-12 teachers likely have similar characteristics.

Within the K-12 environment, several research studies combine self-directed learning, or a variable very similar to it, and the professional development of K-12 teachers. Guglielmino and Nowocien (1998) conducted the initial study that correlated self-directed learning and K-12 teachers. They used the SDLRS to measure self-directed learning in two groups of teachers. The first group of teachers contained 58 mentor quality teachers, those who were recommended to mentor other teachers because of both their experience and mastery in teaching. The second group of teachers contained 27 first and second year novice teachers, deemed worthy of needing a mentor teacher. In the first group, the mean score on the SDLRS was 249.26, with a range of 211-288. In the second group, the mean score on the SDLRS was 235.52, with a range of 181-272. Both groups of teachers scored above the mean score for adults in general, which is 214. The study found that although the averages of these two groups differed by more than 10 points, there was no statistically significant difference between them in relation to self-directed learning readiness. Therefore, there was no real difference in readiness level due to experience. This was the only one of a few studies found that directly linked self-directed learning, or the SDLRS, to K-12 teachers directly and purposefully.

Wagner (2011) conducted research that linked K-12 teachers and self-directed learning. He employed a mixed methods approach with elementary teachers. For the quantitative portion of her study, she utilized the SDLRS. Wagner found, similar to Guglielmino and Nowocien (1998), that, overall, teachers scored above average on self-directed learning readiness. The average score was 240.89, which was, again, significantly above the 214 general adult mean supporting the view that teachers demonstrate a high level of self-directed learning readiness.

Additionally, Rowe (2009) linked self-directed learning to teacher efficacy as it relates to teacher performance appraisal. A teacher evaluation process was piloted in a school district in Canada and the SDLRS was used to show a positive correlation between self-directed learning and teacher efficacy. Rowe suggests using these results to more effectively plan professional development opportunities that facilitate teacher self-directed learning and contends that teachers in general tend to be self-directed.

Although they do not always consider pedagogical preparation as learning, and do not always consider their planning for teaching as a self-directed activity, teachers, by the simple nature of their profession, consistently prepare and design their day's activities. This professional responsibility highlights attributes of self-initiating and self-starting. (p. 41)

Rowe's discussion here shows teachers should, by nature, be self-directed individuals. The findings of all three studies reviewed thus far have shown that teachers are self-directed individuals. Also, studies that relate items very similar to self-directed learning to teacher learning have been conducted.

To further demonstrate the potential for teachers to be self-directed, research has shown that self-directed learning is an essential element and even the preferred method of general professional development for teachers. Beginning with research by Hall (1997), self-directed professional development is a highly sought after type of professional development for teachers. It allows teachers to have more control over their learning. From this initial investigation correlating self-directed learning with teacher professional development, researchers have conducted more studies combining these two variables.

For example, in a phenomenological study of 28 teachers by Van Eekelen, Vermunt and Boshuizen (2006), the teachers' will to learn was investigated. Specifically, this study looked at "which behaviors of experienced teachers within the workplace indicate the presence or absence of a will to learn" (Van Eekelen, et al., 2006, p. 409). While the terms "self-directed" or "self-directed learning" are not utilized here, the study clearly explores the self-directed learning readiness of an individual when investigating their will to learn. The observation component of this study included monitoring how often learning experiences might occur in the classroom; following that, an interview was conducted to determine whether the teachers made any attempt to learn from or because of these situations that presented themselves in their classrooms. This learning could occur in multiple ways, but would have been self-directed simply because of the reason *for* the learning in the first place. The results of this study showed that a teacher's will to learn depended both on the learning activity itself and their comfort level with the content to be learned. Ultimately, three groups of teachers emerged: those "not seeing why there is a need to learn, those wondering how to learn, and those eager to learn" (Van Eekelen, et al., 2006, p. 414). This study helped reiterate the work of Houle (1961) and Tough

(1971) in that they also concluded that there are indeed different levels of self-directed learning readiness among individual teachers who perform learning activities as a result of day-to-day classroom issues. This is an effective groundwork study and set the stage for the next study by Mushayikwa and Lubben (2009).

Mushayikwa and Lubben (2009) found that self-directed learning is a highly preferred method for teachers when choosing professional development activities. Fifty-five teachers from a school district in Zimbabwe were interviewed in this grounded theory study. The focus of this study was to determine factors that caused teachers to engage in their own self-directed learning professional development activities.

Mushayikwa and Lubben did not look at professional development that was organized or facilitated by a school district, but professional development that was sought after by the individual teacher. The factors that were discovered regarding the reason why teachers chose this type of professional development were “(1) to promote professional identity, (2) for career development, (3) to increase subject content knowledge, (4) to increase practical knowledge and professional skills, (5) to improve pedagogical knowledge, (6) for professional networking and (7) to benefit themselves and their students” (p. 379). The authors state that these self-directed professional development activities made the teachers feel “empowered, respected, and confident among their peers... professional efficacy was raised” (p. 380). Their study illustrates that teachers choose self-directed professional development on their own to increase their knowledge.

The research studies reviewed in this section highlight self-directed learning in teacher professional development. They assume that teachers have a level of self-directed learning readiness, which was shown by Guglielmino and Nowocien (1998),

although it varied depending on the individual studied. Additionally, the research captures the essence of self-directed learning a teaching as it relates to the teaching profession in general due to the field's unique nature. These studies reviewed general self-directed learning and teachers with a focus on the SDLRS. However, the SDLRS has been criticized by researchers in the field. Their assertions are reviewed below.

Criticisms of the SDLRS

Support for the use of the SDLRS in the field of adult education is evident by the magnitude of studies that have been conducted using the scale. What makes the SDLRS an even stronger instrument, however, is the amount of conversation that has occurred in the literature related to its validity and reliability (Bonham, 1991; Brockett, 1985; Field, 1989; Field, 1991). Responses to some of these critiques have been written (Guglielmino, 1989; Long, 1989; McCune, 1989) and additional studies contend that the SDLRS has been used successfully, some of which have been reviewed already. A chronological review of these criticisms and support is investigated in this section to determine how the SDLRS is viewed now by scholars of self-directed learning.

Brockett (1985) criticized the SDLRS from the standpoint of its application to all adults. Brockett's (1985) study centered on the relationship between self-directed learning and life satisfaction with a population of older adults, most of whom had little education. Brockett stated that most of the validity found in studies supporting the SDLRS involved a population of students in formal learning at a university. The adults he surveyed did not feel the survey was relevant to them. In conclusion, Brockett stated that the SDLRS "defines self-directedness from a highly school- and book-oriented

perspective and, thus, may not be as appropriate for adults with relatively few years of formal schooling” (p. 22).

Field (1989) also investigated the validity of the SDLRS as well. He first argued that few studies have actually attempted to validate this scale and those that did were in fact superficial or qualitative in nature. Field questioned the factors that Guglielmino (1977) developed related to their validity. He did not believe that the scale had been properly tested or validated in the field. Specifically, he attacked the “use of the Delphi technique as a basis for item generation, the definition of the terms ‘readiness’ and ‘self-directed learner,’ the use of negatively phrased items, and the incorporation of additional items after validation of the scale” (Field, 1989, p. 128). Field claimed in his conclusion that the SDLRS does not in fact measure self-directed learning readiness, but instead measures a love for learning. He determined that the scale was unfit for further research because it misrepresents what it intends to measure. Several authors, including Guglielmino herself, responded to this attack.

Guglielmino (1989) responded to Field’s (1989) article by pointing out several inaccuracies in his claims against the SDLRS. She reviewed and defended the four areas mentioned above. The Delphi study was not used to construct the scale, but to arrive at a consensus. The terms were not defined in the dissertation because they were defined by the Delphi panel. However, Guglielmino agreed that she did not define “readiness” appropriately in her dissertation. She refuted his argument against her reverse items as they were shown to be valid in her original study. She also addressed the additional items and revealed that a second factor analysis was conducted in 1978 when the instrument was changed slightly and she rediscovered the same eight factors.

Guglielmino also argued that the validity and reliability had been tested in at least 17 studies, three of which she cited.

Long (1989) and McCune (1989) also wrote reactions to Field's (1989) article in support of the SDLRS. Long (1989) discussed the lack of literature referenced by Field. He also discussed the lack of definitions in Field's (1989) paper as well as his nit-picking instead of focusing on Guglielmino's (1977) original dissertation. He concluded that Field's study did not contribute to the knowledge base on self-directed learning and that further studies on the SDLRS were needed. McCune (1989) responded from a statistical standpoint saying that Field's article failed to fully understand the statistical analysis that it claimed to refute. Field actually used a modified version of the scale, not the original, and then correlated his results to the original constructs of the full SDLRS. McCune (1989) believed that Field's article "was based on inadequate or weak statistical applications" and that "his findings and conclusions should be dismissed as unreliable and invalid" (p. 245).

In 1991, Field addressed the three responses to his 1989 article. In the 1991 article, he continued to support his original claim that changes were made to the original scale, yet were not validated. He also re-validated his argument regarding the eight factors by citing West and Bentley's (1989) study that makes the same claims. The construct and the negative items also were still incorrect, in Field's opinion. Therefore, he did not feel that his findings were reversed from the responses of Guglielmino (1989), Long (1989), and McCune (1989). Field still believed that the SDLRS had many flaws.

Bonham (1991) also criticized the SDLRS. Specifically, Bonham addressed the meaning behind participants' low scores on the SDLRS. She argued that while this low

score should mean that participants are not ready for self-directed learning, instead, it could signal that they dislike learning in general. Bonham (1991) focused on the construct validity of the instrument. She discussed two opposing types of learning, other-directed learning and dislike for all learning, or lack of motivation. Specific questions on the scale were used to demonstrate that some had a negative tendency toward other-directedness, and some had a negative tendency toward lack of love for learning. Levels of education also came into play here in that those who had lower levels of education probably had a higher lack of love for learning and would thus score lower. The argument presented here was that the low score on the SDLRS did not represent low self-direction but an overall lack of motivation or love of learning and that high scores on the SDLRS would represent love of learning and not, in fact, self-direction. While a response from Guglielmino was not found, Delahaye and Smith (1995) refuted this construct validity claim in their study.

The criticisms mentioned above and the responses presented by both Guglielmino and others show the magnitude of the presence of the SDLRS in the field of adult education and self-directed learning today. Despite criticisms of the scale, it is still the most widely used measure of self-directed learning readiness. Researchers in this field, however, should develop a thorough knowledge of these critiques and responses prior to conducting a study utilizing the SDLRS because, clearly, the scale acknowledges the fact that it is biased toward education level (hence the development of the SDLRS-ABE). Care should be taken to choose an appropriate environment in which to administer the scale as it was originally intended or later developed variations be taken into account, so that the SDLRS is not used as a measure in an inappropriate environment.

The definitions, early research, instrumentation and studies presented above support the use of the SDLRS instrument in this study to identify self-directed learner characteristics in the non-formal learning environment of the K-12 teacher. The basis of self-directed learning readiness is then tied to teaching innovation, which was reviewed conceptually in the introduction section and reviewed further below.

Studies in Technology Integration with Factors Similar to Self-Directed Learning

Although no studies were found that directly and explicitly predict technology integration from self-directed learning readiness, several studies exist that suggest that self-directed learning readiness has a possible correlation to technology integration. This concept propelled the current investigation and formed a solid literature basis from which this study was conducted. This section is divided into (1) studies that discuss variables that are related in nature to self-directed learning and (2) studies that investigate self-directed learning as it relates to professional development surrounding technology integration.

Related Variables

A study conducted by Inan and Lowther (2010a) discussed factors related to the instructional use of laptops in the classroom. This study was conducted with 76 teachers in several school districts in Michigan. The study was geared toward a state-funded sixth grade technology project, which consisted of 379 teachers. The *Teacher Technology Questionnaire* was applied in this study, along with demographic questions. In their study, Inan and Lowther (2010a) cited teacher readiness as one of the most important predictors of laptop integration in the classroom. Their definition of teacher readiness included preparation for knowledge, skill and confidence in designing and integrating

lesson plans. The main component of teacher readiness that predicted laptop integration was “feeling well prepared to use technology” (p. 938).

Inan and Lowther’s (2010a) study included how the teachers were prepared, focusing only on formal professional development that was provided by the district and technical support within the school. In their study, the definition of teacher readiness is interesting, particularly its relevance to self-directed learning readiness because preparedness was only related to professional development and technical support. The preparation and support given to teachers for employing self-directed learning by themselves was not considered in this study yet could also very well be a factor in predicting laptop, or more generally technology, integration.

Other studies, although slightly less recent, revealed similar results in that they found variables that correlated to levels of technology integration related to teacher characteristics, and that when viewed through the lens of self-directed learning, could potentially be the same. One example is Baylor and Ritchie’s (2002) study in which they investigated 94 classroom teachers in four states using a self-created instrument to measure variables related to technology integration. Baylor and Ritchie found that the level of a teachers’ openness to change had the highest positive correlation to levels of technology integration. The authors state that “teacher openness to change, whether this change is imposed by administrators or as a result of self-exploration, appear to easily adopt technologies to help students learn content” (p. 412). The variable of openness to change could be related to self-directed learning through teachers monitoring and adjusting their ways of instructing through their own self-directed professional development efforts.

A study by Vannatta and Fordham (2004) measured teacher disposition as a predictor for technology use in the classroom by studying reasons for technology integration that were not related to technology. The participants included 177 K-12 teachers in Ohio from four elementary schools and two high schools. The *Teacher Attribute Survey* was utilized in this study and the technology use questions were self-created. Vannatta and Fordham defined teacher dispositions as

personal attributes and teacher characteristics, including: teacher self-efficacy, teacher philosophy, openness to change, amount of professional development, amount of technology training, years of teaching, hours worked beyond the contract work week and amount of use of technology in the classroom. (p. 253)

A forward multiple regression was administered to determine which factors from their study best predicted teacher technology use in the classroom. They found that technology training was essential, but beyond that time “above and beyond the call of duty” was also essential (p. 261). Teachers who spent more time outside of their contract to learn technology who were more open to change used technology the most. This use would include time spent playing with and exploring the technology outside of the work day. The possibility of self-directed learning readiness as a predictor is evident here because the time spent outside of the classroom was probably spent learning the technology. These three studies indicate possible links between technology integration and self-directed learning by highlighting variables that have very similar definitions or components of self-directed learning, that, when viewed through the lens of self-directed

learning, appear to be very similar. Additionally, other studies in the literature of professional development incorporate components of self-directed learning as well.

Self-directed Learning in Professional Development

Literature that relates to professional development for teachers supports the use of self-directed learning. “Educators are expected to be independent, self-directed professionals,” as are adults in all workplaces (Cranton, 1996, p. 51). On a larger scale, programs that allow and encourage the active participation of teachers themselves in their planning tend to have better results (Hunzicker, 2010; Jenkins & Yoshimura, 2010; Lawler & King, 2000). Teachers want the sense of “personal freedom to learn, choice of learning, and the relevance of experiences during learning” (Terehoff, 2002, p. 67). Guglielmino (1993), who has a background in both educational leadership and adult learning, also agrees that self-directed professional development for teachers is beneficial. She states that “empowering intelligent adults [teachers] to be self-directed, self-managing learners.....is the goal of quality adult education” (p. 231). Although these articles are not research based, they still demonstrate the need in education for professional development programs to be self-directed in nature.

A few studies specifically list self-directed learning as a variable that correlates to professional development for technology integration. These studies did not measure the readiness levels of the teachers, but, instead, measured the self-directed components of the professional development program. Hanor and Hayden (2004) conducted a study in California with 2,000 educators in which they included self-directed learning strategies in a program to integrate educational technology. This program included 40 hours of face-to-face training and 80 hours of growth through a professional growth action plan, which

was self-directed and included a mentor. Opportunities for collaboration were provided if desired. The learners had the choice to either attend sessions or to learn on their own—whatever their style dictated. The findings from this study showed that two main points of self-directed learning related to technology integration, referred to here as educational technology. First, adults perform better in settings “where considerable independence is expected or permissible” (p. 54). Second, this study identified elements of self-directed learning as “appropriate to the design and integration of professional development for educational technology” (p. 54). The teacher learners were particularly excited about the fact that they had input in how they learned and in what they took back to their classrooms.

An additional study by Boyer (2007) discussed professional development related to technology integration with a similar focus on self-directed learning elements. While the participants were higher education faculty, elements of Boyer’s (2007) study are still relevant to the K-12 environment. The purpose of Boyer’s study was to examine how faculty could be encouraged to become self-directed with technology integration through professional development. Her study was conducted at the University of South Florida with 35 participants in a pilot program called “Faculty Technology Integration Institute” (FTII) (p. 18). The program was delivered in a self-directed manner, allowing faculty to discover and integrate various types of technology at their own pace and by their own choice. According to Boyer, “Each faculty member had the opportunity to self-direct their way through the design of technology for potential use in students’ learning experiences and to self-evaluate the tools that were appropriate within their particular context” (p. 20). This program increased the level of self-direction related to technology

integration among faculty by fostering elements of self-directed learning in the FTII program.

The findings of these studies reveal the importance of self-directed learning elements in professional development activities related to technology integration. In both cases, teachers enjoyed having input in how and what they learned. While the current study does not include professional development programs, it is still important to note the teachers' positive reactions to programs that were self-directed in nature. These studies, along with research in the related variables section, show the potential for a correlation between self-directed learning and technology integration. The evidence here demonstrates that technology integration increases as variables very similar to or components of self-directed learning increase. Additionally, the studies discussed here reveal that professional development activities that promote and include self-directed learning elements produce positive attitudes among teachers.

Summary

In review, the literature on self-directed learning supports the groundwork for the current study. Variables that correlate to technology integration that are similar to self-directed learning have been validated, as well as self-directed learning elements in professional development that encourage teacher technology integration. The literature is lacking in studies that directly correlate self-directed learning readiness and technology integration. Therefore, the study at hand can build upon this literature to show whether self-directed learning readiness correlates to or is even a predictor of technology integration.

CHAPTER 3

METHOD

The literature review in the last chapter described research related to technology integration and self-directed learning in relation to the K-12 teacher. The literature demonstrates the need for a purposeful study that directly correlates self-directed learning with technology integration. Additionally, the demographic variables of age, experience, grade level, and subject showed mixed results in the literature, thus adding to the significance of the current study.

To review information in the first chapter, the purpose of this study was to investigate the relationship between technology integration and self-directed learning readiness among K-12 teachers in one large southeastern school district. The problem of understanding the teacher as a learner was investigated in this study through the lens of self-directed learning as a means of operationalizing how teachers learn technology. In this chapter, a discussion of the research and analysis methods is explained including a description of the participants, instruments, procedures and data analysis.

Population and Sample

The population of this study consisted of K-12 teachers currently employed in one large, southeastern school district. This school district comprises one county's public educational opportunity. The school district has 49 elementary schools—grades K-5, 11 middle schools—grades 6-8, and 15 high schools—grades 9-12. Additionally, this school system utilizes 10 different facilities to educate adults, children with severe behavioral issues, and children with severe learning disabilities. Through these 85 schools, 54,486 students are educated by 4,071 teachers and administrators, 3,740 of which are teachers.

In this district, 77% of students are white, 15% are African American, and 5% are Hispanic. Additionally, 45% of students in this district are considered Economically Disadvantaged and 12% are considered Students with Disabilities. As for the teachers in this district, 1,570 have a Bachelor's degree only (38.6%), 1,961 have a Master's degree (48.2%), 114 have 45 hours above a Master's degree (2.8%), 311 have an Ed.S. (7.6%), and 47 have a PhD (1.2%). There are 69 teachers in this district, teaching vocational courses, who do not have a four year degree (1.2%). (Tennessee State Department of Education, 2011).

The initial request for research was submitted to the district and was granted with the understanding that each building level principal would need to give additional permission to conduct research at their individual school. To establish this study's sample then, principals at all 85 schools were contacted for the opportunity to participate in the study. Fifteen of those principals responded allowing the research to be conducted in their school. The survey was sent to 722 teachers in the district, within the 15 schools. Of these 15 schools, 10 were elementary, four were middle schools, and one was a high school.

The researcher assumed that contacting 722 teachers would yield sufficient results. An appropriate sample size for a strong correlation of .20, according to the Office of Statistical Research at UT (C. Springer, personal conversation, April 4, 2012), was 191 teachers, and to obtain a reasonably strong correlation of .25 was 120 teachers. Therefore, the initial goal for this study was 200 participants. However, this study yielded a 19% response rate of 135 teachers, which does still met the threshold for proper

analysis and a reasonably strong correlation potential. The procedure is further explained in a future section.

Research Design

This study employed a correlational design, with the integration of prediction, utilizing survey methodology. A correlational study is one that “determines whether two (or more) variables covary and, if so, to establish the directions, magnitudes, and forms of the observed relationships” (Bordens & Abbott, 2008, p. 99). A correlational design was appropriate for this study because the intent was to determine the extent to which levels of self-directed learning readiness correlated to levels of technology integration and its factors, as well as other variables. The research was administered as a quantitative study, using a survey methodology. The survey contains two instruments and four demographic variables. The survey was conducted as web-based survey.

Variables

The variables for this study included the two main variables of self-directed learning readiness and teaching innovation. Teaching innovation consists of three factors: level of technology integration (TI), current instructional practices (CIP), and personal computer use (PCU), which are all necessary to determine the level of technology integration in instruction. Additionally, four demographic variables were addressed, including: teacher age (age of participant), years of teaching experience (number of years in the teaching profession), grade level taught (K-6 elementary and 7-12 secondary), and subject area taught (list of subjects plus the option of other). All variables were measured through instrumentation found in the literature.

Instrumentation

There were two main variables in this study, self-directed learning readiness and teaching innovation. These two variables were assessed through standardized instruments found in the literature reviewed in Chapter 2. The demographic variables were measured utilizing additional written questions attached to these two standardized instruments. Explanations of the instrumentation chosen will be provided below, including discussion of why these particular instruments were chosen for this study instead of others that might be available in the field. These two instruments plus the demographic questions were combined into a web survey for teachers.

Demographics

The web survey began with demographic questions. These questions included: age (continuous), experience (continuous), grade level (elementary [K-6] and secondary [7-12]), and subject area (elementary inclusive, language arts, reading, math, science, social studies, special education, technology, foreign language, physical education, family and consumer science, business, other). For the purposes of this study, experience refers to the number of years one has taught in a K-12 classroom, without regard to the location. Demographic questions are shown in Appendix A.

Self-directed Learning

The web survey ended with the first of main variable, self-directed learning readiness, which was assessed using the *Learning Preference Assessment* (LPA), also known as the *Self-Directed Learning Readiness Scale* (SDLRS), developed by Guglielmino (1977). The SDLRS was created by Lucy Guglielmino as a doctoral dissertation from the University of Georgia in 1977. Guglielmino added the title LPA, in

1991, but the two surveys are the same. The reason for the name change to LPA was due to a finding by Guglielmino that participants were prone to select choices that they thought were self-directed in nature because the title of the instrument contained the words self-directed learning (Guglielmino & Guglielmino, 1991). The LPA is a 58-item self-reporting survey using a Likert scale that measures self-directed learning readiness in adults.

To create the survey, Guglielmino (1977) used the Delphi Technique where 14 experts in the field of self-directed learning were asked questions related to how they felt self-directed learning would be defined. For example, one question was, “what do you judge to be the characteristics of the highly self-directed learner which are the most closely related to his/her self-directed learning behavior?” (1977, p. 93). Through initial testing, the survey yielded an internal reliability coefficient of .87 (Guglielmino, 1977). When creating the additional LPA survey, Guglielmino & Guglielmino (1991) conducted a study with 3,151 participants and determined, through split-half Pearson product moment correlation with a Spearman-Brown correction, a reliability coefficient of .94. A revisit of the validity of the instrument was done by Delahaye and Smith (1995). After the name change in 1991, they confirmed the high validity of the instrument in assessing adults over the age of 20 when compared to a similar study using measure of andragogy as a basis, the *Student's Orientation Questionnaire* or SOQ. Delahaye and Smith (1995) also found an internal consistency of $\alpha=0.72$.

The LPA/SDLRS has a total range of scores from 58 to 290 and is divided into three levels of self-directed learning readiness: below average, average and above average. The average self-directed learning readiness score for adults is 214 with a

standard deviation of 25.59. A participant scoring below 201 in the scale is considered below average in their self-directed learning readiness. Average is the range of 202-226 and above average is the range of 227-290. Since its development, the SDLRS has been adopted by over 200 researchers. Their studies have been applied to a wide range of environments, including: universities, community colleges, workplaces, middle schools, various countries, hospitals, and communities. The LPA/SDLRS is provided in Appendix B.

Careful consideration was given as to what instrument to utilize for the self-directed learning component of this study. The LPA/SDLRS was chosen due to its significant long-term contribution to the field of self-directed learning, and also because of its application to the workplace. Other instruments related to self-directed learning, like the PRO-SDLS (Stockdale & Brockett, 2011), are more formal learning oriented and therefore not as relevant to the population under investigation of this study. As discussed in Chapter 2, the LPA/SDLRS has a tendency to favor self-directed learning readiness in adults with higher education levels and those who have gone through more formal learning and professional development (Brockett, 1985). This conclusion fits the demographic for teachers as most teachers are highly educated individuals. Additionally, there have been criticisms of the instrument surrounding its potential to measure love of or lack of learning instead of self-direction (Bonham, 1991; Field, 1989). A full discussion of these criticisms is described in Chapter 2. However, Guglielmino (1989, 1991) responded to each criticism explaining its measurement of self-directed learning readiness more thoroughly and the instrument is still used today. It is important for any researcher using this instrument to keep these criticisms in mind when conducting

research utilizing the instrument. In the current study, because the population is teachers, who as a group have a higher education level and a love of learning, the critiques, while noted, should not affect this study.

Finally, an additional consideration for the decision to use the LPA/SDLRS was that the implications of the results of this instrument are intended to assist those who work with adult learners to better foster self-directed learning in their environment. Information for those who work with adult learners will assist with the practical significance of this study. The LPA/SDLRS appears to be the best choice of instrumentation for the population under investigation.

Technology Integration

Following the LPA/SDLRS survey on the web, a link was provided to the *Levels of Teaching Innovation, Digital Age Survey (LoTi)*, developed by Moersch (1994) and updated by Moersch (2010). The survey originally was developed with consultation from a panel of instructional technology educators in the Los Angeles Unified School District. The *LoTi* survey is based on the NETS-T standards, which are from the International Society of Technology in Education, and are based on integrating technology for teachers. These are national standards and were discussed in Chapter 1.

LoTi is employed in many school districts across the nation as a pre and post test to measure technology integration in the classroom as well as to verify or adjust professional development programs. The TI component of the *LoTi* scale consists of six levels that measure technology use as it ties to classroom instruction and student learning. The levels are: (0) non-use, (1) awareness, (2) exploration, (3) infusion, (4) mechanical integration and routine integration, (5) expansion, and (6) refinement. Levels 1 through 3

indicate that the teacher might be using technology but this use does not fully meet the NETS-T standards. Levels 4 through 6 show a full integration of technology at four different stages. The survey assumes that teachers are aware that technology is an important tool for classroom learning (Moersch, 1994). A full description of the levels of TI is provided in Table 1.

Table 1

Levels of Technology Integration

Level	Level Explanation
Level 0	Non-use: Instructional focus ranges from a direct instruction approach to a collaborative, student centered learning environment. The use of research-based best practices may or may not be evident, but those practices do not involve the use of digital tools and resources.
Level 1	Awareness: Instructional focus emphasizes information dissemination to students using lectures or teacher-created multimedia presentations. Teacher questioning and student learning typically focus on lower cognitive skill development. Digital tools and resources are used for curriculum management tasks, to enhance lectures, or as a reward for students who complete class work.
Level 2	Exploration: Instructional focus emphasizes content understanding and supports master learning and direct instruction. Teacher questioning and student learning focus on lower levels of student cognitive processing. Students use digital tools for extension activities, enrichment exercises, or information-gathering assignments that generally reinforce lower cognitive skill development. Students create multimedia products to demonstrate content understanding in a digital format that may or may not reach beyond the classroom
Level 3	Infusion: Instructional focus emphasizes higher-order thinking (application, analysis, synthesis, evaluation) and engaged learning. Teacher-centered strategies include the concept attainment, inductive thinking, and scientific inquiry models and guide the types of products the students generated. Students use digital tools and resources to carry out teacher-directed tasks that emphasize higher levels of student cognitive processing.

Table 1. Continued.

Level	Level Explanation
Level 4a	Integration (mechanical): Students are engaged in exploring real-world issues and solving authentic problems using digital tools and resources, but the teacher may experience classroom management or school climate issues, such as lack of support from colleagues, that restrict full-scale integration. Teachers rely on prepackaged materials, assistance from other colleagues, or professional development workshops. Emphasis is on applied learning and the constructivist, problem based models of teaching that require higher levels of student cognitive processing and in-depth examination of the content. Students use digital tools and resources to investigate student-generated questions that dictate the content, process, and products embedded in the learning experience.
Level 4b	Integration (routine): Students are fully engaged in exploring real-world issues and solving authentic problems using digital tools and resources. Teachers are within their comfort levels promoting inquiry-based models of teaching that involve students applying their learning to the real world. Emphasis is on learner-centered strategies that promote personal goal setting and self-monitoring, student action, and issues resolution that require higher levels of student cognitive process and in-depth examination of the content. Students use digital tools and resources to investigate student-generated questions that dictate the content, process, and products embedded in the learning experience.
Level 5	Expansion: Students collaborate beyond the classroom to solve problems and resolve issues. Emphasis is on learner-centered strategies that promote personal goal setting and self-monitoring, student action, and collaborations with other diverse groups, such as people from another school, another culture, a business, or a governmental agency. Students use digital tools and resources to answer student-generated questions that dictate the content, process, and products embedded in the learning experience. The complexity and sophistication of the digital resources and collaboration tools used in the learning environment are now commensurate with the diversity, inventiveness, and spontaneity of the teacher's experiential-based approach to teaching and learning and the students' level of complex thinking (analysis, synthesis, evaluation) and in-depth understanding of the content experienced in the classroom.

Table 1. Continued.

Level	Level Explanation
Level 6	Refinement: Students regularly collaborate beyond the classroom to solve problems and resolve issues. The instructional curriculum is entirely learner based. The content emerges based on the needs of the learners according to their interests, needs, and aspirations and is supported by unlimited access to the most current digital applications and infrastructure available. There is no longer a division between instruction and digital tools and resources. The pervasive use of, and access to, advanced digital tools and resources provides a seamless medium for information queries, creative problem solving, student reflection, and product development. Students have ready access to, and a complete understanding of, an array of collaboration tools and related resources.

(Moersch, 2010, p. 22)

The *LoTi Digital Age Survey* consists of 50 “I” statement questions utilizing a Likert scale. As discussed in previous chapters, the *LoTi* measures levels of technology integration (TI), current instructional practices (CIP), and personal computer use (PCU) as factors of teaching innovation. A majority of the questions in the instrument address the TI measurement; however there are five questions each for the CIP and the PCU factors. The *LoTi* survey is designed as a pre-test/post-test improvement measure. It was intended to show growth or improvement in teachers attempting to integrate more technology. While the use of this instrument in this manner is common, several researchers have used the *LoTi* survey as a one-time survey in a dissertation type of research study to measure the current state of a population of teachers. Therefore its reliability has been established and was an appropriate measure to use for the analysis of the current study.

Validity has been measured by Stoltzfus (2009) by comparing the *LoTi* survey to the *STaR chart*, a similar survey. The Pearson’s correlation coefficient was found to be r

= .767 ($p < .001$) signifying that the two surveys overlapped in what they were measuring, thus showing criterion-related validity for the *LoTi* survey. The full *LoTi* survey is included in Appendix C.

The *LoTi* survey was chosen for this study because of its substantial contributions to the field of technology integration. Many instruments in the field of technology integration age themselves after a couple years due to terminology changes in the wording of the questions and in technology usage. The mere fact that technology itself changes so rapidly made it very important to choose an established instrument. The *LoTi* survey, originally created in 1994, was updated in 2010, so it keeps up with the technology and terminology changes that occur in the field. Additionally, several other instruments were investigated, but none integrates current instructional practices and personal computer use as simply as the way the *LoTi* survey does. This integration allows the current study to pinpoint the factor within teaching innovation that is more closely aligned with higher levels of technology integration, something other instruments could not provide. Finally, the magnitude of school districts that have purchased the *LoTi* survey to measure technology integration in their schools is an additional reason for the choice.

Procedure

Initial permission for conducting the research was granted from the school district's research office with the understanding that additional permission be granted from each individual building level administrator (Appendix D). Therefore, the web-based survey process began with an email requesting approval of all building level principals to include their buildings in the study. Responses were collected from the 15

buildings that chose to participate and then a list of email addresses of 722 teachers at those buildings was formed. Those teachers were contacted by email asking them to participate in the study (Appendix F). A link to the web survey was included in this email. The web survey began with an informed consent on which an “I Agree” button was placed (Appendix G). When the teacher clicked this button to proceed to the survey, their consent was confirmed. The survey was expected to take approximately 30 minutes to complete.

The web survey consisted of first, demographic questions that were explained in the previous section. They were listed first because of the manner in which the other two surveys had to be administered. Then, the questions from the LPA/SDLRS were included in the same survey. Because the *LoTi* Corporation would not grant copyright permission for the researcher to combine their questions into a web survey, a link to the *LoTi* survey was placed at the end of the first survey. This means that teachers had to complete both surveys in order to be included in the study. In order to ensure confidentiality as well as to be able to correlate the surveys, the email requesting participation (see Appendix F) from the teachers included a random number (e.g. UT3052). The teacher was asked to place this random number at the beginning of both surveys. It was kept with the teacher’s email address in a spreadsheet maintained by the researcher. After the surveys were correlated, this spreadsheet was destroyed. The number was never part of the data analysis; it was used only to correlate the two surveys.

One hundred thirty-five (19%) of the 722 teachers contacted for participation responded. It was determined prior to emailing the survey that a reasonable length of time to administer an online survey was two weeks (C. Springer, personal

communication, February 9, 2012). It was sent out on May 8, 2012 and reminder emails followed on May 21st (see Appendix H) and May 25th (see Appendix I). The last day to complete the survey (May 26) was also the teachers' last day of school. At the end of the two-week survey period, the researcher gave a randomly drawn prize, an iPad, to a participant. Ethical guidelines were adhered to and were met through approval from IRB at the University of Tennessee as well as from the school district participating in the study.

Upon collection of the 135 surveys, data were sent to the SDLRS organization for coding and the *LoTi* results were computed through the *LoTi* Corporation. Once those results were tabulated, the data were compiled into SPSS for comparison. After being loaded into SPSS, the unique IDs that were assigned to correlate the two surveys were removed. Finally, the data were analyzed. The next section presents the process that was followed to complete the analysis.

Data Analysis

This study was a correlational study, using a survey methodology, with the integration of a regression analysis for prediction. The survey consisted of two-parts that were posted on the web. Additional demographic questions that addressed ordinal scale independent variables of grade level and subject area were included. Age and experience also were analyzed as variables with a continuous interval scale, thus making them dependent variables. Questions on self-directed learning readiness and technology integration were measured on an interval scale and were the dependent variables for this study. Outliers were included because extreme scores were necessary for the data analysis. Teachers who did not complete both surveys were not included in the analysis

because both surveys were necessary to perform the analysis. An alpha level of .05 was used to determine significance. The research questions are listed below, including a description of the analysis that was performed for each one.

Is there a significant relationship between self-directed learning readiness and the factors of teaching innovation: levels of technology integration (TI), current instructional practices (CIP), and personal computer use (PCU) among K-12 teachers?

For the first research question, the researcher completed a Pearson Product Moment Correlation (r) analysis for each of the variables listed compared to self-directed learning readiness. Pearson r measures the “direction and the magnitude of the relationship between two sets of scores” (Bordens & Abbott, 2008, p. 405). This analysis was used because the measurement involved a correlation and because both scales were measured using a Likert scale and the scales were therefore interval in nature.

Is there a significant relationship between teacher age and years of experience and the factors of teaching innovation (TI, CIP, and PCU) or self-directed learning readiness among K-12 teachers?

The Pearson Product Moment Correlation (r) analysis was performed for this question as well. The age and experience variables were continuous and, therefore, were interval in nature.

Are there significant differences between self-directed learning readiness and TI, CIP, and PCU among elementary versus secondary grade level teachers?

This research question includes grade level, an ordinal scale, in correlation with interval scales. Therefore, a series of t -tests were used to measure whether there was a significant difference between grade level and each of the variables listed in the question.

Are there significant differences between self-directed learning readiness and TI, CIP, and PCU among different subject areas taught by K-12 teachers?

To analyze this research question, a One-Way Analysis of Variance (ANOVA) was administered to measure all variables at once. In order to receive a more accurate reading of subject differences, many of the subjects were combined to form umbrella subject areas. A full description of this analysis is provided in Chapter 4. Therefore, there was no guarantee that each subject area was analyzed for differences.

To what extent does the combination of self-directed learning readiness and other demographic variables predict the three factors of teaching innovation?

This is the main research question of the study. A step-wise regression was conducted to analyze the results of this question. The outcome of this analysis revealed the level of technology integration that could be predicted from self-directed learning readiness as well as from the other demographic variables. The step-wise regression method also included a test of each of the demographic variables to determine which variables was the greatest predictor of technology integration in the classroom. Backward elimination was performed to eliminate variables that were not significant to find those that were the most significant related to predicting technology integration.

Summary

This study aimed to investigate the ways in which a teacher might learn in a self-directed manner when approaching the phenomenon of technology integration. Instrumentation has been selected that is appropriate for measuring the variables necessary to determine whether there is a correlation between self-directed learning and factors of technology integration, referred to as teaching innovation. Descriptive statistics

also were analyzed in this study. A full description of the findings of each of these research questions is included in Chapter 4.

CHAPTER 4

ANALYSIS OF DATA

The purpose of this study was to investigate the relationship between technology integration and self-directed learning readiness among K-12 teachers in one large southeastern school district. Responses were gathered from 135 participants and were analyzed in order to address the five major research questions. Within each research question, several components were examined. This chapter provides a more detailed description of the participants as well as a thorough analysis of each research question and its components.

Demographics and Response Rate

As discussed in Chapter 3, participants were gathered from one large, southeastern, K-12 school district. Within this district, 85 school level administrators were contacted for permission to conduct research, 15 of whom responded positively. Of these 15 schools who allowed the research, 10 were elementary schools (K-5), four were middle schools (6-8), and one was a high school. Within these 15 schools, 722 teachers were contacted to participate in the study.

The study was administered through a web-based survey that included demographic questions, and the LPA/SDLRS (Guglielmino, 1977). After completing the LPA/SDLRS, participants were directed to the *LoTi* website to complete the *LoTi Digital Age Survey* (Moersch, 2010). Of the 722 participants who were contacted, 135 successfully completed both components of the web-survey and comprise the sample for the analysis. It is interesting to note that 196 participants actually completed the first part of the survey (the demographic questions and LPA/SDLRS), but only 135 continued to

the second survey (*LoTi Digital Age Survey*). Therefore, 61 participant responses to the demographics and LPA/SDLRS section of the study were not applicable to the analysis and were not included. Because two different surveys were administered in this research, the participants were given a unique identifier to correlate the two surveys; it was eventually destroyed to ensure confidentiality.

Descriptive Statistics

In this section of Chapter 4, a description of the participants is explained further in two parts. First, an overview of the demographics of the sample, including age, experience, grade level, and subject area is described. Following the demographic information, a descriptive statistics section explains the major variables of this study.

Demographics

Participants were asked to respond to four demographic questions regarding: age (age of participant), years of teaching experience (number of years in the teaching profession), grade level taught (K-6 elementary and 7-12 secondary), and subject area taught (math, science, social studies, language arts, technology, foreign language, physical education, family and consumer science, business, special education, other). The mean age reported by the participants was 41.61 ($SD = 11.18$). Reported ages ranged from 23 to 64. Table 2 below shows the breakdown of the age distribution. Experience had a similarly wide distribution. The mean number of years of experience was 12.59 ($SD = 9.36$). The reported ranges for years of experience were one year to 39 years. Table 3 below shows the distribution of experience for the participants of this study.

Grade level and subject areas also were investigated. The grade level distribution included 81 (60%) participants at the elementary level, grades K-6. Secondary level,

grades 7-12, made up 40% of the sample, or 54 participants. Table 4 below shows the breakdown of grade level.

Table 2

Age Distribution of Participants

Teacher Age	Number of Teachers	Percent
23-30	29	21.5
31-40	41	30.4
41-50	28	20.7
51+	37	27.4

Table 3

Experience Distribution of Participants

Years of Experience	Number of Teachers	Percent
1-10	67	49.6
11-20	46	34.1
21-30	18	13.3
31+	7	5.2

Table 4

Grade Level Distribution

Grade Level	Number of Teachers	Percent
Elementary (K-6)	81	60
Secondary (7-12)	54	40

The initial subject area choices given to participants included: elementary inclusive, language arts, reading, math, science, social studies, special education, technology, foreign language, physical education, family and consumer science, business, and other. However to analyze the data more effectively, several of these subject areas were combined with other similar subjects. The results of the distribution of subject

areas are provided in Table 5 below. Elementary inclusive was the most frequent group with 55 participants. Elementary inclusive means that the teacher teaches all core subject areas: math, science, social studies, and language arts/reading at the elementary level. To create larger groups for analysis purposes language arts and reading were combined together. Additionally, technology, foreign language, physical education, family and consumer science, and business were combined with the “other” category to form electives and other because separately they were not large enough for analysis. Despite the fact that there were fewer than 10 science and social studies participants, they were still analyzed separately because combining them would skew the uniqueness of their subject area. Demographic frequencies have been explained here. Descriptive statistics for the main variables of the study—SDLRS, Technology Integration, PCU and CIP—are explained next.

Table 5

Subject Area Distribution

Subject Area	Number of Teachers	Percent
Elementary Inclusive	55	40.4
Language Arts/Reading	16	11.8
Math	13	9.6
Science	7	5.1
Social Studies	8	5.9
Special Education	12	8.8
Electives and other	25	18.4

Main Variables

Learning Preference Assessment/Self-Directed Learning Readiness Scale

(LPA/SDLRS). The first main variable that was investigated through descriptive statistics was self-directed learning readiness, measured by the LPA/SDLRS (Guglielmino, 1977). As mentioned in Chapter 3, the LPA/SDLRS has a total range of scores from 58 to 290 and is divided into three levels of self-directed learning readiness: below average, average and above average. The mean self-directed learning readiness score for adults is 214, with a standard deviation of 25.59. A participant scoring below 201 in the scale is considered below average in self-directed learning readiness. Average is in the range of 202-226 and above average is in the range of 227-290. These norms are taken from Guglielmino's original study (1977).

The mean LPA/SDLRS score in this study was 240, with a standard deviation of 19.83. These figures show that, overall, the participants scored above the general adult mean of 214. Additionally, the range in this study was a minimum of 176 and a maximum of 283. According to this range, only three teachers scored below the average established by Guglielmino (1977) of 202. The number of teachers scoring in the established average range was 21.4% (29 teachers). Therefore, overall, 76.3% of the teachers surveyed (103) scored above average. Table 6 shows this distribution.

Table 6

LPA/SDLRS Score Distribution

LPA/SDLRS Score	Frequency	Percent
176-201	3	2.2
202-226	29	21.4
227-290	103	76.3

An internal reliability analysis was conducted for this sample for the LPA/SDLRS instrument. The Cronbach's alpha for this sample was .79, which is a high level of reliability (i.e., anything considered greater than .70) (Bordens & Abbott, 2008). The internal reliability that was revealed is not as high as that from Guglielmino's (1977) original study, which was .87. Nevertheless, it is still a high level of reliability for this sample and is similar to more recent studies such as Delahaye and Smith's study (1995), which found a reliability coefficient of .72.

Levels of Technology Integration (TI) subscale. The second variable in this study was the TI score. This is the first and most prominent subscale in the *LoTi, Levels of Teaching Innovation*, umbrella. The TI framework consists of six levels of technology integration that measure technology use as it ties to classroom instruction and student learning. The levels include: (0) non-use, (1) awareness, (2) exploration, (3) infusion, (4) mechanical integration and routine integration, (5) expansion, and (6) refinement. Levels 1 through 3 indicate that the teacher use technology but these levels do not fully meet the NETS-T standards. Levels 4 through 6 show a full integration of technology at four different stages. Table 1 in Chapter 3 defines each score, including how score 4 is broken down into 4a and 4b.

In this study, the mean TI score was a 2, which demonstrates that most teachers are exploring the use of technology in their classroom ($SD = 1.43$). The lowest score was a 0, showing no technology integration, and the highest score was a 4b, showing routine integration of technology. None of the participants scored 5 or 6, the two highest TI subscale scores. The instrument has been administered in many school districts across the country and does not produce overall averages for comparison, unlike the

LPA/SDLRS scale. Therefore, the mean scores presented here are specific for this sample and are discussed without reference to K-12 teachers as a whole. Table 7 below shows the distribution of the TI subscale scores.

Table 7

TI Subscale Score Distribution

TI Subscale Score	Frequency	Percent
0	2	1.5
1	23	16.9
2	57	41.9
3	13	9.6
4a	13	9.6
4b	27	19.9

An internal reliability test also was conducted on the TI subscale score. Because the questions related to the CIP and PCU subscales are a small portion of the total scale (five questions) they were removed. The internal reliability (Cronbach's alpha) of the TI subscale for this sample measured at .78. This is a high level of internal reliability since anything above .70 is considered high (Bordens & Abbott, 2008).

Personal Computer Use (PCU). The PCU score is a subscale of the *LoTi, Levels of Teaching Innovation*, umbrella. Five questions relate to the PCU subscale on the *LoTi Digital Age Survey*. The PCU score has eight intensity levels ranging from 0, which means that a participant does not feel comfortable with technology and prefers non-technology options like paper and pencil, to a 7, which signifies that a participant is an expert (i.e., using computers and other forms of technology with ease (Moersch, 2005)).

For the current study, the mean PCU score was a 3, which indicates that most teachers operate at the moderate skill level. The complete description from the *LoTi Profiler Guide* reads,

A PCU Intensity Level 3 indicates that the participant demonstrates moderate skill level with using computers for personal use. Participants at Intensity Level 3 may begin to become “regular” users of selected applications such as the internet, email, or a word processor program. They may also feel comfortable troubleshooting simple “technology” problems such as rebooting a machine or hitting the “Back” button on an internet browser, but rely on mostly technology support staff or others to assist them with any troubleshooting issues. (p. 25)

The standard deviation for the PCU subscale was 1.49. The range of PCU scores went from 0, no comfort level, to a 6, which is a high level of skill using technology. None of the participants in this study reached the highest intensity level of 7 on the PCU scale. Table 8 below shows the distribution of PCU scores. It should be noted that many participants also scored a 4 on the PCU scale, which indicates moderate skill, very similar to the level 3, but with slightly more confidence.

Current Instructional Practices (CIP). The final major variable in the study is the CIP subscale score. This score also is under the *LoTi, Levels of Teaching Innovation*, umbrella. On the *LoTi Digital Age Survey*, five questions relate to the CIP subscale. The CIP score reveals how the teacher teaches in his or her classroom. Specifically, the CIP subscale score measures whether the teacher performs in a teacher-centered or learner-centered classroom environment. Similar to the PCU subscale, the CIP subscale has

eight intensity levels ranging from 0, which means the questions did not relate to the teacher's teaching style, to 7, which signifies that the teacher performs solely in a learner-centered classroom environment.

For the current study, the mean CIP score was a 4, which means that teachers have the ability to teach in either a learner-centered or teacher-centered environment. The following is the complete description of CIP intensity level 4 from the *LoTi Profiler Guide* (Moersch, 2005):

At a CIP Intensity Level 4, the participant may feel comfortable supporting or integrating either a subject-matter or learning-based approach to instruction based on the content being addressed. In a subject matter based approach, learning activities tend to be sequential, student projects tend to be uniform for all students, the use of lectures and/or teacher-directed presentations are the norm as well as traditional evaluation strategies. In a learner-based approach, learning activities are diversified and based mostly on student questions, the teacher serves more as a co-learner or facilitator in the classroom, student projects are primarily student directed, and the use of alternative assessment strategies including performance-based assessments, peer reviews, and student reflections are the norm. (p. 27)

The standard deviation of the CIP subscale score was 1.50. The range of CIP scores went from a 1, which is exclusively teacher-centered, to a 7, which is exclusively learner-centered. This was the widest range of the three *Levels of Teaching Innovation*

subscales. Table 9 shows the distribution of CIP scores, indicating that the CIP subscale score trended toward a more learner-centered environment, skewing slightly to the right.

Table 8

PCU Subscale Score Distribution

PCU Subscale Score	Frequency	Percent
0	3	2.2
1	20	14.8
2	22	16.3
3	35	25.9
4	32	23.7
5	14	10.4
6	9	6.7

Table 9

CIP Subscale Score Distribution

CIP Subscale Score	Frequency	Percent
1	2	1.5
2	15	11.1
3	23	17.0
4	32	23.7
5	29	21.5
6	23	17.0
7	11	8.1

The section presented above was intended to give demographic and descriptive information about the participants and major variables for this study. The next section provides an analysis of the results of the study as they relate to each research question.

Analysis of Research Questions

Because there is not a single score that results when measuring teaching innovation, there were a large number of research questions for this study. The reason for using this approach is that each factor of the teaching innovation variable could be properly correlated to the other variables of the study. Following are the research questions:

1. Is there a significant relationship between self-directed learning readiness and the factors of teaching innovation: levels of technology integration (TI), current instructional practices (CIP), and personal computer use (PCU) among K-12 teachers?
2. Is there a significant relationship between teacher age and years of experience and the factors of teaching innovation (TI, CIP, and PCU) and self-directed learning readiness among K-12 teachers?
3. Are there significant differences between self-directed learning readiness and TI, CIP, and PCU among elementary versus secondary grade level teachers?
4. Are there significant differences between self-directed learning readiness and TI, CIP, and PCU among different subject areas taught by K-12 teachers?
5. To what extent does the combination of self-directed learning readiness and other demographic variables predict the three factors of teaching innovation?

Each of these research questions were analyzed utilizing the analysis presented in Chapter 3. The results of each analysis are explained below with tables for ease of understanding. Discussion on the findings and their meanings is completed in Chapter 5.

Research Question 1

Is there a significant relationship between self-directed learning readiness and the factors of teaching innovation: levels of technology integration (TI), current instructional practices (CIP), and personal computer use (PCU) among K-12 teachers?

The first research question addressed the four main variables of the study and their potential correlation to each other. To perform this analysis, Pearson correlations (r) were conducted on each pair of variables. Results showed that the SDLRS positively correlated to the TI and CIP subscales at an alpha level of .05. The SDLRS and TI scores correlated at .226 with a p -value of .008. The R squared for this analysis was 5.1%; thus, the SDLRS explains the TI subscale scores at slightly above 5% of the variability. This is a statistically significant, though weak, correlation. The SDLRS and CIP scores correlated at .295 with a p -value of .001. This relationship is slightly stronger. The R squared for this analysis was at .087, which is significant and stronger. Therefore, SDLRS explains the CIP subscale scores at 8.7% of the variability. Both of these correlations are statistically significant, yet are weak and only explain a small piece of technology integration. There was no significant correlation between the PCU subscale and the SDLRS at an alpha level of .05. Table 10 shows the analysis in detail.

Research Question 2

Is there a significant relationship between teacher age and years of experience and the factors of teaching innovation (TI, CIP, and PCU) and self-directed learning readiness among K-12 teachers?

The second research question investigated the relationship between age and experience as they relate to the four main variables of the study (SDLRS, TI, PCU and CIP). The question regarding age refers to the teacher's age. The question on experience refers to the number of years of teaching experience in all schools. To perform this analysis, Pearson correlations (r) were conducted on each of the four main variables with age and experience. No significant relationships were found among any of the variables in this analysis. Age did not significantly correlate to SDLRS, TI, PCU, or CIP. Experience did not significantly correlate to SDLRS, TI, PCU or CIP. Table 11 and Table 12 illustrate the details of this analysis.

Table 10

Correlation of SDLRS to LoTi subscales

SDLRS correlation to	Correlation	R square	p-value
TI	.226	.051	.008**
PCU	.114	.013	.187
CIP	.295	.087	.001**

** $p < .01$

Table 11

Correlations of Age to SDLRS, TI, PCU, and CIP

Main Variable	With Age	<i>p</i> -value
SDLRS	.152	.078
TI	-.004	.965
PCU	-.029	.741
CIP	-.048	.577

Table 12

Correlations of Experience to SDLRS, TI, PCU, and CIP

Main Variable	With Experience	<i>p</i> -value
SDLRS	.038	.664
TI	-.016	.852
PCU	-.016	.851
CIP	-.084	.334

Research Question 3

Are there significant differences between self-directed learning readiness and TI, CIP, and PCU among elementary versus secondary grade level teachers?

In the third research question, participants noted the grade level or levels they taught at the current time. The researcher then categorized those grade levels into elementary, which included Kindergarten through sixth grade, and secondary, which included seventh through 12th grade. Four teachers indicated that they taught sixth, seventh, and eighth grades collectively. These teachers were labeled as secondary

because two of the three grades they taught were at the secondary level. All other teachers were defined easily as elementary or secondary.

To conduct analysis for this question, four independent *t*-tests were performed. From these *t*-tests, it was determined that only the CIP subscale score had a significant relationship with grade level ($p = .024$). According to the data, elementary teachers had a CIP mean of 4.59, and secondary teachers had a CIP mean of 4.02. The elementary teachers scored higher on the CIP subscale than did the secondary teachers, as they displayed higher comfort levels with student-centered instruction. Table 13 depicts the differences between grade levels.

Table 13

Elementary and Secondary Levels Related to SDLRS, TI, PCU and CIP

Main Variable	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p-value</i>
SDLRS						
Elementary	81	239.26	20.83	-.850	133.00	.397
Secondary	54	242.22	18.26			
TI						
Elementary	81	3.85	1.57	1.73	131.60	.086
Secondary	54	3.44	1.16			
PCU						
Elementary	81	3.26	1.55	1.35	133.00	.179
Secondary	54	2.91	1.34			
CIP						
Elementary	81	4.59	1.58	2.28	126.06	.024*
Secondary	54	4.02	1.33			

* $p < .05$

Research Question 4

Are there significant differences between self-directed learning readiness and TI, CIP, and PCU among different subject areas taught by K-12 teachers?

As discussed at the beginning of this chapter, the original subject areas listed for participants were combined to form the following breakdown: elementary inclusive, language arts/reading, math, science, social studies, special education and electives/other. To conduct analysis for this question, a one-way ANOVA was performed on each of the four main variables. No significant differences were found among the seven subject areas with any of the four main variables—SDLRS ($p = .503$), TI ($p = .695$), PCU ($p = .218$) or CIP ($p = .265$) at the alpha level of .05. The large number of elementary inclusive participants could explain why there is no relationship. Additionally, analysis was conducted on science and social studies, even though there were fewer than 10 participants per subject area, so a difference would not be likely. More discussion on the reasons for the potential lack of relationships is presented in Chapter 5.

Research Question 5

To what extent does the combination of self-directed learning readiness and other demographic variables predict the three factors of teaching innovation?

For this question, a step-wise regression was conducted to reduce multicollinearity and it was determined in the research questions already presented that there were relationships between some of the variables. Therefore, a step-wise regression was utilized to only pull in variables that were significant.

For the TI subscale, only the SDLRS was included into the model with an R-square of .051 ($p = .008$). While it is a significant model, it is very weak, with SDLRS

revealing only 5.1% of the variability in the TI subscale. For the CIP subscale, SDLRS and grade level were included in the model, resulting in an R-square of .118 ($p < .001$). This model is significant and a little stronger with 11.8% of the variability in CIP explained by SDLRS and grade level, yet overall is still a weak prediction. No significant model was found for PCU. Table 14 shows this analysis in detail.

Table 14

Prediction-Step-wise Regression

Model	B	Std. Error	T	Sig.	R-square	Model <i>p</i>- value
TI						
Constant	-.245	1.47	-1.66	.868		
SDLRS	.016	.006	2.68	.008	.051	.008**
CIP						
Constant	-1.05	1.49	-.704	.483		
SDLRS	.024	.006	3.82	.000		
Grade level	-.644	.249	-2.59	.011	.118	.000**

** $p < .01$

This prediction model shows that the SDLRS scale predicts levels of teaching innovation, the umbrella for which the TI, CIP, and PCU subscales are factors. The SDLRS predicts the CIP and the TI subscales with significance. Therefore, two of the three subscales can be explained somewhat by the SDLRS score. They are statistically significant correlations and predictions, yet they are weak and only explain a portion of teaching innovation. However, one can tentatively conclude that self-directed learning readiness predicts teaching innovation because it is statistically significant

Summary

This chapter has revealed several trends and findings related to the data. Teachers tend to have higher than mean level score for self-directed learning readiness as compared to adults in general. Additionally, an analysis of the data gathered by the web-survey for this study revealed that there was a positive correlation between self-directed learning readiness and levels of technology integration with this sample of teachers. Along those same lines, there was also a positive correlation between self-directed learning readiness and current instructional practices. These two findings combined illustrate that the more self-directed an individual teacher is, the more technology he or she is likely to integrate, and the more likely they are to engage in a learner-centered as opposed to a teacher-centered, classroom environment.

Interestingly, there was no significant relationship found between any of the four main variables and teacher age or experience. Regarding grade level, the findings show that elementary teachers are more likely to engage in learner-centered environments in their classrooms. Subject areas, however, were not related significantly to or different from any of the main variables in this study. Finally, prediction was found to occur within the variables. Self-directed learning readiness predicted levels of technology integration at 5%. Additionally, self-directed learning readiness and grade level predicted current instructional practices by 11.8%. These findings can be combined to show that self-directed learning readiness predicts teaching innovation. It should be cautioned that while this claim can be made because of statistical significance, it is still a weak prediction and only explains a small piece of the puzzle.

The following chapter addresses the findings of this study as explained above, with possible explanations for why relationships were, or were not, found among the variables. Additional discussion relates to the importance of these findings and possible implications discovered among the variables. The conclusion of the following chapter contains recommendations for future research.

CHAPTER 5

SUMMARY AND CONCLUSIONS

The past four chapters have presented the purpose and rationale, prior research, method, and findings of the study. The intent of this chapter is to provide a conclusive summary of the study as well as a more in depth look at the findings and their potential implications for both research and practice. The layout of the chapter includes a summary of the study, the major findings, implications and discussion of those findings, and recommendations for future research.

Summary of the Study

The purpose of this study was to investigate the relationship between technology integration and self-directed learning readiness among K-12 teachers in one large southeastern school district. The suggestion investigated was that self-directed learning might predict levels of teaching innovation. According to the literature, no study has explored the relationships between self-directed learning and teaching innovation. Therefore, current research is significant in three ways. First, it adds to the body of literature surrounding technology integration. Second, it contributes to the body of knowledge regarding adult learning, specifically, teachers as adult learners. Third, the correlations found between self-directed learning readiness and levels of teaching innovation could help teachers, professional development program directors, and administrators better understand how to integrate technology into their schools effectively.

To begin the study, a letter requesting permission to conduct the research was sent to the chosen school district. Permission was granted with the understanding that each

building level principal at each school would need to give their consent. Principals at all 85 schools in the district were contacted and given the opportunity to participate in the study. Fifteen of those principals granted their permission, allowing the research to proceed. Of these 15 schools, 10 were elementary schools, four were middle schools, and one was a high school. A web survey with demographic questions and the LPA/SDLRS (Guglielmino, 1977) and a link to the *LoTi Digital Age Survey* (Moersch, 2010) were sent to 722 teachers in the district who were employed by the 15 schools. In order to participate in the study, the teachers were asked to complete both surveys within a 2-week time period. Two reminder emails were sent out, and an opportunity to enter a raffle for an iPad as an incentive to complete the survey was given. Of these 722 teachers, 19% (135) completed both surveys. Proprietary analysis from SDLRS and *LoTi* instrument corporations were conducted first. Then, the results were emailed to the researcher who compiled them in SPSS for comparison purposes.

Demographic and descriptive analyses were conducted initially to determine the overall status of the sample. Five research questions drove this study. These questions related to relationships among the variables of self-directed learning readiness, levels of technology integration, current instructional practices, personal computer use, experience, age, grade level and subject area. Correlational analyses were used to compare the four main variables of the study: self-directed learning readiness, levels of technology integration, current instructional practices and personal computer use. Correlational analyses also were used to compare age and experience with the four main variables. Analysis to examine potential differences between grade levels and the four major variables was conducted utilizing four independent *t*-tests. Analysis to examine potential

differences between subject areas and the four major variables was conducted utilizing a one-way ANOVA.

Findings from the initial correlational and *t*-test analyses, showed that the SDLRS, or levels of self-directed learning readiness, correlated positively with levels of technology integration subscale, or TI ($r = .226$; $p = .008$), as well as with the CIP subscale, current instructional practices ($r = .295$; $p = .001$). Additionally, the findings revealed a difference between levels of CIP (current instructional practices) for elementary teachers versus secondary teachers. Elementary teachers scored higher overall on the CIP subscale than did secondary teachers.

The final research question is related to whether it was possible to predict teaching innovation from a combination of variables. A step-wise regression was utilized to test for prediction because the relationships explained above were already noted. The analysis indicated that the SDLRS predicted 5.1% of the variability in the TI subscale. While this is a significant percentage, it is a relatively weak explanation of the variability. Additionally a model of SDLRS and grade level predicted 11.8% of the variability in the CIP subscale—a stronger explanation of the variability, yet overall still a relatively weak model. However, the claim can be made that the SDLRS correlates significantly to and predicts two of the three subscales of the levels of teaching innovation, with the understanding that this correlation and prediction is relatively weak. Implications for these results are discussed in an upcoming section.

Major Findings

Discussion in this section revolves around the major findings of the study. Initially, the demographic and descriptive analyses are explained and are compared to

current research. Then, the relationship analyses are explained. Finally, the analysis for prediction is outlined. These results are compared to findings in current research.

Implications and discussion of these findings are presented in the following section.

1. The mean age of teachers who participated in the study was 42, with a range from 23 to 64. The mean experience level of teachers who participated in the study was 13 years, with a range of one to 39 years. Sixty percent of the sample ($n = 81$) were elementary teachers, and 40% ($n = 54$) were secondary teachers. Of the subject areas, elementary inclusive was the highest number, with 55 teachers falling into this category (40%). Thus, more elementary teachers responded to the study than did secondary teachers. However, more elementary teachers were surveyed, so the response rates related to grade level and subject area are comparable to those sampled.
2. The mean LPA/SDLRS score in major research for all adults is 214 (Guglielmino, 1977). In this study, the mean score was 240, which is above the mean score for all adults. Additional research shows that adults with higher levels of education tend to score higher on the LPA/SDLRS, which accounts for the higher mean score for the group of teachers surveyed, because teachers tend to have higher levels of education than all adults (Brockett, 1985; Guglielmino & Nowocien, 1998; Wagner, 2011). A higher level of education is assumed for teachers, because a bachelor's degree is required for a teaching certificate. Additionally, teachers typically have higher levels of education above a bachelor's degree, including master's degrees, and doctoral degrees.

3. The *LoTi Digital Age Survey* is given to teachers in schools across the country and varies considerably in its mean scores. In the current study, teachers' mean score was 2 out of 6 on the TI subscale. Teachers' mean PCU score, personal computer use, was a level 3 out of 7. For CIP, current instructional practices, the mean score was 4 out of 7. While a few teachers scored on the higher end of the TI and PCU subscale, the range of scores were negatively skewed suggesting that teachers in this sample are not achieving high levels of technology integration nor do they have high levels of personal computer use. It does appear, however, that these same teachers are making progress and moving toward a higher score on the current instructional practices subscale.
4. Self-directed learning readiness was found to be positively correlated to the TI subscale, levels of technology integration ($p = .008$), and the CIP subscale, current instructional practices ($p = .001$). This is a major finding and is discussed further in the next section.
5. No significant relationship was found between the PCU, personal computer use, subscale and any other variables. Additionally, no significant model was found to predict the PCU subscale. Interestingly, this is the only variable of the major four variables that did not show relationships. More discussion on the PCU subscale is presented in the next section.
6. Literature reviewed in Chapter 2 revealed mixed results related to age and experience and their relationship with technology integration (Eteokleous, 2008; Inan & Lowther, 2010b; Lee & Tsai, 2010; Norris, et al., 2003; Russell et al., 2004) as well as with self-directed learning readiness (Guglielmino & Nowocien,

1998). This study supports those findings in that no significant relationship was found between the four main variables (self-directed learning readiness, levels of technology integration, personal computer use, and current instructional practices) and age or experience.

7. The data revealed that elementary teachers tended to have higher mean CIP, current instructional practice, scores than secondary teachers. Several studies reviewed in the literature found elementary teachers to be higher users of technology. According to Moersch (2010), one cannot fully integrate technology without having a more student-centered approach to teaching, or CIP. Therefore, this finding is consistent with the research suggesting that elementary teachers tend to, or have the instructional practices to, integrate more technology into the classroom than secondary teachers (Barron et al., 2003; Russell, et al., 2004; Wozney, et al., 2006).
8. Results of the studies related to subject areas and technology integration that were reviewed in the literature in Chapter 2 were mixed. However, some research stated that social studies teachers were the lowest integrators (Zhao & Bryant, 2005) and that math (Russell et al., 2004), and science (Baron et al., 2003) teachers might be the highest technology integrators. However, in the current study, no significant differences were found between the subject areas of the participants and their levels of teaching innovation nor their levels of self-directed learning readiness.
9. Literature related to aspects of self-directed learning and technology integration (Baylor & Ritchie, 2002; Inan & Lowther, 2010a; Vannatta & Fordham, 2004),

revealed that self-directed learning readiness might be a predictor for levels of technology integration in the classroom. The study confirms that this is the case, showing a significant, yet weak, predictive model of self-directed learning readiness as a predictor of the TI subscale at 5%.

10. Additionally, in support of the suggestion presented in this study that self-directed learning readiness predicts levels of technology integration, the findings show that levels of CIP, current instructional practices, can be predicted by self-directed learning readiness and grade level with a model of 11.8% of the variability.
11. Overall, the data show that self-directed learning readiness predicted two of the three subscales of teaching innovation. Thus, the conclusion can be made that self-directed learning predicts levels of teaching innovation at a statistically significant level.

Implications and Discussions of the Findings

Initially, it is important to discuss briefly the participants of this study and their possible impact on the results. Many of the findings from the study could have been affected by the number of responses to the survey. The initial population ($N = 722$) of teachers was large; however, a response rate of 19%, while good, yielded only a small number of self-selected participants ($N = 135$). Delimitations of the study might have caused some of the results. For example, the 135 teachers who responded might have been more self-directed than the rest of the population, since they self-selected into the study. They also may have been higher technology users than the rest of the population, since it was a web-based survey with the possibility to win an iPad. It is important to

recognize these assumptions prior to discussion of the findings, but in all likelihood, they did not skew the results enough to warrant additional concern.

Elementary Teachers and Current Instructional Practices

Regarding the demographics of the study, interestingly, 55 of the 135 participants were elementary inclusive teachers. Elementary inclusive here does not refer to the commonly utilized inclusive term signifying special education students in a regular education classroom. Instead, elementary inclusive teachers are those who teach all core subject areas (math, science, social studies, and language arts/reading) at the elementary level and is a term developed by the researcher to label this group. The large number of responses from elementary inclusive teachers could have been related to the fact that more elementary schools responded to the initial research request than did middle and high schools. The high number of elementary inclusive teachers made finding difficult any differences among subject areas very difficult because no questions distinguishing how these teachers used technology differently in their four subject area lesson plans were asked.

The large number of elementary inclusive teachers, coupled with the fact that 60% of the participants were elementary teachers in general and were possibly teaching in more discipline-specific school settings instead of inclusive settings, allowed for a clear understanding that elementary teachers have higher levels of CIP, current instructional practices, than secondary teachers. Higher levels of CIP means these elementary teachers are more likely to incorporate student-centered learning activities in their classroom. Moersch (1999, 2010) suggests that in order to have high levels of teaching innovation, current instructional practices is an important component. To

explain further, in a classroom favoring student-centered lessons created by elementary teachers the potential for more technology integration and, thus, higher levels of teaching innovation exists. Therefore, the findings show that these elementary teachers have a higher level of teaching innovation than secondary teachers. This finding supports the research reviewed in Chapter 2, which indicated that elementary teachers integrated more technology than their secondary colleagues (Barron et al., 2003; Russell, et al., 2004; Wozney, et al., 2006).

From a teaching standpoint, then, the findings suggest that these types of teachers could be used as models for teaching high levels of student-centered instruction, which sets the groundwork for high levels of teaching innovation. From the research discussed in Chapter 2, it is clear that higher levels of technology integration increase student achievement. In order to reach high levels of teaching innovation, Moersch (2010) states that one needs to have not only high levels of technology integration but also high levels of current instructional practices and personal computer use. Therefore, those teachers who have higher levels of current instructional practices, such as the elementary teachers who participated in the study, are closer to achieving higher levels of teaching innovation than their colleagues, or have the potential to reach higher levels of teaching innovation than their colleagues. Learning how these elementary teachers' current instructional practices function in the classroom might be an ideal professional development opportunity for practicing teachers who did not score as high in the current instructional practices area. The finding explained here was related to grade level. Another significant finding, or lack of finding, relates to technological expertise.

Technology Expertise-A Non-Factor

It is interesting to note the lack of significant relationships and predictions among the variables related to the PCU, personal computer use, subscale. The PCU subscale did not correlate significantly with self-directed learning readiness, age, experience, grade level or subject area. As a reminder from Chapter 1, personal computer use refers to a “classroom teachers’ fluency level in using digital tools and resources for student learning” (Moersch, 2010, p. 20). Therefore, PCU refers directly to the teachers’ level of technological expertise. The lack of significant relationships between PCU and other variables suggests, therefore, that the ability level of the teacher, as it relates to technology, does not factor into their willingness or readiness to learn or integrate technology.

Teaching Innovation. The lack of significant relationships between PCU and other variables is important, because many training sessions on technological instruction focus on teachers’ actual fluency or expertise in technology and not on the overarching educational and instructional implications of the technology for student learning. The focus of training is often on the “how” and not the “why.” What can be inferred from the finding showing a lack of significant relationships between PCU and other variables is that it does not actually matter how fluent teachers are with the technology itself. What matters is that the teachers develop proper instructional practices in the classroom and have readiness for self-direction. The focus of professional development opportunities for teachers, then, might need to change. Instead of an emphasis on mastering the technology, current instructional practices and fostering self-directed learning might be a more important focus as these two variables have shown in the current study to predict

higher levels of teaching innovation. Literature reviewed in Chapter 2 on self-directed learning and professional development supports this change (e.g., Boyer, 2007; Hanor and Hayden, 2004). Changing the focus of professional development might be a paradigm shift but a necessary one to encourage more teachers to integrate technology in their classrooms.

Age/Experience. Additionally, the lack of significant relationships between PCU and other variables suggests that the age or experience of a teacher does not reflect their use of technology. Research reviewed in Chapter 2 related to technology use and age or experience revealed similar findings (Eteokleous, 2008; Inan & Lowther, 2010b; Lee & Tsai, 2010; Norris, et al., 2003; Russell et al., 2004). The lack of significant relationships between PCU and age or experience is important, because teachers who are older often tend to either self-state and/or others may assume that they are not technologically savvy. Older, more experienced teachers could take comfort in the results of this study, which illustrate that age and experience are not linked to technology expertise. Additionally, anyone who might have assumed that older teachers do not use technology as often as younger teachers should not dismiss them simply because of their age and experience. The implications of these findings are both important and contribute to the research on teachers' use of technology. Further research implications were found in the relationships related to self-directed learning readiness.

Self-Directed Learning

The study clearly suggests that the sample of teachers surveyed tended to be more self-directed than adults in general. This finding also is supported by literature reviewed in Chapter 2 (Brockett, 1985; Guglielmino & Nowocien, 1998; Wagner, 2011). Higher

levels of self-directed learning readiness among teachers could be due to teachers' higher levels of educational attainment overall, as discussed in the previous section, but whatever the reason, the readiness level for self-direction is clearly present. Because of this discovery, those involved in teaching and professional development for teachers might want to recognize the importance of incorporating self-directed learning activities into the learning programs for their teachers. Professional development leaders and administrators also could foster self-directed learning within the schools to encourage teachers to use the readiness they have. Incorporating self-directed activities into professional development could be beneficial for all types of learning, but this study suggests that incorporation of self-directed learning activities is important specifically for learning related to technology integration.

Self-Directed Learning and Teaching Innovation. This study reveals that self-directed learning readiness has not only a significant relationship to both levels of technology integration and current instructional practices but also is the predictor for two of the levels of teaching innovation. Because two out of three of the factors of teaching innovation were in the model, it is safe to say that self-directed learning readiness predicts teaching innovation. These relationships and predictions support the suggestion presented in this study that teachers who are more self-directed tend to integrate more technology in their instruction. While these correlations and predictions are statistically significant, it is important to be reminded that the models are relatively weak (5.1% and 11.8%) and only explain a portion of technology integration.

A potential reason for the relationship between self-directed learning readiness and technology integration is that teachers who integrate technology in their classrooms

must learn on their own at some level. While professional development opportunities are available for technology in most, if not all, schools or school districts, much of the time spent with technology involves teaching oneself how to adapt the technology to fit the lesson one is going to teach. Adapting lessons and utilizing different types of technology in the classroom requires a strong level of self-direction. Because teachers in general tend to be highly self-directed learners, learning technology this way might be easier for them; however, encouraging and fostering self-directed learning related to technology in schools will only increase the integration.

Additionally, the finding that self-directed learning readiness has a significant relationship with both levels of technology integration and current instructional practices also supports Moersch's (2010) claim that in order to integrate technology, one's teaching practices must be more student-centered in nature. As mentioned above, professional development opportunities often focus on the "how" of technology and not the why, leaving out the instructional practices that are necessary for effective technology integration. How to actually approach teaching with technology (teaching innovation) from an instructional standpoint is more difficult than just learning how the technology works. Teachers might overcome this gap in a self-directed manner. The findings of the study suggest that teachers who are more self-directed will have an easier time bridging this gap.

Professional Development

In support of the results of this study, it is important to note the practical implications of the findings on professional development opportunities for teachers. The results of this study demonstrate that teachers learning how to use technology in the

classroom would benefit from professional development opportunities that encourage and foster self-directed learning. Instructional practices also might need to also be incorporated in order to provide the most effective training possible. To foster self-directed learning, schools could incorporate learning opportunities that encourage readiness so that teachers have access to learn how to integrate technology without, or in addition to, the formal learning environment. Teachers also could also have opportunities to seek out on their own professional development related to technology integration that incorporates instructional practices.

The major findings and their implications presented above add to the body of research on technology integration as well as on self-directed adult learning. Prior to this study, no study could be found that incorporated the major variable of self-directed learning readiness with technology integration related to K-12 teachers. Therefore, this study contributes to the knowledge base by providing evidence that technology integration can be predicted, by self-directed learning readiness, although the relationship appears to be weak.

This study also adds to the body of research on self-directed learning in that it supports the notion that more educated adults tend to be more self-directed in nature and that teachers tend to be above average self-directed individuals. Because of this study, more has been uncovered related to the K-12 teacher as a learner.

Both practical and research-based implications were presented in this section. The following section relates to recommendations for future research.

Recommendations for Future Research

The population of this study was one large southeastern K-12 school district. Similar populations can be identified that would benefit from self-directed learning and the factors of teaching innovation. The following list describes recommendations for future research which might be conducted similarly to this study:

1. Future research could incorporate strategies to gather information from more diverse participants. Because this study included only 135 teachers, and of those, 55 were elementary inclusive, the results of the study could have been influenced by this elementary majority. Therefore, more secondary level teachers could be recruited to participate in the study, and more information related to subject area could be included. This could be accomplished by requesting permission to conduct research from the building level principals of secondary schools.
2. To address the first recommendation, more than one school district could be selected in future research. For this study, one school district was ideal. However, the research requirement that each building level principal be contacted could have caused fewer teachers to respond overall. If more than one school district is selected to take part in the research, more participants might be recruited.
3. In response to the concern that only high technology users responded to this study due to its web-based format and iPad incentive, future research could include two different approaches. For example, a paper-based survey could be administered along with the web-based survey for teachers who might not want to complete a web-based survey. Additionally, a more generic teacher incentive, like a gift card

to a classroom supply store, could be awarded instead of an iPad. This would deter teachers who love technology from responding to the survey, however.

4. Because the explanations of the variances of the prediction models were significant, but not strong, perhaps analysis in future studies could incorporate more variables. For example, while variables such as teacher readiness and teacher efficacy were discussed in the literature section, they were not incorporated in this study. Conducting analysis on more variables, particularly those that have shown high correlations in the past, could produce a more significant model for the prediction of technology integration.
5. Further studies could utilize a qualitative approach in conjunction with a survey to more fully understand the reasons behind teacher integration of technology. Utilizing a mixed methods approach might help to explain more of the variance in the levels of teaching innovation.

Concluding Comments

A journey through the process of preparing to teach a lesson in a K-12 classroom is a combination of planning, researching, testing, revising, and learning. In a world of new accountability, as discussed in Chapter 1, the stakes are higher and the job, more stressful. Teachers are continuously seeking to learn and grow and opportunities for professional development continue to be available. It is the researcher's hope with this study, however, that no more time be wasted on educating teachers technology itself, but instead, they should be taught how to use technology in educating their students. It is a distinct difference, yet sometimes hard to explain and hard to convey to someone who is not proficient in technology integration.

Exploring teachers in this study has hopefully increased awareness of the ways in which teachers learn and in what they need to be teaching innovators. Allowing teachers to practice self-directed learning would not only increase their ability to integrate technology, but also would increase their confidence level. The saying, “trying to fit a square peg into a round hole” comes to mind when thinking about the current state of professional development related to technology in teaching. Instead of forcing this square peg, let us instead develop and mold the teacher’s instructional practices so that the peg, or technology, fits nicely into the instructional atmosphere of the classroom.

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APPENDIX

APPENDIX A

Demographic Questions

1. For research purposes, it would be very beneficial to get your age. Please list your age in the box below.

2. How many years of teaching experience do you have? Please combine all districts and years and list that number in the box below.

3. What is your current grade level position? (Please check next to your grade level)

K
1
2
3
4
5
6
7
8
9-12

4. If at the middle or high school level, please indicate your current subject area.
If at the elementary level, please leave blank.

Language Arts	Math
Reading	Science
Foreign Language	Social Studies
Physical Education	Technology
Family and Consumer Science	Business
Special Education	Other

APPENDIX B

LPA/SDLRS Questions and Responses

1. I'm looking forward to learning as long as I'm living.
2. I know what I want to learn
3. When I see something that I don't understand, I stay away from it.
4. If there is something I want to learn, I can figure out a way to learn it.
5. I love to learn.
6. It takes me a while to get started on new projects.
7. In a classroom, I expect the teacher to tell all class members exactly what to do at all times.
8. I believe that thinking about who you are, where you are, and where you are going should be a major part of every person's education.
9. I don't work very well on my own
10. If I discover a need for information that I don't have I know where to go get it.
11. I can learn things on my own better than most people.
12. Even if I have a great idea I can't seem to develop a plan for making it work.
13. In a learning experience, I prefer to take part in deciding what will be learned and how.
14. Difficult study doesn't bother me if I'm interested in something.
15. No one but me is truly responsible for what I learn.
16. I can tell whether I'm learning something well or not.
17. There are so many things I want to learn that I wish that there were more hours in a day.
18. If there is something I have decided to learn, I can find time for it, no matter how busy I am.
19. Understanding what I read is a problem for me.
20. If I don't learn, it's not my fault.
21. I know when I need to learn more about something.
22. If I can understand something well enough to get a good grade on a test, it doesn't bother me if I still have questions about it.
23. I think libraries are boring places.
24. The people I admire most are always learning new things.
25. I can think of many different ways to learn about a new topic.
26. I try to relate what I am learning to my long-term goals.
27. I am capable of learning for myself almost anything I might need to know.
28. I really enjoy tracking down the answer to a question.
29. I don't like dealing with questions where there is not one right answer.
30. I have a lot of curiosity about things.
31. I'll be glad when I'm finished learning.
32. I'm not as interested in learning as some other people seem to be.
33. I don't have any problem with basic study skills.
34. I like to try new things, even if I'm not sure how they will turn out.
35. I don't like it when people who really know what they're doing point out mistakes that I am making.
36. I'm good at thinking of unusual ways to do things.
37. I like to think about the future.

38. I'm better than most people are at trying to find out the things I need to know.
39. I think of problems as challenges, not stopsigns.
40. I can make myself do what I think I should.
41. I'm happy with the way I investigate problems.
42. I become a leader in group learning situations.
43. I enjoy discussing ideas.
44. I don't like challenging learning situations.
45. I have a strong desire to learn new things.
46. The more I learn, the more exciting the world becomes.
47. Learning is fun.
48. It's better to stick with the learning methods that we know will work instead of always trying new ones.
49. I want to learn more so that I can keep growing as a person.
50. I am responsible for my learning—no one else is.
51. Learning how to learn is important to me.
52. I will never be too old to learn new things.
53. Constant learning is a bore.
54. Learning is a tool for life.
55. I learn several new things on my own each year.
56. Learning doesn't make any difference in my life.
57. I am an effective learner in the classroom and on my own
58. Learners are leaders.

Responses:

Almost never true of me; I hardly ever feel this way.

Not often true of me; I feel this way less than half the time.

Sometimes true of me; I feel this way about half the time.

Usually true of me; I feel this way more than half the time.

Almost always true of me; there are very few times when I don't feel this way.

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APPENDIX C

LoTi Questionnaire¹

Read each response and assign a score based on the following scale:

0 1 2 3 4 5 6 7

N/A Not true of me now Somewhat true of me now Very true of me now

1 Score _____

I design projects that require students to analyze information, think creatively, make predictions, and/or draw conclusions using electronic resources such as multi-purpose calculators, hand-held computers, the classroom computer(s), or computer peripherals (e.g., digital video cameras, probes, MIDI devices).

2 Score _____

I use our classroom computer(s) primarily to present information to students using presentation software (e.g., PowerPoint) or interactive white boards because it helps students better understand the content that I teach.

3 Score _____

I currently use instructional units acquired from colleagues, curriculum resource catalogs, or the internet that integrate the use of computers with higher order thinking skills and student-directed learning (e.g., students generate questions, define tasks, set goals, self-assess learning).

4 Score _____

Students in my classroom design either web-based or multimedia presentations to showcase their research (e.g., information gathering) on topics that I assign in class.

5 Score _____

I have experienced past success with designing and integrating web-based projects that emphasize complex thinking skill strategies such as problem-solving, creative problem solving, investigation, scientific inquiry, or decision-making.

6 Score _____

My students collaborate with me in setting both group and individual academic goals that provide opportunities for them to direct their own learning within my classroom curriculum.

7 Score _____

I have stretched the limits of instructional computing in my classroom using the most current and complete technology infrastructure (e.g., small student/computer ratio, high-speed internet access, updated computer software, teleconferencing capability).

8 Score _____

Students in my classroom use the available technology resources (e.g., websites, multimedia applications, spreadsheets, MIDI devices) to complete projects that focus on critical content and higher order thinking skills (e.g., analysis, synthesis, evaluation).

9 Score _____

I use computers primarily to support my classroom management tasks such as taking attendance, posting assignments to a web page, using a grade book program, and/or communicating with parents via email.

10 Score _____

In my classroom, students use multiple software applications/hardware peripherals (e.g., internet browsers, productivity tools, multimedia applications, digital video cameras, MIDI devices) as well as resources beyond the school building (e.g., partnerships with business professionals, other schools) to solve problems of interest to them.

¹ LoTi questionnaire referenced from Johnson (2006).

LoTi Questionnaire

Read each response and assign a score based on the following scale:

0 1 2 3 4 5 6 7

N/A Not true of me now Somewhat true of me now Very true of me now

11 Score _____

In my classroom, students use computers primarily to improve their basic skills or understand better what I am teaching them with the aid of supplemental instructional resources (e.g., CD's, internet, integrated learning systems-ILS, tutorial programs).

12 Score _____

Technical problems prevent me and/or my students from using the classroom computers during the instructional day.

13 Score _____

I access the computer daily to browse the internet, send/ receive email, and/or use different productivity and multimedia tools (e.g., word processor, spreadsheet, database, presentation software).

14 Score _____

I empower my students to discover innovative ways to use our school's vast technology infrastructure to make a real difference in their lives, in their school, or in their community.

15 Score _____

I am proficient with and knowledgeable about the technology resources (e.g., hardware, software programs, peripherals) appropriate for my grade level or content area.

16 Score _____

Locating good software programs, websites, or CD's to supplement my curriculum and reinforce specific content is a priority of mine at this time.

17 Score _____

Getting more comfortable with using computers during my instructional day is my goal for this school year.

18 Score _____

I have the background to assist others in the use of a variety of software applications (e.g., Excel, Inspiration, PowerPoint), the internet (web browsers, web page construction and design), and peripherals (e.g., digital video cameras, probes, MIDI devices).

19 Score _____

The current student-to-computer ratio in my classroom(s) is not sufficient for me to use computer(s) during my instructional day.

20 Score _____

I consistently provide alternative assessment opportunities (e.g., performance-based assessment, peer reviews, self-reflection) that encourage students to "showcase" their content understanding in nontraditional ways.

21 Score _____

In my classroom, students use the internet for (1) collaboration with others, (2) publishing, (3) communication, and (4) research to solve issues and problems of personal interest to them that address specific content areas.

LoTi Questionnaire

Read each response and assign a score based on the following scale:

0 1 2 3 4 5 6 7

N/A Not true of me now Somewhat true of me now Very true of me now

22 Score _____

Students in my classroom participate in online collaborative projects (not including email exchanges) with other entities (e.g., schools, businesses, organizations) to find solutions, make decisions, or seek a resolution to an issue of importance to them.

23 Score _____

Given my current curriculum demands and class size, it is much easier and more practical for students to learn about and use computers and related technologies outside of my classroom (e.g., computer lab).

24 Score _____

I use my classroom computer(s) primarily to locate and print out lesson plans appropriate to my grade level or content area.

25 Score _____

Using the classroom computers is not a priority for me this school year.

26 Score _____

I do not have to call someone (e.g., computer technician, network manager) to figure out a problem with my computer or a software application; I have the confidence and expertise to "fix" it myself.

27 Score _____

I prefer using previously-developed curriculum materials (e.g., instructional kits, existing web based projects) that

(1) emphasize complex thinking skill strategies (e.g., creative problem-solving, decision-making, investigation),

(2) promote the use of computers, and (3) provide opportunities for students to direct their own learning.

28 Score _____

My students' creative thinking and problem-solving opportunities are supported by our school's extensive technology infrastructure (e.g., high-speed internet access, unlimited access to computers, updated computer software, multimedia and video production stations).

29 Score _____

My personal professional development involves investigating and integrating the newest innovations in instructional design and computer technology that takes full advantage of my school's extensive technology infrastructure (e.g., immediate access to the newest software applications, multimedia and video production stations, teleconferencing equipment).

30 Score _____

I favor previously-developed curriculum materials (e.g., instructional kits, existing web-based projects) that emphasize students using technology to solve "real" problems or issues of importance to them rather than building my own instructional units from scratch.

31 Score _____

I have an immediate need and interest in contacting other teachers, "qualified" consultants, and/or related professionals who can assist me in my ongoing effort to design and manage student-directed learning experiences using the available computers.

LoTi Questionnaire

Read each response and assign a score based on the following scale:

0 1 2 3 4 5 6 7

N/A Not true of me now Somewhat true of me now Very true of me now

32 Score _____

Students' use of information and inquiry skills to solve problems of personal relevance guides the types of instructional materials used in and out of my classroom.

33 Score _____

I take into consideration my students' background, prior experiences, and desire to solve relevant problems of interest to them when planning instructional activities that utilize our available technology.

34 Score _____

I am able to design my own student-centered instructional materials that take advantage of our existing computers to engage students in their own learning (e.g., students generate questions, define tasks, set goals, self-assess learning).

35 Score _____

I alter my instructional use of the classroom computer(s) based upon (1) the newest software and web-based innovations and (2) the most current research on teaching and learning (e.g., differentiated instruction, problem-based learning, multiple intelligences).

36 Score _____

Students applying what they have learned in the classroom to a real world situation (e.g., student-generated recycling program, student-generated business, student-generated play/musical) is a vital part of my instructional approach to using the classroom computer(s).

37 Score _____

I need more training on using technology with relevant and challenging learning experiences for my students rather than how to use specific software applications to support my current lesson plans.

38 Score _____

An ongoing goal of mine is for students to learn how to create their own web page or multimedia presentation that shows what they have been learning in class.

39 Score _____

The types of professional development offered through our school, district, and/or professional organizations does not satisfy my need for bigger, more engaging experiences for my students that take advantage of both my "technology" expertise and personal interest in developing student-centered curriculum materials.

40 Score _____

My students use the classroom computer(s) for research purposes that require them to investigate an issue/problem, think creatively, take a position, make decisions, and/ or seek out a solution.

41 Score _____

Having students apply what they have learned in my classroom to the world they live in is a cornerstone to my approach to instruction and assessment.

LoTi Questionnaire

Read each response and assign a score based on the following scale:

0 1 2 3 4 5 6 7

N/A Not true of me now Somewhat true of me now Very true of me now

42 Score _____

The curriculum demands at our school such as integrating standards and increasing student test scores have diverted my attention away from using the computers in my classroom.

43 Score _____

I have the background and confidence to show others how to merge technology with relevant and challenging learning experiences that emphasize higher order thinking skills and provide problem-solving opportunities for students.

44 Score _____

Though I currently use a student-centered approach when creating instructional units, it is still difficult for me to design these units on my own to take full advantage of our classroom computers.

45 Score _____

My immediate professional development need is to learn how my students can use my classroom computer(s) to achieve specific outcomes aligned to district or state standards.

46 Score _____

It is easy for me to identify software applications, peripherals, and web-based resources that support and expand student's critical and creative thinking skills, and promote self-directed problem solving.

47 Score _____

My students have immediate access to all forms of the most current technology infrastructure available (e.g., easy access to newest computers, latest software applications, small student/computer ratio, video or teleconferencing kiosks) that they use to pursue problem-solving opportunities surrounding issues of personal and/or social importance.

48 Score _____

I need access to more resources and/or training to start using computers as part of my instructional day.

49 Score _____

I frequently explore new types of software applications, web-based tools, and peripherals as they become available.

50 Score _____

Students' questions and previous experiences heavily influence the content that I teach as well as how I design learning activities for my student.

APPENDIX D

Letter to District of Study

April 24, 2012

Dear Research Granting Person:

I am a PhD student at the University of Tennessee, Knoxville, pursuing a degree in Educational Psychology and Research with a major in Adult Education and a cognate in Instructional Technology. I have filled out your application for research in _____ Schools. I am an Assistant Principal at the Middle School level, but I live in _____ County and appreciate the level of education your system provides this county's children. I am avoiding utilizing my own school district due to bias and size and I am hopeful you will allow me to conduct my research in _____ County.

The reason I am writing you this letter is that I see on your application that _____ Schools requires approval from the Institutional Review Board prior to approval of research requests. However, the IRB at the University of Tennessee has the same requirements and will not approve my research until I have received approval from the district where I will be conducting my study. I have therefore written this letter and had it signed by my major professor, Ralph G. Brockett, to show that my committee and my department are aware of and support my research and fully anticipate IRB approval.

My intent is to hopefully secure approval for my research from _____ Schools. At that time, I will immediately seek approval from the IRB at UT. When I receive IRB approval through UT, I will immediately send that approval letter on to you, prior to beginning any research at _____ Schools. Please consider approving this project in this order, as I know it is out of your norm, but it would really help me to be able to conduct my research. Thank you for considering my request.

Sincerely,

Julia M. Kirk, PhD Student UT

Ralph G. Brockett, Major Professor

APPENDIX E

Email to Principals

Email to: Building Level Administrators in School District

From: Julia Kirk

Subject: How are your teachers integrating technology? *Research participation request*

Dear Building Level Administrator:

I am a PhD student at UT in Education and a teacher in _____ Schools. I am interested in learning how teachers integrate technology into their classrooms. _____ Schools, through _____, has allowed me to contact you today to see if you are able to help me with my research.

I am interested in sending your teachers an email survey about (1) their technology integration habits and (2) their level of self-directed learning readiness. I think there might be a relationship between integrating technology in the classroom and being a self-directed individual. This survey can help you and your district better plan professional development for your teachers related to technology integration in the classroom.

This study is for my dissertation research and I am excited to have the opportunity to contact you today. Please consider allowing me to email your teachers at the beginning of May so that they can complete a survey for me. The survey will take your teachers about 30 minutes to complete. They will get the survey as a link in their email, which I will gather from your school webpage if you give me permission. Then, I will send a follow up email 5 days later to see if anyone else would like to participate. The total time this survey will circulate in email in your building will be two weeks.

I am also excited to offer one lucky teacher an iPad for participating in my survey. We can always use additional tools in the classroom! Please kindly respond to this email and let me know if you are interested in allowing me to conduct research in your building through the email survey. I understand your teachers have had an overwhelming year, but this survey might help them learn how they learn, self-reflection, which is a great way to end the year!

I look forward to hearing from you soon! Please do not hesitate to contact me if you would like more detailed information as to the instrumentation for this study or the proposed analysis.

~Julia Kirk

Curriculum and Technology Integration Facilitator

PhD Student in Educational Psychology and Research, Adult Learning

APPENDIX F

Email to Teachers to Participate

Email to: Chosen Teachers
From: Julia Kirk
Subject: *A local research study request---win an iPad!!*

Dear Educator:

I am a fellow teacher, in _____ Schools, working to get my PhD in Education at UT. I am hoping you will help me out! I am conducting my dissertation study with teachers in your school district on how they learn technology and integrate it in their classroom. Don't worry about how much technology you integrate right now, I am just interested in your habits and your style of learning. Please take a moment to complete my survey using the link below.

Your building level principal has given me permission to contact you. I am also excited to tell you that once you complete this survey, you will be automatically registered for a free iPad! We can all use more tools in the classroom! Just above the survey link below, there is a number. Please utilize this number when filling out the survey; it is unique to you. Don't worry; once I get all the data, I will delete the numbers so that your answers will remain anonymous.

I do hope you take the time to complete the survey! Please do not hesitate to contact me if you would like more detailed information as to the instrumentation for this study or the proposed analysis, or if you have any questions at all. Please take the survey as soon as you can, but the window will last until May 25th.

Unique number:
Survey Link:

~Julia Kirk
Curriculum and Technology Integration Facilitator
PhD Student in Educational Psychology and Research, Adult Learning

APPENDIX G

Informed Consent

You are invited to participate in a study on Technology Integration as it relates to Learning Preference. The purpose of this research project is to investigate the relationship between your learning preference and how much you integrate technology into your classroom. Your answers are strictly confidential and will in no way affect your job or pay. This survey is completely voluntary and you may stop answering at any time. It is estimated that it will take 30 minutes to complete.

If you would like more information as to the results of this study or the study's purpose, please feel free to email the researcher: Julia Kirk at jvolk@utk.edu. Julia Kirk is a PhD student in the Educational Psychology and Research Department at the University of Tennessee. She is pursuing her degree in Adult Education. Julia's major professor and advisor is Dr. Ralph Brockett, brockett@utk.edu.

By clicking on the I agree button below, you are giving your consent to take this survey.

APPENDIX H

Reminder Email to Teachers, May 21st

Dear Educator:

The following email was sent to you last week regarding a local research request and an iPad drawing. The deadline for completion of this survey for the iPad drawing is Friday, May 25th. Please consider completing this survey to help out a local teacher!

I am a fellow teacher, in _____ Schools, working to get my PhD in Education at UT. I am hoping you will help me out! I am conducting my dissertation study with teachers in your school district on how they learn technology and integrate it in their classroom. Don't worry about how much technology you integrate right now, I am just interested in your habits and your style of learning. Please take a moment to complete my survey using the link below.

Your building level principal has given me permission to contact you. I am also excited to tell you that once you complete the entire survey (both parts), you will be automatically registered for a free iPad! We can all use more tools in the classroom! Just above the survey link below, there is a number. Please utilize this number when filling out the survey; it is unique to you. Don't worry; once I get all the data, I will delete the numbers so that your answers will remain anonymous.

I do hope you take the time to complete the survey! Please do not hesitate to contact me if you would like more detailed information as to the instrumentation for this study or the proposed analysis, or if you have any questions at all. Please take the survey as soon as you can, but the window will last until May 25th.

Unique number: UT3000

Survey Link: <http://survey.utk.edu/mrIWeb/mrIWeb.dll?I.Project=JKIRKDISSERTATION>

~Julia Kirk

Curriculum and Technology Integration Facilitator

PhD Student in Educational Psychology and Research, Adult Learning

APPENDIX I

Reminder Email to Teachers, May 25th

Dear Educator:

There are only 8 hours left for your chance to win an iPad! You should have received the email below related to a survey opportunity where, upon completion, you will be registered to win an iPad. The drawing for the iPad will occur at 5:00 today, May 25th, so not much time is left! Please consider helping me out with my dissertation now that the kids are gone and you might have a moment to breathe. I would really, really appreciate it!

I am a fellow teacher, in _____ Schools, working to get my PhD in Education at UT. I am hoping you will help me out! I am conducting my dissertation study with teachers in your school district on how they learn technology and integrate it in their classroom. Don't worry about how much technology you integrate right now, I am just interested in your habits and your style of learning. Please take a moment to complete my survey using the link below.

Your building level principal has given me permission to contact you. I am also excited to tell you that once you complete this survey, you will be automatically registered for a free iPad! We can all use more tools in the classroom! Just above the survey link below, there is a number. Please utilize this number when filling out the survey; it is unique to you. Don't worry; once I get all the data, I will delete the numbers so that your answers will remain anonymous.

I do hope you take the time to complete the survey! Please do not hesitate to contact me if you would like more detailed information as to the instrumentation for this study or the proposed analysis, or if you have any questions at all. Please take the survey as soon as you can, but the window will last until May 25th.

Unique number: UT3022

Survey Link: <http://survey.utk.edu/mrIWeb/mrIWeb.dll?I.Project=JKIRKDISSERTATION>

~Julia Kirk

Curriculum and Technology Integration Facilitator

PhD Student in Educational Psychology and Research, Adult Learning

VITA

Julia Kirk was born in Cincinnati, Ohio, and grew up in Franklin, Tennessee. Her father is an electrician and her mother is an accountant. She is currently married with two dogs, one cat, and a child on the way due very close to this dissertation defense. Julia and her husband Andrew have lived in the Knoxville area for the past 12 years, but have just recently moved to the Tri-cities area for a job opportunity. Julia attended the University of Tennessee, Knoxville for her undergraduate degree, which she received in Accounting in 2004. Julia did not spend much time in the Accounting field before deciding to return to school to pursue her Master's in Business Education from Middle Tennessee State University, which she obtained in December of 2005. Julia spent three years teaching business in a classroom environment before transitioning to a Curriculum and Technology Integration Facilitator.

The transition to Curriculum and Technology Integration Facilitator for Oak Ridge Schools occurred concurrently with enrolling in the PhD program at the University of Tennessee in Educational Psychology and Research with a major in Adult Education. Julia has worked full time as a Curriculum and Technology Integration Facilitator throughout her PhD process. Additionally, this past year, Julia took on the role of Interim Assistant Principal at a middle school in Oak Ridge. She also decided to add on her administrative credentials for administration in public K-12 education. Currently, Julia has taken on a new position as a Regional Data Analyst for the First Tennessee Region in Johnson City. This role allows her to work with teachers on student achievement data.

Julia has participated in the Self-Directed Learning Research Group at the University of Tennessee with Ralph Brockett and others. With this group, a collaboration of students has presented at the ISDLS and has published one article, with one on the way in the IJSDL.