Abstract

Title of Document: ASSESSING THE LEVEL OF TECHNOLOGY INTEGRATION OF TITLE I TEACHERS IN A LARGE URBAN SCHOOL DISTRICT

Terri Jefferson, Doctor of Education, 2016

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By law, Title I schools employ teachers who are both competent in their subject knowledge and State certified. In addition, Title I teachers receive ongoing professional development in technology integration and are equipped with the latest innovative resources to integrate technology in the classroom. The aim is higher academic achievement and the effective use of technology in the classroom. The investment to implement technology in this large urban school district to improve student achievement has continued to increase. In order to infuse current and emerging technology throughout the curriculum, this school district needs to know where teachers have, and have not, integrated technology. Yet the level of how technology is integrated in Title I schools is unknown. This study used the Digital-Age Survey Levels of Teaching Innovation (LoTi) to assess 508 Title I teachers' technology integration levels using three major initiatives purchased by Title I— the iPads program, the Chromebook initiative, and the interactive whiteboards program. The study used a quantitative approach. Descriptive statistics, regression analysis, and statistical correlations were used to examine the relationship between the level of technology integration and the following dependent variables:

personal computer use (PCU), current instructional practices (CIP), and levels of teaching innovation (LoTi). With this information, budgetary decisions and professional development can be tailored to the meet the technology implementation needs of this district. The result of this study determined a significant relationship between the level of teaching innovation, personal computer use, and current instructional practices with teachers who teach with iPad, Chromebook, and/or interactive whiteboard. There was an increase in LoTi, PCU, and CIP scores with increasing years of experience of Title I teachers. There was also a significant relationship between teachers with 20 years or more teaching experience and their LoTi score.

ASSESSING THE LEVEL OF TECHNOLOGY INTEGRATION OF TITLE I TEACHERS IN A LARGE URBAN SCHOOL DISTRICT

by

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Dissertation submitted to the Faculty of the Graduate School of the University of Maryland, College Park, in partial fulfillment of the requirements for the degree of Doctor of Education
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Dedication

To my late mother, Kathryn Wilson, who passed away a month before I started this journey, to my husband, Kevin Jefferson, and my two children, Avian and Jared. Thank you for your never-ending faith, encouragement, and many sacrifices.

Acknowledgements

First, I would like to thank my committee members; Dr. David Imig, Dr. Margaret McLaughlin, Dr. John Norris, and Dr. Pamela Shetley, for their guidance throughout this process. My advisor and committee chair, Dr. Tom Davis, was patient in giving me encouragement and advice. He helped make writing my dissertation a rewarding experience and I am deeply grateful for his assistance. Whenever I had a question, Dr. Davis always had the answer.

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CHAPTER 1: INTRODUCTION

The integration of technology in the classroom is critical for 21st century learning. Students who have easy access to current information, eBooks, and digital resources develop skills needed for higher learning and workplace demands: critical thinking, effective collaboration, communication, and technological skills (Partnership for 21st Century Skills, 2015; Shapley, Sheehan, Maloney, & Caranikas-Walker, 2010). For students in Title I schools, which are schools with a large low-income student population that meet the definition and requirements for students to be eligible to receive Title 1 funds, technological engagement not only improves their academic achievement, but increases global economic competitiveness and enhances home-to-school connections. These students not only need access to technology themselves, but students better engage in technology when their teachers have a developed technological literacy (Blair, 2012; Duncan, 2011).

Over the last five years, a growing number of large urban school districts across the country have provided students and teachers with wireless internet access, one-to-one laptops, interactive whiteboards, and mobile devices as a means to improve student education (Cisco, 2013). In the district that was studied, the Title I office has also provided technology training and professional development for over 1,000 teachers aimed towards the integration of iPads, interactive whiteboards, and web 2.0 tools into their daily lessons (District's Technology Plan, 2008). However, the district's Title I Office Technology Survey (September, 2012) revealed that the majority of teachers did not utilize the given technology devices even after training.

Recent findings are consistent with earlier work in underlying the importance of ongoing professional development and professional learning communities to equip teachers to integrate technology in the classroom (Ehrlich, Sporte, & Sebring, 2013). If teachers are receiving training, why have the majority failed to integrate technology into their classrooms? Schools have been under pressure to increase the supply of technology equipment for student use in the classroom and for the administration of computer-based assessments (Bryant, 2008). As the technology supply has increased, so does the demand for effective professional development. It was critical to measure the level at which teachers utilize technology to enhance learning in order to help them utilize them more.

Problem Statement

In the district studied, each Title I teacher received over 151 hours of professional development in technology integration each year over a 3-year period. The professional development occurred after school, during collaborative planning, in professional learning communities, and during summer sessions. Training included integrating web 2.0 tools into lessons, interactive whiteboard utilization, iOS Apple basics, mobile learning, Cyber-Safety and digital citizenship, collaboration and communication tools such as educational social media apps and Edmodo, Google Apps for Education, multimedia productivity, and best practices for the 21st century classroom such as challenge-based learning and student-directed activities.

Despite the investment in time and money, a formal evaluative study has not been conducted on the District's state of technology implementation in Title I schools (District's Technology Plan, 2008). Therefore, it was imperative to assess the current levels of technology integration in Title I Schools in accordance with the Maryland Technology Teacher Standards (MTTS) and the International Society of Technology in Education (ISTE) Standards for teachers.

Justification/Rationale

Approximately 95% of all Title I classrooms have Interwrite Boards, a brand of digital interactive whiteboards. According to a quarterly technology usage survey administered by the district's Title I Office in 2012, 30% of Title I teachers reported that they use interactive whiteboards daily during instruction. As shown in the chart below, the national daily usage average of interactive whiteboard by teachers according to the 2012 Public Broadcasting Service Learning Media survey is 54% (PBS Learning Media, 2013).

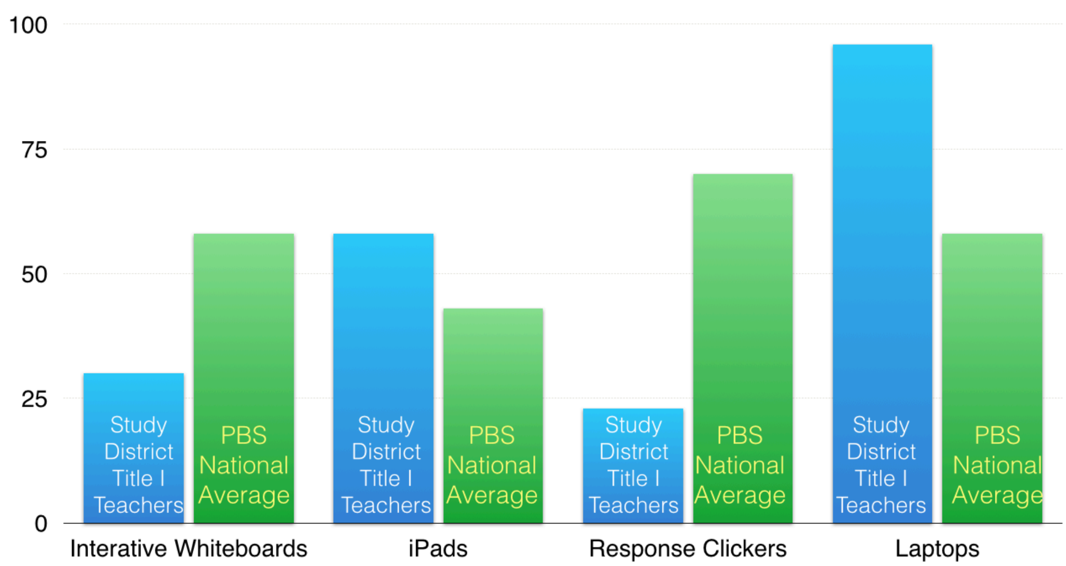

Figure 1. Title I Teachers verses the PBS National Average usage during daily instruction (2014)

The district has invested more than $5 million of Title I funding on technology, professional development, and consultants in an effort to enhance instructional delivery in Title I schools. Even though extensive efforts have been made to provide Title I schools with technology support and resources, teachers have not been assessed on their ability to use technology and the quality of how they implement the resources and services they receive. The challenge is more than just providing the technology; it is getting teachers to utilize the technology effectively.

The purpose of this study was to assess the levels of technology integration of Title I teachers in a large urban district in order to determine what factors play a part in the successful integration of technology resources in Title I schools. Bingimlas (2009) revealed lack of teacher confidence, lack of teacher competence, resistance to change and negative attitudes, lack of time, lack of effective training, lack of accessibility, and lack of technical support all play a part in the successful integration of technology in schools. According to Buabeng-Andoh (2012), leadership is one of the factors affecting the successful integration of technology. Recent studies also revealed that high levels of efficacy in teaching confirmed feelings of confidence and the ability to design and implement enriching instructional experiences (Teo, 2009). One study adapted to measure self-efficacy of teachers who integrated technology defined a learner's confidence in using computer technology in a learning context or a classroom setting (Wang, Ertmer, & Newby, 2004). According to Teo (2009), "emphasis should be placed on building teachers' capacity and awareness of their ability to use technology with an understanding towards transforming classroom practices. Teachers must not only be able to use the technology of the day, but be prepared to handle tools of the future" (p.13).

Characteristics vital to 21st century teaching and learning skills include effective use of digital tools and resources to promote higher order thinking, engaged student learning, and authentic assessment practices in the classroom. Title I teachers are provided with a wealth of technology resources to assist with academic achievement. Yet, despite greater access and training opportunities, educational technology remains underutilized in many classrooms. This study used a quantitative correlational approach to assess the technology integration of Title I elementary and middle school teachers. The results of this study aimed to provide large urban school districts with information useful for technology acquisition, integration, distribution, and professional development.

Data. The number of Title I schools increased from 44 schools in 2011 to 75 schools in 2014. Of the 207 schools in this urban school district, 36% are Title I (District's Facts and Figures, 2015). There are 125,136 students in this district, and 26.9% are students who attend a Title I school (Figure 2). In this district, 50% of all middle schools, 50% of all elementary schools, and 25% of all K-8 academies are Title I schools. Due to eligibility guidelines, none of the high schools in the district received Title I funding. Of the 9,197 teachers in the school district, 22% teach in a Title I school. The number of Title I schools receiving additional technology has resulted in challenges for the Title I Office to provide quality resources and services to help ensure that all students meet challenging state academic standards in core academic areas.

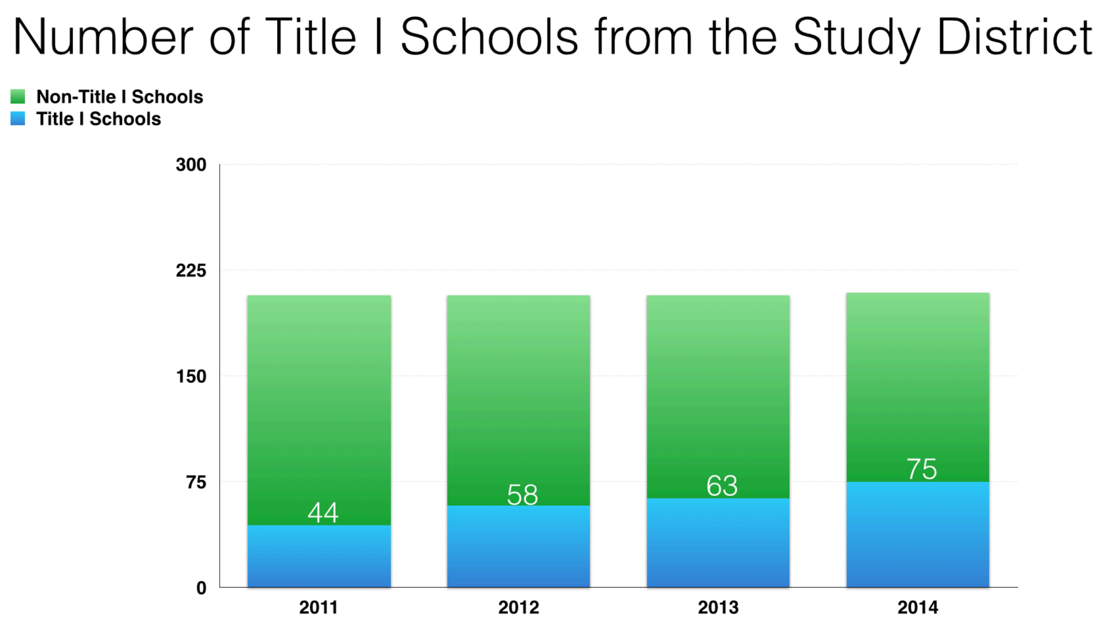

Figure 2. Number of Title I schools in the District

The district's Title I office has increased access to technology for all of its schools (Table 1). The number of Title I schools has steadily increased in the district over the past four years. Currently, five middle schools and three elementary schools are participating in a one-to-one iPad initiative comprising over 5,000 iPads for teachers and students. There are 69 schools with interactive whiteboards in each classroom, totaling 1,589 interactive whiteboards. The Title I Office has added over 600 computers in all of its first-grade classrooms and 100 laptop carts in middle schools to assist with supplemental programs and productivity, which are digital and online resource tools that allow teachers to enhance student learning, promote creativity, save time, and work more efficiently (Ottenbreit-Leftwich, Brush, Strycker, Gronseth, Roman, Abaci, & Plucker, 2012). Over 4,000 Chromebooks have been dispersed to third grade classrooms in 48 schools, and 600 response clicker systems are in 35 schools. The emphasis is on using multiple forms of technology to raise test scores and improve student achievement. The National Education

Association (NEA) suggests that programs aimed to close the achievement gaps must begin addressing equity concerns related to Internet access, software, and technical support (Van RoeKel, 2008).

Table 1

2011 -2014 Title I Schools Technology by Distribution

Devices	**Elementary Schools**	**Middle Schools**	**K-8 Academies**
iPads	1,600	5,000	675
Interactive Whiteboards	1,474	52	63
Chromebooks	4,400	0	300
Response Clickers	548	25	42
Laptops	189	1,600	120
Desktops	600	0	60

The District expects teachers to move from being comfortable with the hardware to expanding their skills to include diverse software applications that enhance and differentiate instruction (District's Technology Plan, 2008). The goal of this district's Technology Plan was for all teachers to meet state-established standards (Maryland Teacher Technology Standards) for technology related knowledge and skills by 2012. There are no data from 2012 to date that have measured whether teachers have met the Maryland Teacher Technology Standards.

In 2007, The Maryland State Department of Education developed an educational technology plan to help teachers meet the state technology standards. The Maryland Educational Technology Plan is a guide designed to help school systems accomplish these goals, as well as the goals of No Child Left Behind and the National Education Technology Plan (Maryland Public Schools, 2007). Consequently, the state of Maryland Online Technology Assessment was designed to measure the technology competency of teachers based on the Maryland Teacher Technology Standards [MTTS] (Maryland Public Schools Website, 2012). The MTTS list criteria for teaching and learning to prepare students for college and career readiness. An assessment of technology integration skills is one way of measuring whether or not technology is used effectively in teaching.

The state's technology standards are: information access; evaluation, processing and application; communication; legal, social and ethical issues; assessment for administration and instruction; integrating technology in the curriculum and instruction; assistive technology; and professional growth. These standards are to be met through technology supported productivity tools, high-quality instruction, professional development, and technology applications (Maryland Public Schools Website, 2012).

According to The Maryland Educational Plan for the New Millennium, five objectives have been established to meet this overall goal:

Objective 1: Improve student learning through technology.

Objective 2: Improve staff's knowledge and skills to integrate technology into instruction.

Objective 3: Improve decision-making, productivity, and efficiency at all levels of the organization using technology.

Objective 4: Improve equitable access to appropriate technologies among all stakeholders.

Objective 5: Improve the instructional uses of technology through research and Evaluation (Maryland Public Schools, 2007).

Through intelligent collaborative planning and the use of innovative applications of technology in Maryland schools, local school system master plans must include goals, objectives, and strategies for addressing how technology will be integrated into curriculum, instruction, and high-quality professional development, as well as addressing all other aspects of educational technology (Standards for School Library Media Programs in Maryland, 2007).

Literature Review

For a better understanding of the issues that affect teacher integration of technology in Title I schools, this literature review will define Title I, the qualifications of a Title I teacher, and No Child Left Behind, Part D. This is important in order to determine the efficacy of Title I teachers as well as what other factors play a part in the successful integration of technology resources in Title I schools. Title I is a federal program, which provides supplemental funding to schools that qualify according to Free and Reduced Meal Student (FARMS) eligibility. Students qualify for FARMS based on household size and income. Importantly, Title I funding provides technology resources and professional development opportunities that are intended to go above and beyond what is provided to non-Title I schools (Miller & Lake, 2012).

Title I Schools

Title I of the Elementary and Secondary Act (ESEA) of 1965 addresses the problem by providing funding to school districts serving low-income students to enable them to improve the educational opportunities for this population (Title I - Improving The Academic Achievement of The Disadvantaged, 2010). Title I has three major objectives: to improve achievement for all students, improve staff development, and boost parental and community involvement. Technology plays a large part in efforts to meet those goals (National Title I Association, 2012). Despite the efforts that have been put in place, our schools are not using the resources available to their fullest potential (Peske & Haycock, 2006).

Over the past 47 years, the challenge of closing the achievement gap between disadvantaged students in Title I schools and their more affluent peers continues (Murnane, 2008). Title I has not accomplished its goal of closing the achievement gap and the U.S. public education system continues to fail to ensure that our most disadvantaged students have the opportunity and preparation to succeed in school (Peske & Haycock, 2006). Consequently, a substantial amount of Title I funding is used for technology integration to assist in closing the achievement gap. It is also critical to evaluate whether or not investments in time and resources spent in integrating technology into instruction makes a difference in the instructional delivery (Maryland Public Schools, 2007). Title I provides financial assistance to local educational agencies and schools with high numbers or large percentages of low-income students to help ensure that all students meet challenging state academic standards (National Title I Association, 2012). Title I funds provide additional academic support and learning opportunities to help low-achieving students master challenging curricula and meet state standards in core academic subjects (Murnane, 2008). These funds support supplemental instruction in reading and mathematics, as well as afterschool programs, additional pay for highly qualified teachers, and summer programs to extend and reinforce the regular school curriculum (National Title I Association, 2012).

Highly qualified teachers

Despite efforts to improve teacher quality in Title I schools, many states and districts continue to struggle in their efforts to recruit and retain highly qualified, well-prepared, and effective teachers in low-income areas (Darling-Hammond & Berry, 2006). Teacher preparation and training are the most often-cited predictors of the successful integration of technology into the classroom (Use of Educational Technology in US Public Schools, 2010). The federal definition of a highly qualified teacher is one who is a fully state certified teacher, holds a bachelor's degree from a four-year institution, and demonstrates competence in each academic subject in which the teacher instructs (Law, 2002). It is also important to note that technology skills or competencies are not a requirement in the definition of being a highly qualified teacher. However, skills for implementing technology in the classroom are expected and encouraged.

In this large urban school district, Title I teachers are offered paid professional development opportunities above and beyond what the school district offers.

Professional development trainings take shape as professional learning communities and workshops conducted by central office instructional technology specialists and product-specific trained teachers. Teachers, including new and veteran teachers, need professional development that is germane to their needs (Morewood, Ankrum, & Bean, 2010)). Therefore, the Title I Office in this sample district also purchased 3,632 hours of technology-enhanced professional development services from an outside vendor over the course of three years. Yoon, Duncan, Lee, Scarloss, and Shapley (2007) stated that teachers who receive an average of 49 hours of professional development, over a six- to 12-month period, could increase student achievement through developing the technology skills of teachers. The District's Title I office has exceeded the recommended amount of professional development for successful implementation, averaging 151 hours offerings each year per teacher, which is the equivalent of 44 training workshops. According to Engel and Green (2011), teachers need to have a clear understanding of how to integrate technology, how to resolve possible issues that may arise, and how to use mobile devices effectively in their subject area.

As technology integration continues to expand in society, it is vital that teachers possess skills and behaviors of digital-age, tech-savvy professionals (Shelly, Gunter & Gunter, 2011). Teaching using technology as part of the instructional practice requires teachers to select the methods that are appropriate to the learning objectives, the technology selected, learning styles, techniques, and pace of learning (Okojie, Olinzock & Okojie-Boulder, 2006). To achieve this, school districts must provide educators with high-quality professional development that includes continued time and effort to learn, maintains and improves technology skills (Turner, 2005), and gives teachers the ability to use those skills in their professional work.

Despite the highly qualified label earned by Title I teachers, there is an observable gap in the use of technology and the state and federal qualifications of being highly qualified (Darling-Hammond & Berry, 2006). Technology integration is not a "one size fits all" (Wepner, Tao, & Ziomek, 2006, p. 230) where teachers do the same thing for their students or where teachers possess the specific skills to be competent technology users. Title I teachers have the advantage of receiving more resources than teachers in non-Title I schools. A study by Reading Horizons determined that most teachers are willing to consider new ideas about integrating technology into classrooms (Wepner, Tao, & Ziomek, 2006) . However, despite the advantages that technology offers, some teachers remain resistant to educational technology or suffer from technophobia—a fear of technology (Hicks, 2011). The Virginia Department of Education (2010) identified technophobia as one of the most cited reasons teachers avoid training and do not seek assistance. Likewise, a lack of teacher confidence, resistance to change, and teacher burnout are significant barriers that threaten successful implementation (Bingimlas, 2009). In order to eliminate this resistance to change, Fullan suggest that teachers should have an evolutionary perspective of the programs and policies being implemented (2007).

In *Leading in a Culture of Change* (2001), Fullan writes, "the implementation dip" is literally a dip in performance and confidence as one encounters an innovation that requires new skills and new understandings" (p. 6). Leaders who understand the dip in performance and confidence of implementing new technologies know that teachers are experiencing the fear of change, and the lack of technical skills to make the transformation work (Fullan, 2001). The dip is a normal occurrence when there is a change in a process, materials, practices, or beliefs (Fullan, 2001). Therefore, based on a Title I end-of the-year technology report survey, the integration of technology reflected a dip in performance and usage (Title I Office, 2012). Likewise, a decrease of implementation resulted in the Title I initiative depicted in figure 3.

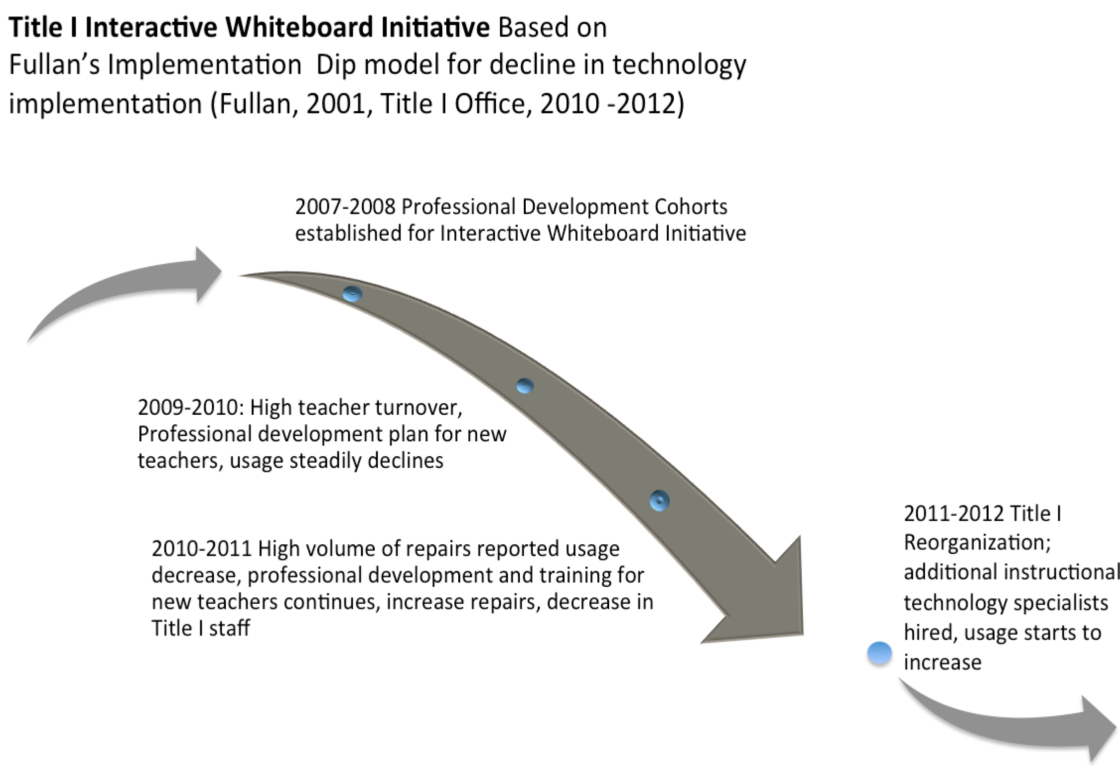

Figure 3. Implementation Dip (Fullan, 2001). Diagram of the Title I Office Interactive Whiteboard Initiative 2007-2012

Enhancing Education through Technology

No Child Left Behind, Part D (2010) emphasizes the effective integration of technology into the professional development of teachers, principals, and other school staff. Training for instructional staff should be geared around best practices that originated from research-based methods (Tallerico, 2005). This integration includes using technology efficiently, infusing it into the curriculum, and supporting technology skill development. Multimedia such as digital cameras, projectors, interactive whiteboards, animation and gaming software, and presentation programs have proven helpful in engaging students in learning about subjects, in exploring ways to present their learning, and in helping students control their learning (Project Tomorrow, 2010). Okojie, Olinzock and Okojie-Boulder (2006) stated, "Technology integration can be described as a process of using existing tools, equipment and materials, including the use of electronic media, for the purpose of enhancing learning" (p. 67).

Technology is a tool for engaged learning. Technology usage in the classroom has been noted by teachers to increase student engagement and motivation (Li, 2007; Prensky, 2006). VanTassel-Baska and Brown (2007) noted that this skill development should be incorporated into research-based technology integration practices to cultivate student learning in all core academic capacities including language arts, math, social studies, and science. Subjects such as foreign languages, music, and technology literacy can also benefit from these practices.

Preparing teachers to use technology in the classroom to improve student academic achievement is the principal goal of Enhancing Education through Technology (EETT), and Title II, Part D of No Child Left behind (NCLB) legislation. The U. S. Department of Education requires states to report the number of local educational agencies (LEAs) that have fully integrated technology, which is one of the goals of the Title II-D EETT legislation. The specific EETT goals, taken from the NCLB website, are as follows:

- To improve student academic achievement through the use of technology in elementary schools and secondary schools;
- To assist every student in crossing the digital divide by ensuring that each student is technologically literate by the time he or she finish eighth grade, regardless of race, ethnicity, gender, family income, geographic location, or disability; and
- To encourage the effective integration of technology resources with teacher training and curriculum development to establish research-based instructional methods that can be widely implemented as best practices by state education agencies and local education agencies. (No Child Left Behind, Title II, Part D, 2010)

Technology integration projects and programs call for a high degree of behavioral change of teachers. Of all educational programs in schools today, technology integration projects are the type most likely to encounter delay and resistance, especially if they involve learning new skills and devices (West, 2012). Some school systems either ignore the need to integrate technology into the classroom or view it as optional. A major weakness in current change strategies is that they do not require integration (Hew & Brush, 2007). Traditionally, teachers and students engage in classroom learning within an existing system of teaching/learning resources and relevant methods. A systematic change of integration is needed so teachers and learners can realize the practical benefits of having technology available (Jackson, et al., 2008). According to Shieh (2012):

> Effective teaching with technology demands an understanding of the representation of concepts using technologies; pedagogical skills that employ technologies in constructive methods to teach content; knowledge of resolving problems students encounter with the use of technologies; and knowledge of how technologies can be used to strengthen existing knowledge and to develop new epistemologies. (p. 207)

Naturally, learning how to teach using technology requires imagination, intellect, creativity, and audacity.

National Technology Standards

There is more to technology integration in education than equipping a classroom with computers and an LCD projector. The difference between technology use and technology integration for learning is that integration involves full-time, daily infusion into the content curriculum. According to ISTE, the integration of technology is when classroom teachers use technology to introduce, reinforce, extend, enrich, assess, and remediate student mastery of curricular targets (Hamilton, 2007). Ottenbreit-Leftwich, et al. (2010) stated that technology integration occurs when it is a used as a tool for instruction by differentiating the delivery of information in order to provide technology options for students to engage in content skills using technological tools to create and share new experiences in learning. The practice of educational technology integration requires reliable and effective methods, tools, and technologies (Davies & West, 2014).

Society has embraced technology integration and allowed it to reinvent the ways in which we create, explore, collaborate, and even think about information. Many schools have implemented one-to-one programs in which every student is provided a laptop, netbook, tablet computer, or some other handheld device (Bebell & Kay, 2010). Finding it difficult to escape the rapidly growing wave of innovation and instructional fads, school districts often bow to societal pressure to fund technology without having a thoughtful plan for implementation. Nonetheless, as technology and the Internet become more prevalent in American schools, many experts' concerns have shifted from whether educators and students have access to digital technologies to how they use the learning tools available in their schools (Okojie, Olinzock, & Okojie-Boulder, 2006).

The need to assess, monitor, and evaluate technology usage in schools has led to the development of local, state, and national technology standards. The ISTE developed National Educational Technology Standards for Teachers (NETS-T) to measure proficiency and set goals for the knowledge, attitudes, and skills necessary for teaching 21st century skills to students (ISTE, 2009). Figure 4 depicts the five standards with performance indicators designed to fit state, university, or district guidelines for technology integration in the classroom (ISTE, 2009). In order for technology to positively affect teaching methods—and therefore student learning—teachers must possess the technology-related skills needed to use technology and must actively use these tools in their classrooms (Iding, Crosby, & Speitel, 2002). Therefore, teachers need to become familiar with technology standards (NETS for Teachers, 2010). These include the ability of the teacher:

1. To facilitate and inspire student learning and creativity;
2. To design and develop digital-age learning experiences and assessments;
3. To model digital age work and learning;
4. To promote and model digital citizenship and responsibility; and
5. To engage in professional growth and leadership. (ISTE NETS, 2008)

Figure 4. ISTE Standards for Teachers, Second Edition, ©2008, ISTE® (International Society forTechnology in Education. All rights reserved. http://www.iste.org/standards/ISTE-standards/standards-for-teachers

The Partnership for 21[st] Century Learning (2015) refers to the term 21st century skills as a broad set of knowledge, skills, work habits, and character attributes that are believed by educators, school reformers, college professors, employers, and others to be critically important to achievement in today's world, particularly in collegiate programs and modern careers and workplaces. Twenty-first century skills

(Figure 5) are applicable to all academic subject areas, and in all educational, career, and civic settings throughout a student's life.

Even though the term, 21st century skills, might be one of the most general terms used today, it is defining skill sets needed for the next generation workforce, college students, and how students think, solve problems, and make decisions (Silva, 2009). According to Darling-Hammond (2006) in order for 21st century learning to occur, "Students need to be able to find, evaluate, synthesize, and use knowledge in new contexts, frame and solve non-routine problems, and produce research findings and solutions" (p. 1).

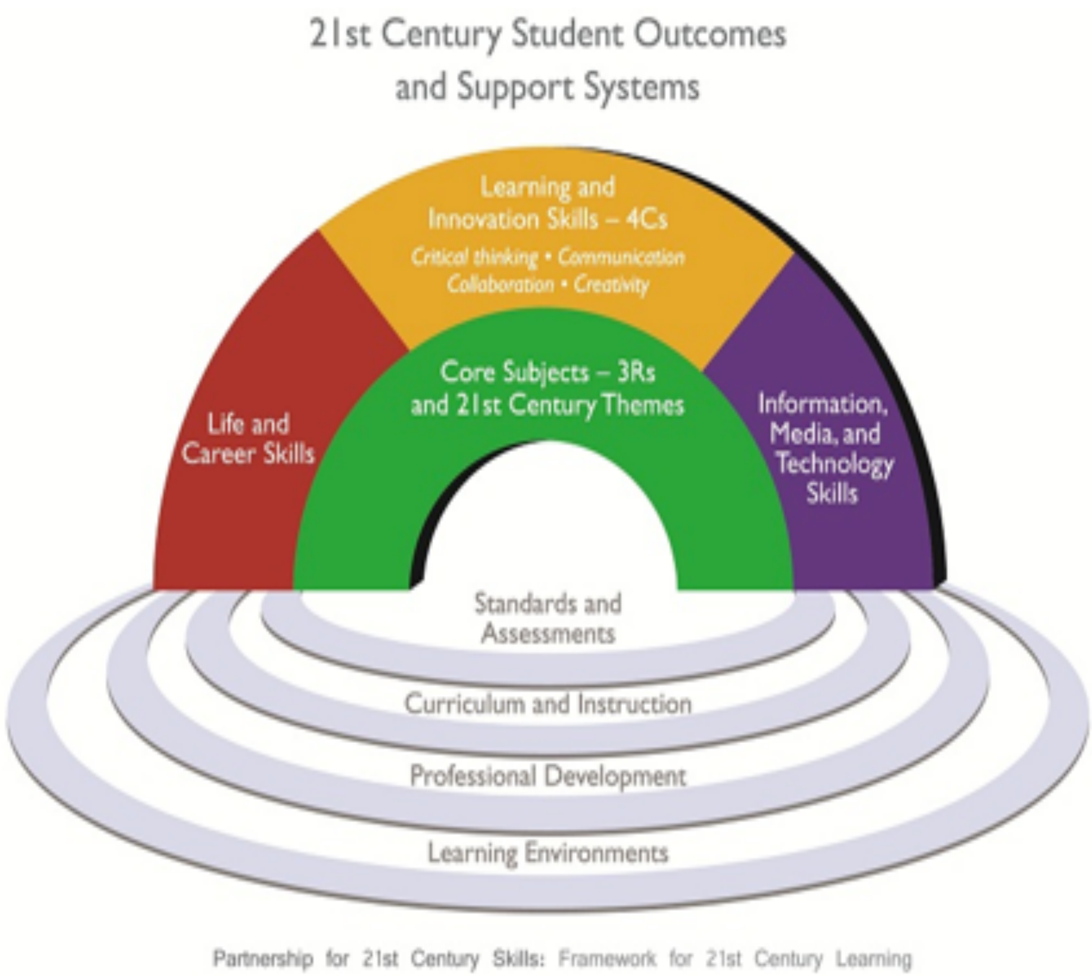

Figure 5. 21st Century Student Outcomes www.p21.org/framework

It is also important that teachers possess as well as teach 21st century skills to their students. Most teachers want to learn how to integrate effectively technology into their instruction (Allsopp, Hohlfeld & Kemker, 2007). Moreover, one of the most requested professional development activities, as indicated by teachers, after training in their specific content area, was training in the use of technology for instruction and student engagement (Choy, Chen, & Bugarin, 2006; Title I Office, 2012). Even though technology integration became a popular choice for professional development and teacher training, the problem of integrating technology effectively into the teaching and learning process has become an ongoing issue. In the National Staff Development Council (NSDC) report, "41% of teachers used technology daily to monitor student progress, 37% for research and information, 32% for instruction, and 29% for planning and preparation of instruction" (Wei, Darling-Hammond, Andree, Richardson, & Orphanos, 2009, p. 33). Common reasons teachers gave for the underutilization of technology to support instruction included having a limited supply of computers, lack of computer skills, and feeling intimidated by technology (Ehrlich, Sporte, & Sebring, 2013; Okojie, Olinzock, & Okojie-Boulder, 2006). While these excuses could affect the success of technology integration, the degree of success teachers have experienced in using technology for instruction could depend primarily on their capacity to explore the correlation between pedagogy and technology (Belland, 2009).

School districts are held accountable for meeting state and national standards through performance on standardized tests; the focus on improving student achievement through technology has become an even greater issue. Title I schools face a challenge: how can they effectively educate economically disadvantaged children to provide them with an equal opportunity to succeed? The need to prepare students with the technology skills required in their future lives is particularly imperative in large urban schools districts and communities in order to promote diversity in the work force for information technology and broaden the sources of employment for disadvantaged students (Tettegah & Mayo, 2005).

Technology Integration Supportive documents

Angers (2004) concluded that teacher beliefs about classroom practice shape their goals for technology. Huberman and Miles (2013) reached a similar conclusion, and found that technology integration requires a cultural and paradigm shift from a teacher-centered approach to technology, to a student-centered approach to technology. Such a shift would reduce the frequency with which teachers use technology in lectures while increasing student-centered learning that cultivates creative and critical exploration using 21st century technological skills (Huberman & Miles, 2013).

Sustained use of new technology is connected to teachers' re-envisioning their social identities (Strong-Wilson, 2008). This finding showed technology as an integral part of society, rather than an add-on. Once teachers saw the connection of technology and education, new technologies introduced in the classroom environment became more sustained and a meaningful part of how teachers used them with the curriculum and how they identified themselves as an educator (Strong-Wilson, 2012).

Years of experience play a part in how successful technology is integrated in the curriculum. According to Burns and Dimock (2007), veteran teachers do not use technology for technology's sake, or for reward or remediation, as with many novice teachers. The veteran teachers embedded computer use in the curriculum by having students use the computers to write reports and or create spreadsheets showing data analysis. Burns and Dimock (2007) also noted that veteran teachers integrated technology into the classroom in a more student-centered approach by encouraging students to learn from each other, whereas novice teachers were more skilled and comfortable with technology and the manipulation of the devices and software and took a more teacher-centered approach.

Wallace (2012) found a sizeable discrepancy in attitude, belief, skill, and knowledge about technology between teachers who are 50 plus years of age and teachers who are younger than 40 years old. Understanding teacher perception of technology integration and its impact on their instructional practice will impact the way training is conducted (Wallace, 2012). Martin, Strother, Beglau, Bates, Reitzes, and Culp (2010) suggested that quality instructional technology professional development could have a positive impact on teachers and students. These findings suggest that quality professional development leads to improved teacher knowledge, which can then lead to higher student achievement (Martin et al., 2010).

Integrating Technology in the classroom

In order to integrate technology effectively into the classroom, technology training must go beyond basic technology skill development, such as word processing and Web navigation skills. The technology training must include activities that help teachers in utilizing technology to reinforce instruction and curriculum standards (Bryant, 2008). The quality and quantity of professional development matters to enhance skill development and the professional development of teachers has been a crucial variable in successfully integrating technologies within schools (Choy, Chen, & Bugarin, 2006; Davis, Preston, & Sahin, 2009; Valcke, Rots, Verbeke & Van Braak, 2007). In order for teachers to maintain and improve their technology skills, high quality and ongoing professional development is crucial (Turner, 2005). Research shows that when students do not perform well, it is more about the quality of teaching and learning in the classroom environment than it is about the child's background (Policy Studies Associates, 2010). Professional development opportunities that engage teachers in 30 to 100 hours of training over six to 12 months have been shown to increase student achievement and enhance the skill level of the teacher (Yoon et al., 2007).

A prevailing problem lies in planning and coordinating successful professional development programs that meet the needs of teachers adequately and in a timely manner. It is valid to note that with a successful professional development plan, teacher attitudes and beliefs about technology can also affect implementation (Penuel, 2006).

According to Pitler, Hubbell, Kuhn, and Malenoski (2007), technology has the potential to advance a good teacher to a great teacher. Yet educators frequently fail to modify their pedagogy appropriately by taking advantage of the interactive features of technology (Hall, 2010). For years, researchers have sought to discover why teachers fail to utilize technology to its fullest potential (Brinkerhoff, 2006). According to a National Center for Education Statistics study in 2012, only 23 percent of teachers from the sampling surveyed report that they feel ready to integrate technology into their daily instruction. Those who use technology do so mainly to present information rather than to provide hands-on learning and activities (Moeller, & Reitzes, 2012).

Barriers to technology integration. The barriers to technology integration have included scarcity of funding, inadequate hardware and software, inadequate professional development, and deficiencies in creating a comprehensive plan. It is important to remember, however, that in general the presence of physical hardware in a classroom has little to do with whether and how it is used in the classroom (Hall, 2010). Another difficult issue is that long-term support and sustainability of technology programs and initiatives takes time and management. Support issues such as hardware, technical support, and management can determine the success of any technology integration plan; these issues relate to purchasing, upgrading, and rotating equipment, and acquiring and updating software.

Experiences in both learning with technology and teaching with technology greatly affected teachers' confidence in integrating technology (Ertmer & Ottenbreit-Leftwich, 2010). Therefore, a change in how school districts asses, select, and train teachers is necessary. Viewing and implementing technology, within the culture of the school and district requires reevaluation.

One tool that school districts have invested time and resources in is the interactive whiteboard. Because of the large investment, there is a strong need for the evaluation and improvement of interactive whiteboard use in schools (Slay, Siebörger, & Hodgkinson-Williams, 2008). Interactive whiteboards have become a popular multimedia tool used in schools to display content and information in a digital and interactive format. Interactive whiteboards allow teachers to support multiple needs within one lesson as well as help with classroom management (Hall & Higgins, 2005). Teachers can draw from a plethora of multimedia resources online and within the software. However, teachers should have technical competencies and skills in order to operate the boards, and are aware of pedagogical implications in order to provide effective instruction to their students (Türel, 2010). In order to do this, according to Glover, Miller, Averis, and Door (2007), "teachers need time to develop their technological fluency, apply pedagogic principles to the available materials or to the development of materials, and then to incorporate the interactive whiteboard (IWB) seamlessly into their teaching" (p. 17). Hall and Higgins (2005) emphasized that teachers need continuous training sessions to improve and maintain such skills. Additionally, the authors also reported teachers who frequently used an interactive whiteboard were more likely to have a higher level of interactive whiteboard competency and more positive perceptions towards the interactive whiteboard (2005). However, research has shown that even after an interactive whiteboard training workshop, teachers who do not sufficiently use their interactive board and do not practice what they have learned may have lost their initial skills and knowledge as well as their confidence over time (Slay, Siebörger, & Hodgkinson-Williams, 2008). Additionally, researchers concluded that teachers confirmed that their interactive whiteboard skills improved as they used the interactive whiteboards and stated that they learned new skills using the boards mainly from their colleagues (Türel & Johnson, 2012). Therefore, it seems critical to support teacher interactive whiteboard collaborations.

The problem of integrating technology into the teaching and learning process has become a recurrent issue. The excuses for the inadequate use of technology to support instruction include unavailability of computers, lack of computer skills, and computer intimidation (Ehrlich, Sporte,& Sebring, 2013; Levin & Wadmany, 2008; Okojie, Olinzock, & Okojie-Boulder, 2006). "There is no blueprint for technology integration, however, it is suggested that effort be made to link technology for instruction to all levels of pedagogical processes and activities…." (Okojie, Olinzock, & Okojie-Boulder, 2006, p. 66). While these could affect the success of technology integration, recognition is necessary for the success teachers have in using technology for instruction. This could depend in part on their ability to balance the relationship between pedagogy and technology (Levin & Wadmany, 2008).

Technology Assessments. It is important to provide a framework to visualize and target desired improvements in any program that includes technology for teaching and learning (Allsopp et al., 2007). Among the many instruments and frameworks for monitoring how teachers use technology to enhance learning are Levels of Technology Integration Digital-Age Profiler (LoTi), WayFind Professional Development Assessment, Technological Pedagogical Content Knowledge (TPCK), and Technology Integration Matrix (TIM). A recent study by Dawson, Ritzhaupt, Liu, Rodriguez, and Frey (2013) reviewed 672 lesson plans using TPCK as a measure for the technological integration practices for math and science teachers. Their findings demonstrated that most of the lesson plans characterized low-level cognitive demands of students and even lower levels of classroom technology integration.

The design of most monitoring instruments and frameworks are around state and national standards to assist with teachers' professional growth and skill development. Assessing how teachers use technology for instruction is important and provides relevant information for a program's efficacy (Allsopp et al., 2007). Stakeholders, school leaders, and policy makers can use data gathered by technology-monitoring programs to make valid decisions on resource provision.

Levels of Teaching Innovation. Moersch (2001) developed the Level of Technology Implementation (LoTi) scale in 1995 to measure authentic classroom technology use. The scale, created to bridge the gap between technology use and instruction, provided a data-driven approach to professional development and technology implementation planning. Moersch later revised the scale in 2009. Because of the implementation of the tenets of digital-age, literacy as manifested in the National Educational Technology Standards for Teachers (NETS-T), Moersch's was renamed the Levels of Teaching Innovation (LoTi) Framework (Table 2). The newer version highlights powerful learning and teaching practices as well as the utilization of digital tools and resources in the classroom (Moersch, 2010). LoTi measures specific levels of technology integration at the local, district and state level by generating a profile for the teacher across three domains: LoTi, personal computer use (PCU), and current instructional practices (CIP). In addition to the Framework, a LoTi Digital-Age Survey, offers classroom teachers with a valid and reliable overview of their LoTi, CIP, and CPU levels together with a personalized professional development needs profile supported with the National educational

Technology Standards for Teachers (Stoltzfus, 2009). The survey assesses technology as an interactive learning medium (Moersch, 2010).

The LoTi Framework centers on the balance between instruction, assessment, and the effective use of digital tools and resources to encourage higher order thinking, engage student learning, and increase authentic assessment practices in the classroom, which are important characteristics of 21st century teaching and learning (Moersch, 2010). The LoTi data enables school leaders to make cognizant decisions based on the actual needs for improving the technology infrastructure and the planning for professional development. Development toward intensity level 6 (refinement) on the LoTi scale involves an integrated relationship between instruction and the use of digital tools and resources. The idea behind the LoTi framework is that teachers will advance from low levels of technology integration, which are teacher-centered, to higher levels of use, which are learner-centered.

Table 2

LoTi Framework of Technology Use

LoTi Level	Technology Use	Specific Characteristics
0 Nonuse	Traditional direct teaching No tools in use	• No technology use • Perception that technology use has no value to learning
1 Awareness	Lecture/discussion, teacher-centered multimedia presentation, i.e. Power Points use for enrichment, presentations,	• No student use of technology tied to content • Computer is a reward station for non-content-related work • Technology is used mostly by teacher/facilitator
2 Exploration	Teacher-centered Emphasizes content understanding and support master of learning	• Lower order thinking skills (i.e., knowledge, comprehension) • Focus is strictly on content understanding.

3 Infusion	Teacher-centered Higher Order Thinking Skills, problem solving, decision making and reflection	• Higher order thinking skills (i.e., application, analysis, synthesis & evaluation) • Focus is on the content and the process • Teaching may be learner-centered
4 Integration	Student-centered Classroom management	• Students are applying learning to real world • Learning becomes authentic and relevant
4a-Mechanical	Applied learning models	• *experiences* management concerns • comfort zone • Teaching is student-centered
4b-Routine	Inquiry based learning strategies	
5 Expansion	Student-centered	• Two-way collaboration with community • Multiple technologies in use
6 Refinement	Student-centered Content based on student interest and needs	• Same as level 5 • Infrastructure and funding are in place

***Note*:** LoTi Framework for Technology Use derived from The LoTi Framework (Moersch, 2002).

Analysis of prior attempts to address the problem. Technology integration allows new opportunities for presenting educational materials. Examples are the interactive whiteboard, mobile devices, and software applications for collaborating with students to be cognitively active and present during class. Researchers have found that using these technology in schools will impact social interaction, which in turn, affects the learning and empowers students to become an active part of their learning community (Beldarrain, 2006; Kershner, Mercer, Warwick, & Staarman, 2010). New technologies, such as interactive whiteboards, allow teachers to write and record their lessons digitally in an interactive format. Interactive white boards can focus students' attention and engagement towards the teacher's instructional activity, resulting in increased collaboration, active talk and learning (Kershner, Mercer, Warwick, & Staarman, 2010). Mobile devices have become a part of the daily life of modern society and are hard to ignore. These mobile devices are also beneficial to both the teaching and learning environment.

The use of instructional technology in the classroom supports student-centered instruction (Pitler, Hubbell, Kuhn, and Malenoski, 2007). Additionally, technology in the classroom permits the creation of multimedia-based learning. This includes integrating digital audio, digital video, text, graphics, animations, and the use of the Internet for research and Web-based activities. These resources can be effective tools for teaching and learning, and can enable teachers to address the various learning styles of their students (Bryant, 2008). Technology also offers the opportunity for students to improve their learning experiences (Beldarrain, 2006).

In an effort to solve the problem, several educational researchers and organizations created theoretical models or standards based documents to guide teacher and administrator practices. One of the more common theoretical models used by instructional technology professionals today is Mishra and Koehler's (2006) Technological Pedagogical Content Knowledge Framework [TPACK], which highlights the connections between teachers' content knowledge, their pedagogical knowledge, and their knowledge of digital technologies. The TPACK framework includes: technology curricula for K-12 students, professional development initiatives for teachers, and pre-service teacher training programs that are typically guided by the International Society for Technology in Education (ISTE) National Educational Technology Standards for students (NETS-S) and teachers (NETS-T) (ISTE, 2007; 2008). There are only a few administrator preparation programs, for example, that are making use of the NETS-A (Richardson & McLeod, 2011). There are also sets of standards from ISTE for administrators (NETS-A), instructional technology coaches (NETS-C), and computer science teachers (NETS-CSE) (ISTE, 2015a, 2015b), however, these typically under-referenced.

Title I Technology Implementation Programs

In an effort for Title I teachers and students to meet the Maryland State Technology Standards, the urban school district's Title I Office created initiatives to increase opportunities for teachers to participate in effective and challenging activities involving the following technological tools – interactive whiteboards, iPads, and Chromebooks. During the first two years of the interactive whiteboard implementation, training of over 1,000 teachers on the usage of the boards during a three-day professional development workshop occurred. Teachers learned how to integrate the equipment with the curriculum by creating engaging, interactive lesson plans. They had the opportunity to assess students by using response clickers, a device that allows students to respond anonymously to teacher-posed question during class providing immediate feedback. Teachers also learned how to incorporate interactive websites, Web 2.0 tools, and other technologies into their lessons. After the second year of a three-year implementation, however, classroom observations, teacher and administrator interviews, walk-throughs—informal quick observations of classroom activities, and surveys revealed a decline in technology usage. From 2012 to 2013, the Title I office survey revealed a 12% drop in daily interactive whiteboard usage and a 5% drop in the daily use of iPads. These figures coincide with a 15% drop in Title I professional development attendance.

To alleviate this problem, the District's Title I Office designated one teacher from each Title I school as a technology facilitator. Principals at each school selected a teacher to represent them at monthly Title I professional learning communities, where they networked with colleagues from other Title I schools, as well as received professional development on 21st century best practices performed throughout Title I schools. The technology facilitator serves as a liaison between the Title I instructional technology specialist at the school system level and the school. The facilitator is a teacher who is comfortable using technology and supporting other teachers, has access to the technology inventory, has good communication skills, and is a leader among his or her peers. Additionally, research suggests that non-expert peer professional development models, such as professional learning communities are effective in helping teachers develop ways to enhance their instructional delivery (Jones & Vincent, 2010).

The Title I iPad program included five middle schools. This one-to-one initiative provides iPads to each student and teacher in order to provide the opportunity for students' academic empowerment, engagement, and the recipient of up-to-date information. When used in the classroom, the iPad is a personalized learning device utilizing an Apple ID to house student work; and used a collaboration tool for instructional resources and practices in the form or apps and websites. Since the introduction of the iPad to the world in 2010, there have been four different versions of iPads on the market. The life expectancy of the iPad 2 has reached its end. Consequently, over 5,000 of these devices that will eventually need replacement, repair, or recycling throughout the District's Title I schools.

The Google Chromebook is the newest Title I initiative in the district that provides Chromebooks to third grade students and teachers in all Title I elementary schools. The Chromebooks allowed each Title I third grade student to access online instructional programs and content through Google Chrome. The iPad program and Google Chromebook initiatives are the multimillion-dollar investments intended to increase digital learning opportunities for Title I students and teachers. Teachers involved in these initiatives received numerous hours of professional development, as well as ongoing support and from the Title I Office. It was imperative to assess the effectiveness of these two initiatives to evaluate the growth and skill sustainability of teachers that participated in these ongoing professional development sessions and trainings.

Proposed investigation / scope

The estimated sample size of this researcher's investigation consisted of teachers in Title I schools. Gender was not a part of this study; however, the number of years of teaching that each teacher experienced was the independent variable in this study. An estimate of 35% (n= 26) of all Title I teachers participated in this survey from 68 elementary and middle Title I schools. During the time of this study, there were no high schools that were eligible for Title I services. The survey measured levels of teaching innovation, personal computer use, and current instructional practices. The researcher gathered and evaluated the data from this survey in order to improve school-wide programs offered by the Title I Office in the study district.

This chapter has provided a look of the importance of technology integration in Title I schools and the regulations that govern its use.. In addition, it has also touched on a few of the challenging barriers prohibiting teachers implementation of technology into the classroom that affects the improvement of student achievement. The next chapter will document the methods used to conduct this study.

CHAPTER 2: INVESTIGATION

The purpose of this study was to assess the levels of technology integration of Title I teachers in a large urban district. The following research questions will guide the purpose and results of this study.

Research Questions

This study pursued the following questions:

1. What is the level of teaching innovation, personal computer use, and current instructional practice of Title I teachers in the District?
2. What characteristics of the teacher are most closely correlated with the level of technology integration?
3. How does the type of device correlate with the level of technology integration?

Design

The research method of choice for this study was a quantitative correlational method. In quantitative correlational studies, information is gathered and analyzed to determine the extent of a relationship between two or more variables. After identifying the statistical data, the researcher then makes comparisons and evaluations (Gay, Mills, & Airasian, 2006). The quantitative correlational study compared the level of technology integration (LoTi) through two instruments: LoTi Digital-Age Survey and the Digital-Age profiler. Both instruments handle authentic technology use in the classroom.

Using the quantitative-correlational method allowed for the investigation and interpretation of relationships if any were present. The study recognized trends and patterns in data, relative to each independent variable LoTi scores. According to Creswell (2003, 2007), "quantitative method involves the process of collecting, analyzing, interpreting, and writing the results of a study. Quantitative research involves surveys related to a particular sample and population" (p. 143). Data collected from the Levels of the Teaching Innovation (LoTi) Digital Age Survey, assessed three dimensions: Level of Teaching Innovation (LoTi), Personal Computer Use (PCU) and Current Instructional Practices (CIP). The PCU dimension determined the respondents' comfort and competence level with using computers (Moses, 2006). The CIP dimension measured teachers' classroom practices relating to subject matter versus a learner-based curriculum approach (Moersch, 2011).

Conceptual framework. Originally known as the Levels of Technology Implementation, the LoTi Framework measured the levels of used by teachers. It is a 21st-century educational model devised to capture classroom teacher digital-age literacy in conjunction with the National Educational Technology Standards for Teachers [NETS-T] (Stoltzfus, 2009). Currently, the LoTi Framework creates data-driven professional development plans for teachers to help them pursue meaningful technology-based learning opportunities for their students. Numerous educational studies and school systems across the country have used LoTi as a survey profiler to gauge the increasing skills and competencies of teachers. Detailed comprehensive results from the LoTi Digital-Age Survey provided online tools that displayed teacher interactions with the assessment. The report gave aggregate information in both graph and table form.

The conceptual framework for this study centered on 21st-century skills and ISTE's educational standards for teachers. The Partnership for 21st Century Skills (2015) list three categories that students need in today's multi-social media world: learning and innovation skills; information, media, and technology skills; and life and career skills (Casner-Lotto & Barrington, 2006; Moersch, 2011). Resulting from the development of new standards from the National Educational Technology Standards for Students (NETS-S), and the National Educational Technology Standards for Teachers (NETS-T) from the International Society for Technology in Education (ISTE), the LoTi framework focuses on using digital tools and resources to promote world class teaching and learning. The results from the LoTi Digital Age Survey guides decision-making of the Title I Office to provide innovative opportunities for teaching and learning. Understanding the level of technology integration amongst Title I teachers will help to build a framework for professional development, technology initiatives, classroom and teacher observation checklists, and enhance overall instruction in the classroom (figure 6). Students and teachers will acquire new skills that will assist students in preparation for college and careers. Ultimately, students will reap the benefits of having a teacher who allows time to build a learning environment that includes collaboration and creativity in order to improve student achievement.

Figure 6. Conceptual framework: Title I technology implementation

The LoTi Digital-Age Framework categorizes seven distinct levels of how teachers implement technology and describes changes in instruction from a teacher-centered to a learner-centered curriculum (Moersch, 1995; LoTi Connection, 2012). The LoTi levels are as follows:

- Level 0: Non-use
- Level 1: Awareness
- Level 2: Exploration
- Level 3: Infusion
- Level 4a: Integration: Mechanical
- Level 4b: Integration: Routine
- Level 5: Expansion
- Level 6: Refinement

The LoTi assessment has undergone widespread research over the past 20 years and has developed as a statistically valid tool to professional development priorities consistent with 21st Century Skills and the National Educational Technology Standards for Teachers (NETS-T) and National Educational Technology Standards for Administrators [NETS-A] (LoTi Connection, 2012). Therefore, this researcher was able to use the results collected from the LoTi data to identify instructional uses of technology and to recommend further professional development needs consistent with 21st-century skills and the NETS-A and NETS-T standards (LoTi Connection, 2012). In this context, the LoTi survey has empirical merit and practical value (Stoltzfus, 2006).

In order to conduct this study, each teacher received a final LoTi score based on a sequence of multi-step calculations that captured their technology usage and how often certain actions occurred in the classroom through the LoTi profiler. The final Levels of Teaching Innovation scores then conveyed through the eight-LoTi Levels that align with the LoTi Framework (Table 2); thus, determining the LoTi Levels for each of the schools and clusters represented by the teacher taking the survey.

According to Stoltzfus (2009), "the first four-Loti Levels—Awareness, Exploration, Infusion, and Integration: Mechanical—represented the core factors of integration, while the remaining levels—Integration: Routine, Expansion, and Refinement—are an extension of the integration subcategories" (p. 2).

Methods and Procedures

Participants. The study consists of responses from 508 highly qualified classroom teachers from Title I schools in the District. According to the reauthorization of the Elementary and Secondary Education Act (ESEA), also known as No Child Left Behind, all teachers of core academic subjects in Title I programs must be highly qualified. A highly qualified teacher is one that is fully certified by the state, has a least a bachelor's degree, and demonstrates competencies in subject knowledge and teaching (ESEA, 2010). The participants of the study are teachers in grades kindergarten through eighth grade. They participated in multiple Title I professional development trainings, such as Title I Professional Learning Communities Network, iPad program, Interactive Summer Academy, and technology integration trainings using one-to-one devices. The Professional Learning Communities (PLC) Network is a professional development avenue comprised of 10 teachers from each Title I school. Professional development participants received extensive training on Web 2.0 tools, technology integration of iPads, Chromebooks, interactive boards, multimedia tools, and applications throughout the school year. Of the 508 teachers who took the LoTi Digital Age Survey, 223 were elementary content subject teachers and 197 were middle school content subject teachers. The remaining 26 were reading specialists or teachers who taught in non-content areas.

The middle school teachers of students given iPads received over three years of professional development training from Apple, Inc. professional developers. The training sessions included instructional and productivity applications for instructional delivery, creating iBooks, digital content, implementing teaching strategies, and project-based learning activities for students using iOS devices and applications. Elementary teachers have received a more practical technology integration approach for using Google Chrome, interactive whiteboards, response clickers, websites, and

Web 2.0 tools in the classroom. The research determined the correlations between the Title I teachers' technology integration level, personal computer use, and current instructional practice of teachers in each initiative during the 2014-2015 school year.

Overall, the baseline LoTi score for Title I teachers for 2014 in this school district is a two, which is lower than the National Loti Level of three in 2005 (Figure 7). According to the LoTi Connection website:

> LoTi Level 2: Exploration At Level 2 (Exploration) the instructional focus emphasizes content understanding and supports mastery learning and direct instruction. Teacher questioning and/or student learning focuses on lower levels of student cognitive processing (e.g., knowledge, comprehension) [*sic*]. Digital tools and resources are used [*sic*] by students for extension activities, enrichment exercises, or information gathering assignments that generally reinforce lower cognitive skill development relating to the content under investigation. There is a pervasive use of student multimedia products, allowing students to present their content understanding in a digital format that may or may not reach beyond the classroom. (LoTi Connection, 2015, para. 4)

The LoTi score indicates that 37% of the teachers are at the exploration level of integration (Figure 7). Approximately 56% of the 508 teachers clustered in Levels 0 through 2. These levels represent the lower portion of the LoTi Framework and focus primarily on teacher's use of productivity tools, student use of tutorial programs, and *project-based* learning opportunities at the knowledge-comprehension level. Therefore, teachers explore technology use, and have yet to infuse, integrate, expand,

and refine higher order application, analysis, synthesis, evaluation, and engaged learning into their daily routines (LoTi Connection, 2012). The study analyzes the data for possible attributes that indicate this score in comparison with elementary and middle schoolteachers to the National LoTi results (Figure 7).

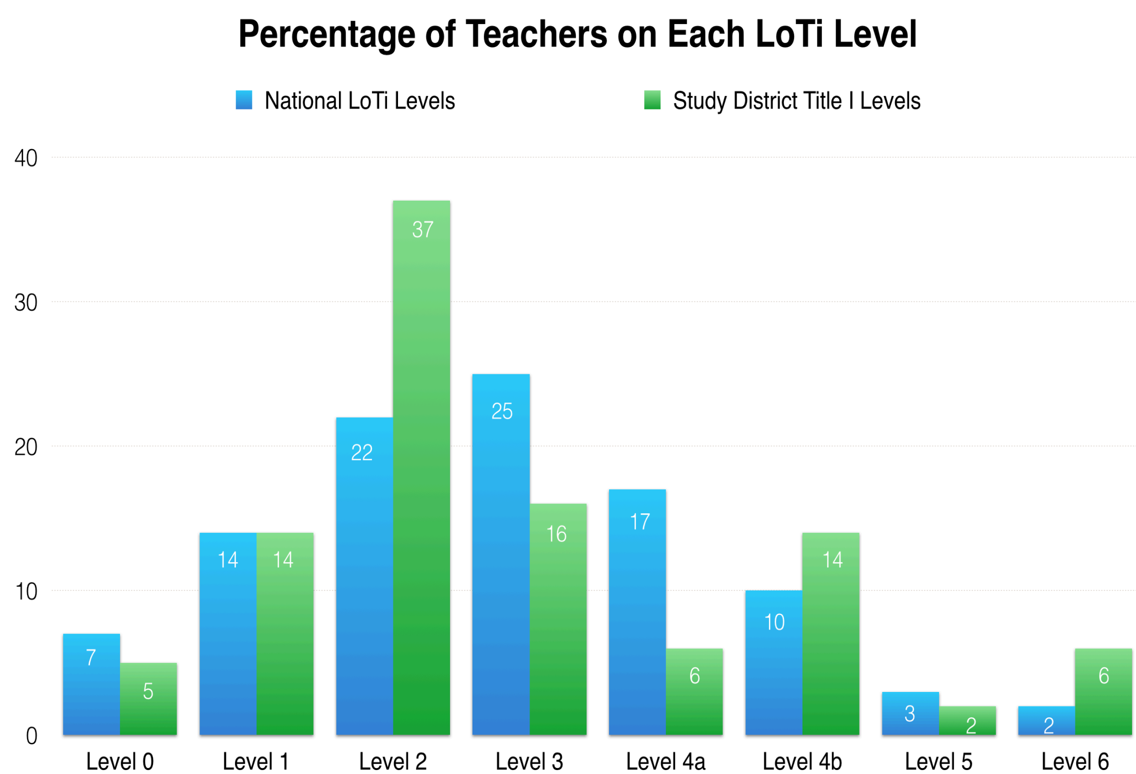

Figure 7 National LoTi Levels of 2005 (Loti Connection) Compared to Title I teachers in the District

Researchers and practitioners agree that planning technology-integrated instruction is challenging for teachers (Mishra & Koehler, 2006). Integrating technology into 75 Title I elementary and middle schools is even more so. Because of the possibilities of these challenges, it was important to determine and compare the LoTi levels of teachers in Title I elementary teachers who teach with Chromebooks, use interactive whiteboards (IWB), with those who teach with iPads.

Instrument. This study assesses each Title I teacher's level of technology skill according to the Levels of Teaching Innovation (LoTi) using the LoTi Digital Age Survey. The Title I office was interested in discovering how teachers were utilizing technology, especially with new and recently purchased technology tools. Because the LoTi survey was on a secure password protected website and the survey instrument was developed and tested by a third party, validity and reliability aspects were not at issue. The LoTi survey was used to gauge Title I teachers' use of technology in the classroom. The survey was administered voluntarily during the Title I technology summer workshop. The purpose of the survey was for teachers to discover their individual level of teaching innovation in order to direct them to workshops and training that would increase their technology utilization knowledge and skill level.

The LoTi survey consists of 50 Likert-type questions that measured the current role of technology used in the classroom through three key areas: a) classroom teacher Levels of Teaching Innovation (LoTi); b) Personal Computer Use (PCU); and c) Current Instructional Practices (CIP). The Technology Use Profile portion assessed classroom teacher current levels of technology integration based on the LoTi Framework developed by Moersch, 2010). The PCU Profile section assessed classroom teacher comfort and skill level with using a personal computer. The CIP Profile portion assessed classroom teacher current instructional practices (LoTi Connection, 2012).

The LoTi scale measured the teachers' authentic classroom technology use in seven categories. The responses had a scale of 0 to 7, as follows: 0 indicated no usage at all; 1 indicated at least once a year; 2 indicated at least once a semester; 3 indicated at least once a month; 4 indicated usage few times a month; 5 indicated usage at least once a week; 6 indicated a few times a week; and 7 indicated usage at least once a day. Each of the 50-questions used the 0-7 scale rating to determine levels of technology integration (LoTi), personal computer use (PCU), and current instructional practices (CIP) scores (LoTi Connection, 2012).

Limitations. A few limitations in the study may have affected survey results. An online self-report survey collected the data. Some teachers may lack interest in taking an online technology integration survey. Since teacher perceptions and attitudes drive how technology utilized in the classroom, caution was taken when interpreting and applying the results (Bishop, 2008). Additionally, the wide range of technology skills, devices, and equipment from school to school may have varied the results based on the level and amount of professional development received during the school year.

Plan for analyses. The study assessed the levels of technology integration of Title I teachers in an urban elementary and middle school over the course of one school year. The expectation was to determine the technology proficiency and efficacy between Title I elementary and middle school teachers. The resulting evidence will be the driving predictors of how new and existing technology programs and resources for planning and introducing initial implementation at elementary and middle schools.

The hypothesis was that teacher efficacy, skill level, and sufficient training history correlated strongly with high levels of technology integration. The intention following the study is for teachers in Title I schools to achieve or aspire to level six on the LoTi scale—Refinement—within a three-year time period. Refinement equates to the use of instruction that is student-centered, uses multiple technologies, and supported by NETS and ISTE Essential Conditions (ISTE, 2009a). In addition to its standards regarding student, teacher, and administrator ability and knowledge of technology, ISTE published a list of Essential Conditions (2009b) necessary to leverage technology for learning. The condition for successful implementation of technology involves vision, leadership, technical support, curriculum frameworks, and supporting policies. ISTE operates on the belief that school leaders who develop and effectively implement the proficiencies outlined in the NETS-A will support a learning environment where students and teachers succeed in their technological practice (ISTE, 2007). Finally, in the assessment of technology integration levels of Title I teachers, schools will not only possess a gauge for improving their teaching practices, but will also confidently meet student academic needs.

Administration of The LoTi survey was in an online group setting. Each teacher had an access code to log on to the profiler at www.lotilounge.com. Teachers identified themselves by their school and cluster. They completed a personal profile that gathered personal data such as years of teaching experience, grade level, content and school name. The survey took approximately 20 to 30 minutes to complete.

The results will help assist the District's Title I Office identify the professional knowledge and skills needed to address 21st-century learners, which include: strategies for differentiating instruction; promotion of engaged learning; and purposeful integration of technology in the classroom. The digital-age profile determines each participant's current level of teaching innovation using the LoTi Digital-Age Survey. The profiles enable the school district's Title I program to target funding sources and provide differential professional development opportunities directed at preparing teachers for a higher level of teaching innovation in the classroom, which will in turn endow their students with college and career ready skills for the 21st century.

Since 2008, the District's Title I Office has used the LoTi Digital-Age Profile sporadically and administered the Survey to 508 elementary and middle school teachers throughout the 75 Title I schools in this school district from June-December 2014. The technology usage of teachers in iPad program schools, teachers teaching without iPads, 3rd grade teachers participating in the one-to-one Chromebook initiative, elementary teachers without Chromebooks, teachers with interactive whiteboards, and teachers without interactive whiteboards were compared. The LoTi technology integration levels of teachers, and Title I technology implementation programs initiated in the district were correlated.

Teachers who took the survey participated in Title I technology professional learning communities (PLCs) and in the Interactive Summer Academy, a weeklong professional development event where teachers are trained on best practices of integrating technology. In order to achieve targeted outcomes to improve student's success through digital literacy, it was important for teachers to know and compare the levels of technology integration between elementary and middle school teachers. The teachers were able to see their individual results immediately after taking the survey.

Data entry, Data cleaning and Dealing with missing data. The LoTi Digital-Age survey and questionnaire collected data on the Title I teachers' levels of technology integration in the classroom. The researcher coded the responses of the survey and used descriptive statistics in the form of narratives, graphs, tables, and figures to represent a visual description of the sample population as well as the results of the statistical analysis (Osborne, 2011). Using and desegregating the data from the LoTi Digital-Age Profile to analyze teacher collective results for analyzing the report, the survey provided an understanding of the level of technology integration provided by the teacher; however, it does not address the quality of the technology integration or implementation in the classroom (Mehta, 2011). Therefore, the data were segregated into data sets (independent variables) according to years of teaching experience, types of devices used in the classroom (iPads, Chromebooks and interactive whiteboards), content area, and grade level (elementary school teachers and middle school teachers).

The researcher then categorized and analyzed the data according to each research question (see *figure* 8). Using the three research questions and the StatPlus™ software, the researcher described, organized, and analyzed the data in an effort to answer the questions presented in this research. Descriptive statistics, regression analysis, and correlation were all collected to analyze and report the evidence retrieved from this study using multiple linear regression to determine the relationship between the level of teaching innovations (dependent variable) and the independent variables. If the data analysis determined that a relationship did exist between the dependent variable and the independent variables, a correlation matrix measured the degree, or strength, of the linear relationship (Creswell, 2003).

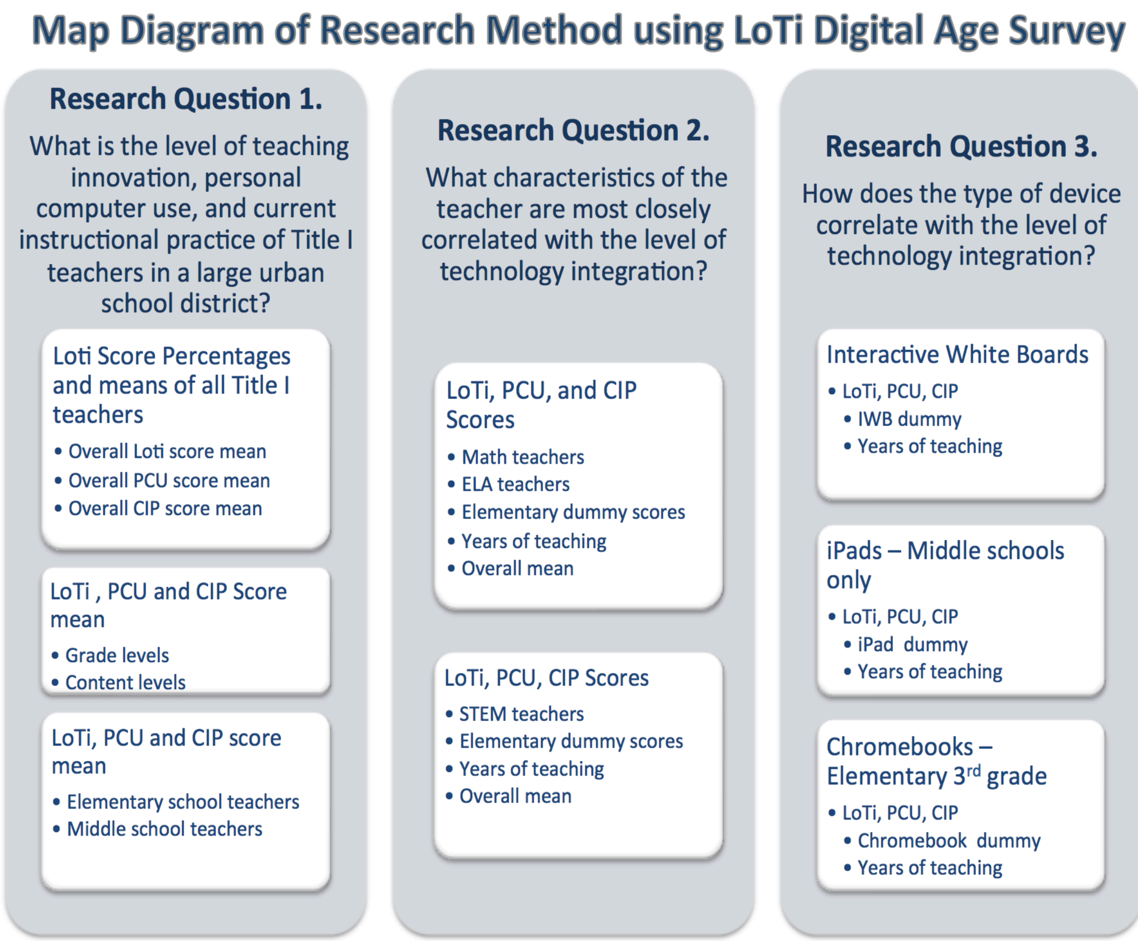

Figure 8 Map Diagram of Research methods using LoTi Digital-Age Survey

Human Subject Review. Approved by the District, the research involved gathering information and studying data from living adult individuals. Additionally, the research involved the survey procedures and possible observation of the human subjects. The data relied on the good faith and motivation of the selected human subjects, and yielded few flaws in the data. Each human subject received information of his or her rights. Their individual results, as agreed upon in the LoTi Profiler, will remain confidential. The researcher included a short demographic survey; however, completion of this form was not required or used as data for the study. To maintain confidentiality, the researcher did not report any individual results in this study. The results of the study were made available to selected personnel in the Title I Office but only in an aggregate format, so as not to identify particular individuals who participated in the study. The Title I office will continue to use the results, to compare school location, clusters, years of experience, grade level, and content level.

CHAPTER 3: DATA ANALYSIS

Results

In this quantitative correlational study, this researcher used descriptive statistics and regression analysis to examine relationships between the variables. The dependent variables included

- levels of teaching innovation (LoTi);
- current instructional practices (CIP); and
- personal computer use (PCU)

The following were the independent variables:

- years of classroom teaching experience;
- teacher's grade level;
- content areas; and
- types of technology used in the classroom (Chromebooks, iPads, or interactive whiteboards).

Descriptive statistics aggregate characteristics of the data in graphs, tables, and figures, in order to give the reader a general sense of what the data looked like. The three most commonly shown characteristics included the mean value of the data, the standard deviation, and the distribution shape (Gay, Mills, and Airasian, 2006).

Participant responses were coded according to predetermined, independent variables significant to District's understanding of how their Title I teachers integrate technology. Codes included a) years of experience; b) grade level taught; c) content area; d) iPads dummy; e) Chromebook dummy; and f) interactive whiteboard (IWB) dummy. In addition, the dependent variables from the LoTi survey were a) current instructional practices; b) level of teaching innovation; and c) personal computer use.

Research question one: What is the level of teaching innovation, personal computer use, and current instructional practice for Title I teachers in a large urban school district? The first research question examined the results of the LoTi survey used to assess a teacher's use of technology in the classroom (Table 3). The researcher asked the teachers to respond to 50 questions to determine their overall level of technology integration. Based on teacher responses to the LoTi instrument, teachers could be categorized among eight possible LoTi levels. The LoTi level is determined based on the formula developed by Moersch (2010). The survey also calculated each teacher's personal computer use (PCU) and current instructional practices (CIP). The LoTi score ranges from 0 to 6 and is a combination of the teacher's instructional practices and use of technology, specifically depicting how technology is used in instruction.

Table 3

Summary Statistics for LoTi scores

Summary Statistic	Value
Number of Teachers surveyed	508
Mean LoTi Score	2.828
Standard Deviation	1.764
Mean Standard Error	0.078
Minimum	0
Maximum	7
Range	7
Median	2

The researcher asked the teachers to respond to questions on a Likert scale of zero to seven. A score of zero indicated that the question does not apply, while a score of seven indicates high proficiency of personal computer use and current instructional practices of technology integration.

In order to answer question one, the participants' LoTi, PCU and CIP profiles were determined by first calculating how many participants were in each level of LoTi, PCU, and CIP (Table 4). Overall distribution of the group in LoTi Levels is as displayed in Figure 9.

Table 4

Loti Score Percentages (N=508)

Loti Levels	N	Percent of Total
Level 0 (Non-use)	25	5%
Level 1 (Awareness)	73	14%
Level 2 (Exploration)	190	37%
Level 3 (Infusion)	82	16%
Level 4a (Integration)	29	6%
Level 4b (Routine)	71	14%
Level 5 (Expansion)	9	2%
Level 6 (Refinement)	31	6%

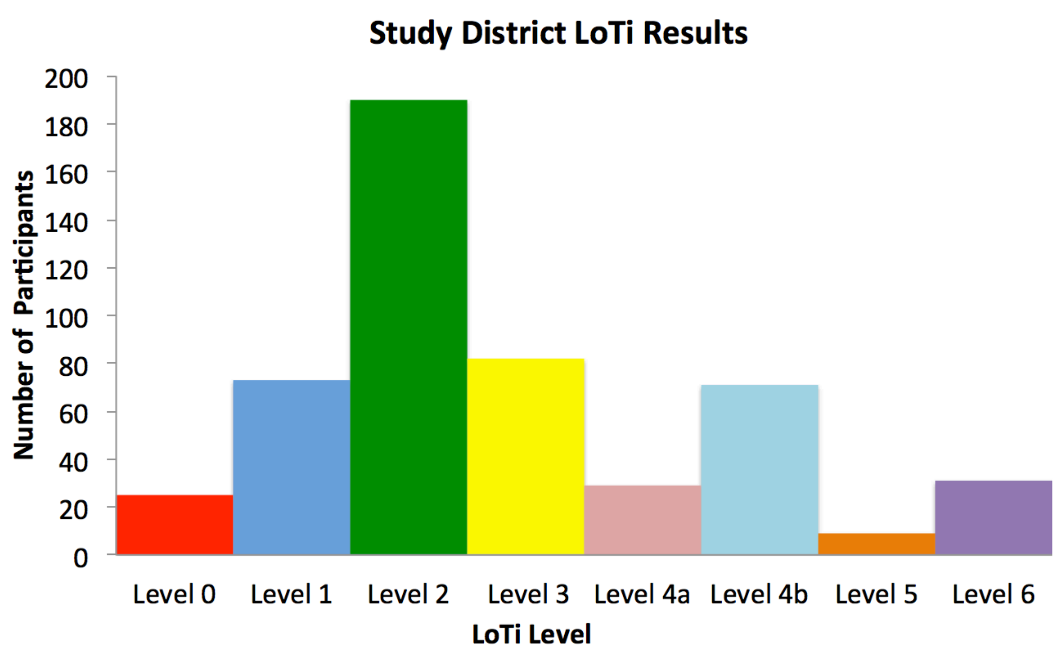

Figure 9. The District's LoTi Results for 2014

The following tables represented descriptive data of the study participants across subject area. Table 5 represented LoTi means of each grade level represented in the study. The 508 respondents are teachers from grades pre-kindergarten to grade eight. Fifth grade teachers had the highest LoTi mean score of 3.16 amongst the elementary grades. The highest LoTi mean score amongst middle school teachers was in the seventh grade with a mean score of 3.2. First grade teachers had the lowest LoTi mean score of all the grades. It is important to note that the third grade teachers are the largest group, and they have a mean LoTi score of 2.4.

Table 5

Mean LoTi Scores by Grade Level Taught

Grade level Taught	N	Percent of Total	LoTi Mean Score
Pre-K	6	1%	2.333
Kindergarten	14	3%	2.857
1st Grade	16	4%	2.312
2nd Grade	14	3%	2.714
3rd Grade	144	28%	2.451
4th Grade	17	5%	3.117
5th Grade	12	2%	3.166
6th Grade	36	7%	3.088
7th Grade	95	19%	3.200
8th Grade	66	13%	3.090
Elementary (multiple grades levels)	41	8%	2.600
Middle school (multiple grade levels)	43	8%	3.116

The CIP is scored on a scale from 0 to 7 and it reflects the teacher’s instructional practices. Table 6 shows a breakdown of CIP scores by grade level.

Table 6

Mean CIP Scores by Grade Level Taught

Grade level Taught	N	Percent of Total	CIP Mean Score
Pre-K	6	1%	4.660
Kindergarten	14	3%	5.642
1st Grade	16	4%	5.125
2nd Grade	14	3%	5.857
3rd Grade	144	28%	4.402
4th Grade	17	4%	5.352
5th Grade	12	2%	5.250
6th Grade	36	7%	5.714
7th Grade	95	19%	5.547
8th Grade	66	13%	6.030
Elementary (multiple grades levels)	41	8%	4.550
Middle school (multiple grade levels)	43	8%	5.3953

The PCU score ranges from 0 to 7, it conveys the personal skill and comfort level with using technology. Table 7 shows a breakdown of the PCU score.

Table 7

Grade level taught PCU Mean Scores

Grade level Taught	N	%Percent of Total	PCU Mean Score
Pre-K	6	1%	4.500
Kindergarten	14	3%	5.000
1st Grade	16	3%	5.187
2nd Grade	14	3%	5.071
3rd Grade	144	28%	3.916
4th Grade	17	3%	4.764
5th Grade	12	2%	4.583
6th Grade	36	7%	4.600
7th Grade	95	19%	4.589
8th Grade	66	13%	5.136
Elementary (multiple grades levels)	41	8%	4.450
Middle school (multiple grade	43	8%	

levels)	4.465

Two-hundred sixty-four middle school teachers took the LoTi survey and this group of teachers had a higher LoTi score overall than elementary school teachers with a mean of 3.1. Two-hundred forty-three elementary teachers took the LoTi survey and their average LoTi score was 2.6. Table 8 shows the average LoTi scores for elementary and middle school teachers.

Table 8

Mean LoTi Scores for Elementary and Middle School Teachers

Teacher groups	N	Percent of Total %	Average LoTi Score
Elementary School teachers	265	53%	2.566
Middle school teachers	243	47%	3.115

Table 9 is a breakdown of the LoTi scores by content area. STEM teachers on average had the highest LoTi score amongst the content areas.

Table 9

Mean LoTi Scores for Teachers by Content Area

Content area all teachers	N	LoTi Score
Math	93	3.215
English/ Language Arts	104	2.951
STEM (Science, Technology and Math)	146	3.260

Table 10 showed the average overall LoTi, CIP, and PCU scores of Title I teachers in the study district. Retrieval of the scores came from the secured Digital – Age Profiler and recalculated using AnalystSoft Inc., StatPlus™: mac LE Version 2009 for accuracy.

Table 10

Overall LoTi Digital-Age scores of study district

LoTi Digital Age Scores of study district	Score
LoTi	2.8
CIP	4.4
PCU	5.1

Research Question Two: What characteristics of the teacher are most closely correlated with the level of technology integration? Table 11 represented the LoTi, CIP and PCU mean score of the years of teaching experience. Teachers with less than five years of teaching experience had a lower LoTi score on average than teachers with 20 or more years of teaching experience. Novice teachers—those with less than five years of teaching experience—had the lowest mean score in Current Instructional Practices and Personal Computer Use. On average, veteran teachers—those with 20 or more years of teaching experience—scored the highest across each of the assessment areas.

Table 11

Mean Scores by Years Teaching

Independent Variable	N	Percent of Total %	Mean LoTi Score	Mean CIP Score	Mean PCU Score
Less than 5 years	146	29	2.6896	5.2123	4.3287
5 to 9 years	127	25	2.7165	5.0472	4.4015
10 to 20 years	152	30	2.8410	5.1655	4.6092
More than 20 years	83	16	3.2023	5.3780	4.7073

The researcher performed a regression analysis using AnalystSoft Inc., StatPlus™: mac LE Version 2009 to determine the correlation between the independent variables, including subject taught (Math, ELA), years of teaching experience, elementary dummy and the dependent variables, LoTi Score, CIP, and PCU (Table 12).

Table 12

Regression of LoTi, CIP, and PCU on Subject Taught

Independent Variables	LoTi Score	CIP	PCU
Math	0.446 **	0.005	-0.012
	(0.032)	(0.979)	(0.949)
ELA (English Language Arts)	0.204***	0.271	0.132
	(0.001)	(0.182)	(0.485)
Elementary dummy	-0.486***	-0.953	-0.405***
	(0.001)	(0.0001) ***	(0.007)
Years of experience	0.131*	0.0306	0.129*
	(0.072)	(0.682)	0.064
R^2	0.040	0.072	0.023
N	504	506	506

Notes. *Statistically significant at 10 % (p< .1) level **Statistically significant at the 5% (p< .05) level. ***Statistically significant at the 1% (p< .01) level P-values are in parentheses.

Math and LoTi score. Compared to non-math teachers, math teachers had a higher LoTi score, reaching 0.45 points higher on average after accounting for years of teaching experience, whether or not they taught elementary school and whether or not they taught ELA (English Language/Arts). The difference was statistically significant at the 5% level (p= 0.03).

ELA and LoTi score. Compared to non-ELA teachers and non-math teachers, ELA teachers had a higher LoTi score, reaching 0.20 points higher on average after accounting for years of teaching experience, whether they taught elementary school and whether they taught math. The difference was statistically significant at the 1% level ($p < 0.01$).

Elementary dummy and LoTi score. Compared to middle school teachers, elementary school teachers had a lower LoTi score, 0.49 points lower on average after accounting for years of teaching experience, whether they taught ELA and whether they taught math. The difference was statistically significant at the 1% level ($p < 0.01$).

Years of experience and LoTi score. There was an increase in LoTi scores with increasing years of experience, reaching 0.13 points higher on average for each of the categories of teaching experience (e.g., 5-9 years compared to < 5 years), after accounting for grade level (whether they taught elementary school), whether they taught ELA, and whether they taught math. The association was statistically significant at the 10% level ($p = 0.07$). Overall, the variables math, ELA, Elementary dummy, and years of experience together explain about 4% of the variability in LoTi score ($R^2 = 0.04$).

Elementary dummy and CIP score. Compared to middle school teachers, elementary school teachers had a lower CIP score, 0.95 points lower on average after accounting for years of teaching experience, whether or not they taught ELA and whether or not they taught math. The difference was statistically significant at the 1% level ($p < 0.001$).

Elementary dummy and PCU score. Compared to middle school teachers, elementary school teachers had a lower PCU score, reaching 0.41 points lower on average after accounting for years of teaching experience, whether or not they taught ELA and whether or not they taught math. The difference was statistically significant at the 1% level ($p< 0.01$).

Years of experience and PCU score. As depicted in Table 13, there was an increase in PCU scores with increasing years of experience, reaching 0.13 points on average for each of the categories of teaching experience (e.g., 5-9 years compared to <5 years) after accounting for whether or not they taught elementary school, whether or not they taught ELA and whether or not they taught math. The association was statistically significant at the 10% level ($p= 0.06$). Overall, the variables math, ELA, elementary dummy, and years of experience together explain about 2% of the variability in CIP score ($R^2= 0.02$).

Table 13

Regression of LoTi, CIP, and PCU on STEM Dummy

Independent Variables	LoTi Score	CIP	PCU
STEM	0.5105***	0.08237	0.0965
	(0.004)	(0.6519)	(0.5710)
Elementary dummy	-0.4132**	-0.9423	-0.3847**
	(0.0100)	(0.0001) ***	(0.0192)
Years of experience	0.1468**	0.0344	0.1323
	(0.0435)	(0.6460)	(0.0592)*
R^2	0.0465	0.0690	0.0226
N	506	506	506

Notes. A regression analysis determined whether or not there is a significant association between the independent variables including, subject taught (STEM), years of teaching experience, elementary versus middle school teachers and the dependent variables including, LoTi Score, CIP and PCU. *Statistically significant at 10 % ($p< .1$) level **Statistically significant at the 5% ($p< .05$) level. ***Statistically significant at the 1% ($p< .01$) level P-values are in parentheses.

STEM and LoTi score. Compared to non-STEM teachers, STEM teachers had a higher LoTi score, an estimate 0.51 points higher on average after accounting for years of teaching experience and whether or not they taught elementary school. The difference was statistically significant at the 1% level ($p < 0.01$).

Elementary dummy and LoTi score. Compared to middle school teachers, elementary school teachers had a lower LoTi score, an estimate 0.41 points lower on average, after accounting for years of teaching experience and whether or not they taught STEM. The difference was statistically significant at the 5% level ($p = 0.01$).

Years of experience and LoTi score. LoTi scores increased with more years of experience. There was an increase in LoTi scores with increasing years of experience, on average, an estimated 0.15 points for each of the categories of teaching experience (e.g., 5-9 years compared to < 5 years) after accounting for whether or not they taught elementary school and whether or not they taught STEM. The association was statistically significant at the 5% level ($p = 0.04$). Overall, the variables, STEM, elementary dummy, and years of experience together explain about 5% of the variation in LoTi score ($R^2=0.05$)

Elementary dummy and CIP score. Compared to middle school teachers, elementary school teachers had a lower CIP score, (an estimated 0.94 points lower on average) after accounting for years of experience and whether or not they taught STEM. The difference was statistically significant at the 1% level ($p < 0.001$).

Elementary dummy and PCU score. Compared to middle school teachers, elementary school teachers had a lower PCU score, (an estimated 0.38 points lower on average) after accounting for years of teaching experience and whether or not they taught STEM. The difference was statistically significant at the 5% level (p= 0.02).

Years of experience and PCU score. There was an increase in PCU scores with increasing years of experience, (an estimated 0.13 points higher on average) for each of the categories of teaching experience (e.g., 5-9 years compared to < 5 years) after accounting for whether or not they taught elementary school and whether or not they taught STEM. The association was statistically significant at the 10% level (p=0.06). Overall, the variables, STEM, elementary dummy, and years of experience together explain about 2% of the variation in CIP score (R^2= 0.02).

There was no statistically significant association between:

- *teaching STEM and CIP score* after accounting for years of teaching experience and whether or not they taught elementary school (p= 0.65);
- *years of experience and CIP score* after accounting for whether or not they taught STEM and whether or not they taught elementary school (p= 0.65);
- *teaching math and CIP score* after accounting for years of teaching experience, whether or not they taught elementary school and whether or not they also taught ELA (p= 0.98);
- *teaching ELA and CIP score* after accounting for years of teaching experience, whether or not they taught elementary school and whether or not they also taught math (p= 0.18);

- *teaching STEM and PCU score* after accounting for years of teaching experience and whether or not they taught elementary school (p= 0.57);
- *years of experience and CIP score* after accounting for whether or not they taught ELA, whether or not they taught Math and whether or not they taught elementary school (p= 0.68);
- *teaching math and PCU score* after accounting for years of teaching experience, whether or not they taught elementary school and whether or not they also taught ELA (p= 0.95);
- *teaching ELA and PCU score* after accounting for years of teaching experience, whether or not they taught elementary school and whether or not they also taught math (p= 0.49).

Research question three: How does the type of device correlate with the level of technology integration? For this question, the independent variables were a) the dummy variable for interactive whiteboard program; b) the iPads one-to-one program; and c) the Chromebook initiative and the years of teaching experience. Figure 10 exhibits the overall LoTi score for each Title I program.

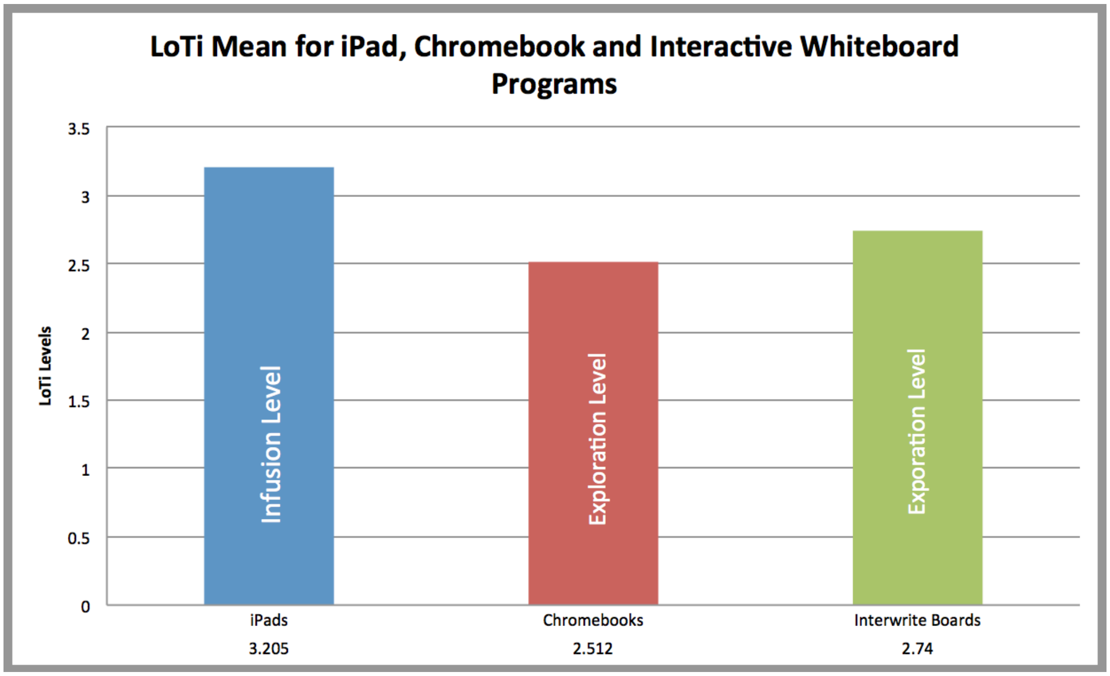

Figure 10. Digital-Age (LoTi) Mean for Title I iPad, Chromebook and Interactive Whiteboard Programs

Years of experience and LoTi score. There was an increase in LoTi scores with increasing years of experience, an estimated 0.13 points higher on average for each of the categories of teaching experience (e.g., 5-9 years compared to < 5 years) after accounting for whether or not they had IWB. The association was statistically significant at the 10% level (p= 0.07). Overall, the variables IWB and years of experience together explain about 1% of the variability in LoTi score (R^2= 0.01).

Years of experience and PCU score. There was an increase in PCU scores with increasing years of experience, an estimated 0.14 points higher on average for each of the categories of teaching experience (e.g., 5-9 years compared to < 5 years) after accounting for whether or not they had IWB. The association was statistically significant at the 10% level (p= 0.06). Overall, the variables, IWB and years of experience together explain about 9% of the variability in PCU score (R^2= 0.09).

Table 14

Digital- Age Coefficient for Interactive Whiteboard program

Independent variables	LoTi Coefficient	CIP Coefficient	PCU Coefficient
IWB	-0.1585	-0.2061	0.0099
	(0.3160)	(0.2138)	(0.9475)
Years of teaching	0.1336	0.03147	0.1357
	(0.0731)*	(0.6867)	(0.0562)*
R^2	0.0093	0.0037	0.08537
N	506	506	506

Notes. A regression analysis determined whether or not there is a significant association between the independent variables, having an interactive white board (IWB) and years of teaching experience and the dependent variables including, LoTi Score, CIP and PCU. *Statistically significant at 10 % ($p< .1$) level. **Statistically significant at the 5% ($p< .05$) level. ***Statistically significant at the 1% ($p< .01$) level. P-values are in parentheses.

Table 15 shows positive statistically significant correlations between iPads and the three integration scores at the 5% level. There was also a positive and statistically significant correlation between years teaching and PCU at the 5% level.

Table 15

Teachers with iPads Digital-age Coefficients

Independent Variables	LoTi	CIP	PCU
iPads	0.7881**	0.6373**	0.7125**
	(0.0134)	(0.0398)	(0.0145)
Years of teaching	0.2039*	0.1458	0.2225**
	(0.0630)	(0.1719)	(0.0267)
R^2	0.0405	0.0260	0.0459
N	241	241	241

Notes. A regression analysis determined whether or not there is a significant association between the independent variables, having an iPad and years of teaching experience and the dependent variables including, LoTi Score, CIP and PCU. *Statistically significant at 10 % ($p< .1$) level. **Statistically significant at the 5% ($p< .05$) level. ***Statistically significant at the 1% ($p< .01$) level. P-values are in parentheses.

IPads and LoTi score. Teachers who had iPads had higher LoTi scores compared to those who did not, approximately 0.78 points higher on average after accounting for years of teaching experience. The association of having an iPad with higher LoTi scores was statistically significant at the 5% level (p= 0.01).

Years of experience and LoTi score. There was an increase in LoTi score with increasing years of experience, controlling for iPad use, an estimated 0.20 points higher on average for each of the categories of teaching experience (e.g., 5-9 years compared to < 5 years) after accounting for whether or not they had an iPad. The association was statistically significant at the 10% level (p= 0.06). Overall, the variables iPad and years of experience together explain about 4% of the variation in LoTi score (R^2= 0.04)

IPads and CIP score. There was an increase in CIP scores comparing teachers who had IPads to those who did not, about 0.64 points on average after accounting for years of teaching experience. The association was statistically significant at the 5% level (p= 0.04).

Years of experience and CIP score. There was an increase in CIP score with increasing years of experience, controlling for iPad use, an estimated 0.15 points higher on average for each of the categories of teaching experience (e.g., 5-9 years compared to <5 years) after accounting for whether or not they had an iPad (p=0.17). Overall, the variables iPads and years of experience together explain about 3% of the variation in CIP score (R^2= 0.03)

IPads and PCU score. There was an increase in PCU scores comparing teachers who had iPads to those who did not, about 0.71 points higher on average after accounting for years of teaching experience. The association was statistically significant at the 5% level (p= 0.01).

Years of experience and PCU score. There was an increase in PCU scores with increasing years of experience, controlling for iPad use, reaching 0.22 points higher on average for each of the categories of teaching experience (e.g., 5-9 years compared to < 5 years) after accounting for whether or not they had an iPad. The association was statistically significant at the 5% level (p= 0.03). Overall, the variables iPad and years of experience together explain about 5% of the variation in PCU score (R^2= 0.05).

Table 16: A regression analysis was performed to determine whether or not there is a significant association between the independent variables, having a Chromebook and years of teaching experience, and the dependent variables including, LoTi Score, CIP, and PCU.

Table 16

Chromebook dummy digital-age coefficients

	LoTi	CIP	PCU
Chromebooks	-0.1010	-0.6777***	-0.5419***
	(0.6205)	(0.0019)	(0.0076)
Years of teaching	0.0493	-0.1528	-0.022
	(0.6165)	(0.1449)	(0.8173)
R^2	0.0023	0.03873	0.0271
N	265	265	265

Notes. *Statistically significant at 10 % (p< .1) level. **Statistically significant at the 5% (p< .05) level. ***Statistically significant at the 1% (p< .01) level. P-values are in parentheses.

Chromebook and CIP score. Compared to those without Chromebooks, teachers with Chromebooks had a lower CIP score, reaching about 0.68 points lower on average after accounting for years of teaching experience. The association was statistically significant at the 1% level (p< 0.01).

Chromebooks and PCU score. Compared to those without Chromebooks, teachers with Chromebooks had a lower PCU score, reaching about 0.54 points lower on average after accounting for years of teaching experience. The association was statistically significant at the 1% level ($p < 0.01$).

There was no statistically significant association between having a

- *Chromebook and LoTi score* after accounting for years of experience ($p = 0.62$);
- *the years of teaching experience and LoTi score* after accounting for whether or not they had a Chromebook;
- *between years of experience and PCU score*, after accounting for whether or not they had Chromebooks ($p = 0.82$);
- *the years of experience and CIP score* after accounting for whether or not they had Chromebooks ($p = 0.14$). Overall, the variables Chromebook and years of experience together explain about 0% of the variability in LoTi score ($R^2 = 0.00$).
- *IWB and CIP score* after accounting for years of experience ($p = 0.21$);
- *years of experience and CIP score* after accounting for whether or not they had IWB ($p = 0.69$); and
- *IWB and PCU score* after accounting for years of experience ($p = 0.95$). Overall, the variables IWB and years of experience together explain about 0% of the variability in CIP score ($R^2 = 0.00$).

Regressions were run a second time with all devices included, as shown in table 17.

Table 17
Regressions of all devices at once

Independent Variables	LoTi Score	CIP	PCU
iPad dummy	0.64321***	0.63961***	0.31277*
	(0.0006)	(0.0007)	(0.0780)
IWB dummy	-0.18994	-0.0249	0.1717
	(0.2819)	(0.8896)	(0.3063)
3rd Grade Chromebook	-0.0043	-0.7140	-0.4993***
dummy	(0.9543)	(0.0016)	(0.0182)
Novice Dummy	-0.1692	0.06735	-0.2268**
	(0.3250)	(0.7001)**	(0.1658)
R^2	0.037	0.0875	0.0393)
N	506	506	506

Notes. A regression analysis determined whether or not there is a significant association between the independent variables including, iPad dummy, IWB dummy, 3rd grade dummy, novice dummy, and the dependent variables including, LoTi Score, CIP and PCU. *Statistically significant at 10 % ($p < .1$) level. **Statistically significant at the 5% ($p < .05$) level. ***Statistically significant at the 1% ($p < .01$) level. P-values are in parentheses.

IPads and LoTi score. Teachers who taught with iPads had higher LoTi scores compared to those who did not have any device, reaching approximately 0.64 points higher on average after accounting for years of teaching experience. The association of having an iPad with higher LoTi scores was statistically significant at the 1% level ($p = 0.01$).

IPads and CIP score. Teachers who taught with iPads had higher CIP scores compared to those who did not have any device, reaching approximately 0.64 points higher on average after accounting for years of teaching experience. The association of having an iPad with higher CIP scores was statistically significant at the 1% level ($p = 0.01$).

Chromebooks and PCU score. Compared to those without Chromebooks, teachers with Chromebooks had a lower PCU score, reaching about 0.49 points lower on average after accounting for years of teaching experience. Third grade teachers with Chromebooks also had lower PCU scores than the teachers with no devices. The association was statistically significant at the 1% level ($p < 0.01$).

Interpretation of Results

Research Question One: What is the level of teaching innovation, personal computer use, and current instructional practice for Title I teachers in a large urban school district? According to the Digital-Age survey results, Title I teachers in the District scored on level 2 of the LoTi Framework scale. According to the survey, 56% of the Title I teachers' average was below Level 2. This is the exploration level, which indicated that the teachers have a pedagogical understanding of the content to support mastery learning and direct instruction. However, according to the LoTi framework, student learning focused on lower levels of Bloom Taxonomy cognitive processes: applying, analyzing, evaluating, and creating (Moersch, 2011; Rahimi, Van den Berg & Veen, 2014). Digital resources primarily used for extension activities, enrichment exercises, or information gathering assignments that support lower cognitive skill development relating to the subject area or assignment. The district's average LoTi level score of 2 reflects low technology usage in Title I schools. Teachers need to be able to integrate technology within the curriculum to support higher order thinking skills. Too much emphasis has been on the equipment instead of the creation of technology-enhanced learning activities that encourage productivity, planning, and organization (Penuel, Fishman, Yamaguchi, & Gallagher, 2007). Level 2 also indicated that teachers are not allowing students to use technology to create, produce, and execute assignments and lessons. The engagement of students and teachers using digital devices, Web 2.0 technologies, and other digital resources would help them reach the learning potential of integrating technologies (Rahimi, Van den Berg, & Veen, 2014).

Middle school teachers had an average LoTi score of 3.1 (Figure 11). This score indicated an instructional focus on engaging higher order skills using digital tools and resources to solve teacher-directed problems related to the content under investigation. Middle school teachers have received the most professional development because of the one-to-one iPad program. Since its initial implementation in 2011, middle school teachers have averaged over 151 professional development hours. The 151 professional development hours has the equivalent of 44 workshops and training geared to improve, increase, and enhance integration of technology in the classroom. Teachers received pay as an incentive to attend the offered trainings.

STEM teachers had an average LoTi score of 3. The science, technology, and math teachers have numerous technology resources available at the district level. A majority of these teachers are also Title I technology facilitators, library media specialist, and profession development presenters.

First grade teachers averaged the lowest LoTi score at 2.3. Compared to middle school teachers, teachers in the early grades did not receive as many professional development opportunities specific to their interest or grade level. The Title I Office's focus was on the middle school teachers due to the large roll out of iPads in the one-to-one program. However, Title I teachers had access to online and technology resources such as Waterford Early Learning, interactive white boards, and response clickers specific to their content area and grade level.

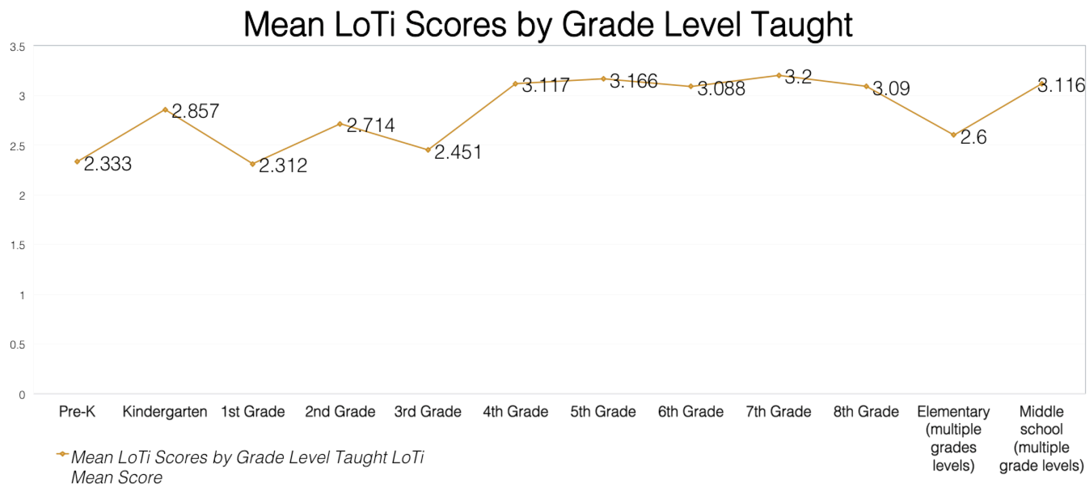

Figure 11 the District's Mean LoTi scores by grade level taught

The average current instructional practices (CIP) intensity level for Title I teachers was 5. The Digital-age profile suggested that the teachers' instructional practices at level five tend to lean more toward a student-directed approach. This approach allows students to make their own choices while learning in order to make their learning experience more meaningful, relevant, and effective (Moersch, 2011). Title I teachers created lessons from the standards that trigger students' interests. Students are encouraged to research and solve issues of significance to them using critical thinking and problem-solving skills (Moersch, 2011). In many of the Title I schools, the types of learning activities and teaching strategies used in the learning environment are diversified and driven by student questions.

The average personal computer used (PCU) intensity level was also 5. This level indicated that the Title I teachers demonstrated a high fluency level with using digital tools and resources for student learning. While teachers received numerous opportunities for professional development, attendance at workshops has been low (Title I Office, 2011). Title I teachers are introduced to an array of new and existing digital-age media and platforms to enhance their curriculum and instructional strategies. Teachers who take advantage of professional development are well versed in providing safe, legal, and ethical uses of digital content and technologies (ISTE, 2008).

Research Question Two: What characteristics of the teacher are most closely correlated with the level of technology integration? Middle school math and STEM teachers who have taught for 20 years or more had the highest LoTi score. These teachers exhibited characteristics that allowed infusion of technology throughout the instructional day. According to LoTi level 3, the Infusion level, these teachers incorporated higher order thinking skills such as application, analysis, synthesis, and evaluation with a focus on including technology within the content (Moersch, 2011). Teachers who teach math and STEM allow their students to use digital tools and resources for activities that emphasize higher levels of student cognitive processing, according to the Bloom's Taxonomy of Learning domains related to the content (Atherton, 2013). In addition, there is an array of new technology tools available for student use in the math classroom. In addition to calculator and computer applications, new technologies include presentation technologies such as interactive whiteboard, LCD projectors, graphic calculators, mobile devices, and accessibility to the Internet (Anthony & Walshaw, 2009).

Teachers who have taught for 20 years or more had the highest LoTi score. The LoTi score increased as the years of teaching increased. In this study the LoTi mean score for teachers who taught for 20 years or more was 3.2 (Level 3). Teachers who successfully implement technology understand how computers, Web 2.0 tool, social media, and mobile devices can enhance the authentic learning process within the learning environment. In terms of authentic learning, technology enhances the process of math education by reducing the need for learners to complete all calculations by hand and allowing them to discover real-world problems that they will confront in daily life (Mueller & Wood, 2012). ISTE (2008) states the following:

> Effective teachers model and apply the ISTE Standards for Students (Standards•S) as they design, implement, and assess learning experiences to engage students and improve learning; enrich professional practice; and provide positive models for students, colleagues, and the community (para 1).

There was an increase in LoTi, PCU, and CIP scores with increasing years of experience (Figure 12). Using technology to enhance the instructional environment encompasses more than just learning how to use the Internet or mobile device. It requires an understanding of pedagogical knowledge and skills that are exclusive to the use of technology in the classroom (Okojie, Olinzock, & Okojie-Boulder, 2006). According to Moersch's LoTi Framework (2002), Title I teachers portray characteristics of teachers who successfully infuse technology at level 3 of the LoTi framework. At the Infusion level, Title I teachers are able to gauge the appropriateness of any technology device used for teaching and learning as it relates to the curriculum and instructional delivery. The teachers consider how and what technology is suitable for instructional use and are able to adjust their instruction to meet the needs of their students. They are able also to determine how the technology fits into the objective of the lesson, instructional approach, assessment, feedback, and enrichment activities.

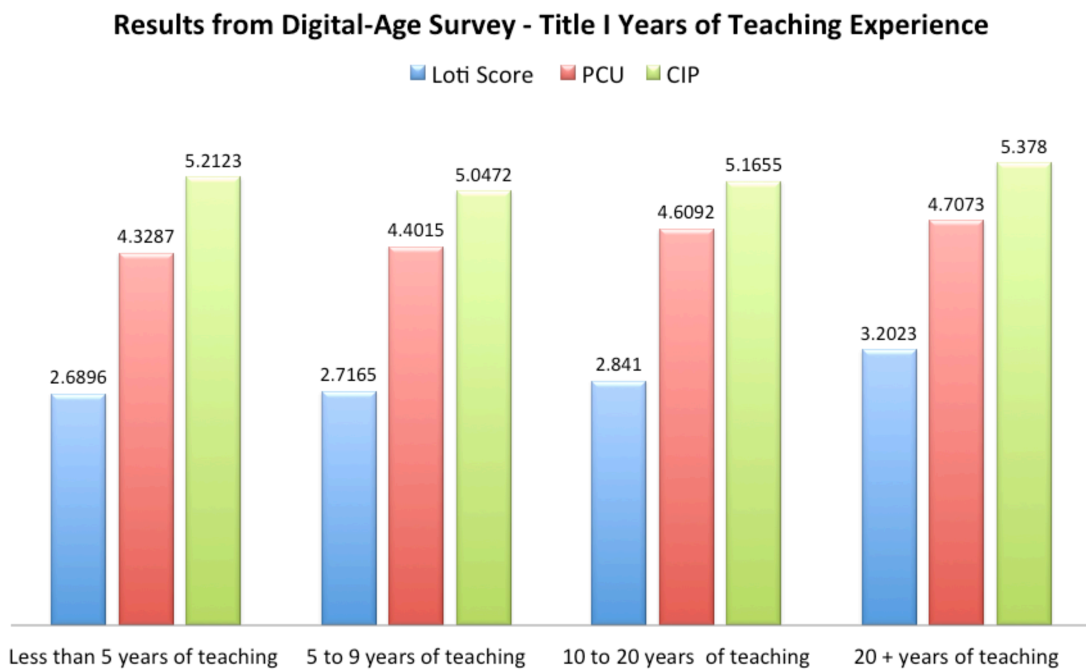

Figure 12. Results from digital-age survey – Title I years of teaching experience.

This increase of LoTi, PCU, and CIP scores is due to the investment of resources and professional development. From this we can infer that teachers' ability to integrate technology increases and improves each year that they are in a Title I school. Although there is evidence that technology usage is low, there is a consistent increase in the level of technology integration as teachers increase their learning and technology integration experience.

There was no statistically significant correlation between the CIP scores and the teachers' years of experience, among teachers who taught math, ELA, and STEM. Current instruction practices integrate both a learner and subject-matter approach to teaching and learning. This approach is characterized by learning activities modified to the readiness level of the learner (LoTi Connection, 2012). On average eighth-grade teachers received the highest CIP score of 6, while the lowest average was in the third grade. It is important to note that Title I teachers need more development in this area. Appropriate use of technology can support higher cognitive skills and complex thinking skills through teaching practices.

There was no statistically significant correlation between the PCU scores, and teachers who taught math, ELA, and STEM. Personal computer use measures the classroom teachers' fluency level with using digital tools and resources for student learning (LoTi Connection, 2012). On average first grade teachers received the highest PCU score of 5, while third grade teachers received the lowest PCU score of 3.9.

Elementary teachers had a lower CIP, PCU, and LoTi score compared to middle school teachers. The LoTi score was statistically significant at the 5% level ($p = 0.01$). The middle school teachers received the most professional development from the District's Title I office due to the iPad program and the extensive training sessions for implementation. Four Title I schools received professional development geared around teaching with iPads, incorporating Web 2.0 tools, and the functions and use of the iPad in a one-to-one environment. The iPad has replaced the laptop as the newest trend in technology due to its smaller size, lighter weight, and longer battery life (Marmarelli & Ringle, 2010). Naturally, training teachers to use the iPad involved teachers adopting a broadened perspective of literacy, a concept that moves beyond notions of paper-pencil tasks and engages learners as creators and producers of their work.

There was a statistically significant correlation between STEM teachers and their LoTi score at the 1% level ($P < 0.01$); STEM teachers had the highest LoTi score of 3. The LoTi score is a balance of assessment, instruction, and the effective use of digital devices, and resources to encourage higher order thinking, engaged student learning, and instructional practices (LoTi Connection, 2012). Many of these teachers were also professional development presenters and teachers leaders for professional learning communities.

Research Question Three: How does the type of device correlate with the level of technology integration? The study concluded that there is a correlation between the type of device teachers used for instruction and the level of technology integration (Figure 13). The LoTi score by type of device (iPad, Chromebook, and Interactive whiteboards) indicated that the teachers who taught with iPads had the strongest predictor of technology integration. Teachers who integrated the iPad during instruction had a higher Digital-Age score than teachers who taught with interactive whiteboards and Chromebooks. The teachers' CIP was at level 5 indicating that they had a more student-directed approach. Their personal computer use intensity level was around 5, suggesting an expanded range of existing and emerging digital age technologies (LoTi Connection, 2012).

Statistically Significant Associations

Independent Variables	LoTi	CIP	PCU
iPads	●	●	●
Chromebooks		●	●
IWBs	●		●
20+ Years of Experience	●	●	●

Figure 13 Statistically significant association between devices used in Title I Classrooms.

In this study, the mean LoTi score for iPad teachers was 3.2 (Figure 14). This association was statistically significant at the 10% level ($p= 0.06$). Overall, the variables iPad and years of experience together explain about 4% of the variability in LoTi score ($R^2= 0.04$). According to Moersch's (2012) research, this score suggest that teachers feel comfortable implementing and supporting content matter in a learner-based approach. In a learner-based approach, student questions drive activities, and student projects are mostly student-directed (Moersch, 2002). In this District, students involved in the one-to-one iPad program created multi-media projects and used a variety of assessment strategies, including student reflection, online polling apps for quizzes, and standardized online practice tests. Teachers received school-based and Title I professional development throughout the school year on the use and implementation of the iPad. This program eventually became nationally recognized for innovative teaching methods and program implementation using iPads.

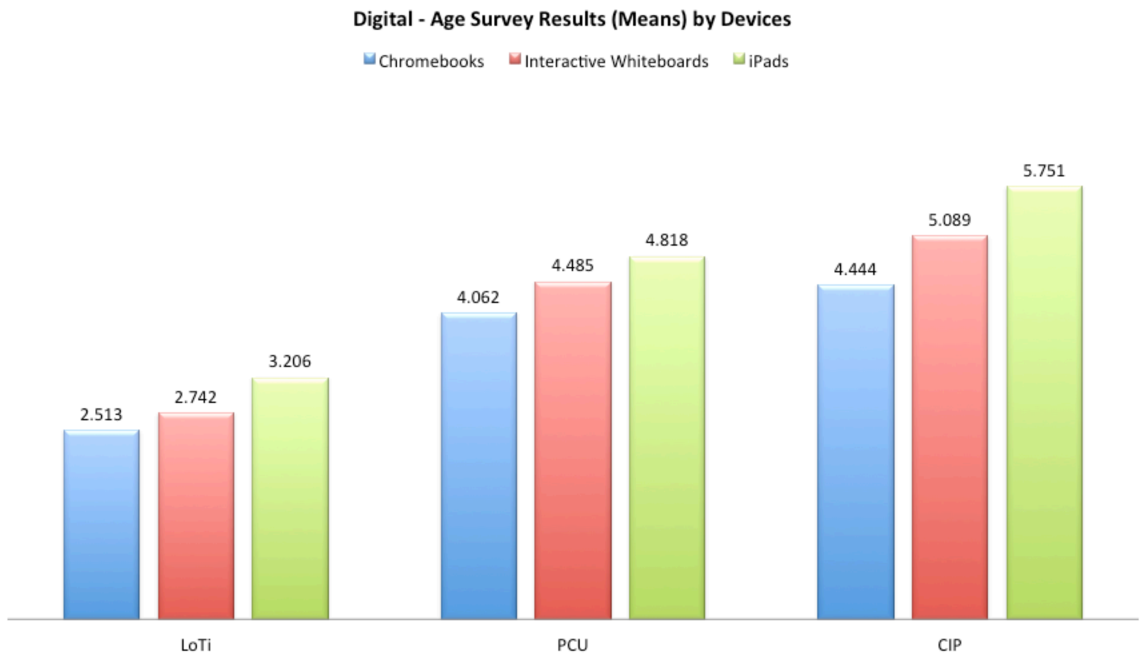

Figure 14 Digital-Age Survey Results (Means) by Device.

There were no statistically significant correlations between teachers who taught with IWB, and their LoTi, PCU, and CIP scores. Overall, the variables IWB and years of experience together explain about 1% of the variability in LoTi score (R^2= 0.01). The current instructional practice intensity level for these teachers was a 5, indicating a more student-directed approach. The teachers' personal computer use was a 4, suggesting the use of a broader range of digital-age media and formats in the classroom (LoTi Connection, 2012). Their average LoTi score was a 2. The IWB program initiated in the District in 2007, with the installation of over 1,500 boards in Title I classrooms; since then there has been an "implementation dip" (Fullan, 2001) of the overall usage of the IWB. Usage has been low due to numerous reports for repairs, loss of equipment, and misuse of the board. In order to use the board properly, all components must be in working order including the LCD projector.

Professional development attendance for this program has been low. However, the training is sustained and available throughout the school year.

There were no statistically significant correlations between teachers who taught with Chromebooks and the Digital-Age scores. Overall, the variables Chromebook and years of experience together explain about 0% of the variability in LoTi score (R^2= 0.00). The current instructional practice intensity level for these teachers was a 4, indicating a more teacher-directed approach. The teachers' personal computer use was a 4, suggesting the use of a broader range of digital-age media and formats in the classroom (LoTi Connection, 2012). This one-to-one initiative is for third grade Title I teachers and students. Teachers in this program received training to use Google Chrome and Google Documents through the District's technology training team and the Title I Office. The mean for Chromebook teachers was a 2.5. This score indicates that teachers LoTi Levels are at the exploration stage of the Digital-Age Framework. Moersch (2010) indicated at this level, that the focus is more on computer use rather than on critical content. Digital technology used for extension activities, projects, and enrichment exercises. The use of technology tools generally emphasizes lower cognitive skill development related to the content. This exploration level is the beginning stage of achieving Standard 2 of ISTE's National Standards for Teachers. Standard 2 is "design and develop digital age learning experiences and assessments" (ISTE, 2015b). However, it was surprising that the 3^{rd} grade teachers who taught with the Chromebooks actually had lower PCU scores than the teachers with no devices.

The overall LoTi scores from this group of teachers were the highest for each for the independent variables: content area, grade level, and years of teaching. This related to the number of hours and professional development offered during the initial rollout of this program. Teachers received ongoing training on Web 2.0 tools, Apple applications, and technology integration methods and techniques.

Conclusion

Based on the results of this study that analyzed the LoTi survey data, there are several areas where professional learning is necessary. The average LoTi score for Title I teachers from this school district was a 2, the exploration level. This indicated that teachers' instructional focus emphasized:

- Content understanding and supported mastery learning. Teacher questioning and /or student learning focused on lower levels of student cognitive processing (e.g., knowledge, comprehension) using the available digital resources.
- Technology used to complement selected multimedia and/or web-based projects.
- Technology in the classroom was used either as extension activities, enrichment exercises, or technology is used to reinforce content matter.

The study found correlations between Title I middle school teachers who use iPads during instruction, third grade teachers who use Chromebooks, teachers who have access to interactive whiteboards in their classroom and their LoTi scores from the web-based survey. The study concluded that there is a correlation between the type of device teachers used for instruction and the level of technology integration.

The LoTi score by type of device (iPad, Chromebook, and Interactive whiteboards) indicated that the teachers who taught with iPads had the strongest predictor of technology integration. Middle school math and STEM teachers who taught for 20 years or more had the highest LoTi score. These teachers exhibited characteristics that allowed for technology infusion throughout the instructional day. Teachers with the highest LoTi score were 7th grade middle school STEM teacher who taught with iPads. This group of teachers was at level 3, the infusion level.

The results indicated areas of improvement, areas of strengths, and suggested professional development for each individual in a digital-age profile. Approximately 56% of the 510 participants clustered in Levels 0 through 2. These levels represented the lower portion of the LoTi Framework (see Appendices) and focused primarily on teachers' use of productivity tools, student use of tutorial programs, and project-based activities. Based on the CIP scores, approximately 81% of Title I teachers from this District indicated that they either supported or implemented one or more attributes of a learner-centered curriculum. A learner-centered curriculum includes attributes such as a focus on multiple assessment strategies, an emphasis on higher-order thinking skills, and the creation of a problem-based learning environment. Research has found strong links between digital tools and resources used in conjunction with these attributes and higher student achievement based on standardized test scores. Based on their responses to the LoTi Digital-Age Survey, the highest professional development priority for Title I teachers in this district were in the area of student learning and creativity. The lowest professional development priority area for this large urban school district's participants was in the area of learning experiences and assessments.

Implications for school district.

This study adds to the literature assessing the way teachers implement technology integration with the learning environment. The focus of this school district should be on how teachers are prepared to use technology. Based on the results of this analysis, urban school districts can define areas where professional learning is necessary and provide a framework for how to assess progress in areas where levels are low. It is important to note that the assessment is not a test and approached as an instrument that looked at the teacher's current instructional practices, authentic technology use, personal computer use, and how 21st century skills are incorporated. Here are the implications for the District:

1. In order to successfully implement the integration of new technological tools such as the iPad and Chromebook, the district must investigate the teachers' level of teaching innovation. These investigations should be performed as a pre- and post-test each school year to measure growth over time. Teachers should have the opportunity to reflect on how well they are integrating technology and how they plan to improve. Several instruments are available for school districts that will give them an understanding of where their teachers are and how they should approach a plan for building their capacity around technology integration. Without an assessment, technology professional development will be hit or miss. Understanding their level of technology integration will help them plan for a successful journey of innovative instructional practices. For this to be successful, policies for implementation and

support are necessary at the state, district, and local school levels with the guidance of state and national technology standards.

2. Based on the findings of this research, ongoing professional development and training should continue for teachers and differentiated for levels 0 to 6 according to the LoTi scale, considering years of teaching experience. The professional development should be mandatory and base on the used and pedagogical integration of iPads, interactive whiteboards, and Chromebooks. The goal would be to move Title I teachers from a level of teaching innovation of 2 to level 4b. Based on their responses to the LoTi Digital-Age Survey, the highest professional development priority for Title I teachers in this district were in the area of student learning and creativity. By providing mandatory ongoing professional development, teachers will be able to address their current needs and build on their knowledge and experience. Lastly, teachers need to work collaboratively to ensure they have a support community and an opportunity to share their innovative ideas with each other.

3. Teachers with 20 plus years, or veteran teachers, have a wealth of pedagogical knowledge that needs consideration when planning professional development. Based on the findings of the research, teachers with 20 years or more teaching experience had higher LoTi scores. These teachers should be technology integration trainers / professional developers for mandatory workshops, emphasizing pedagogy and technology. Their instructional knowledge is rich and adds to the value of how technology should be approached. A technology integration program designed for novice teachers (0 to 5 years teaching experience) should also be considered. Paying close attention to this population will help with the retention rate,

teacher burnout, and how teachers teach using innovative methods. The professional development should model specific strategies and techniques for incorporating higher-order thinking skills and engaged learning with the available digital tools and resources.

4. According to the findings of this study, STEM teachers scored the highest LoTi score. Therefore, more focus should be aimed to further develop science, technology, engineering and math programs in the District's Title I schools. Teachers who successfully implement technology should be encouraged to take a leadership role in order to implement, share, and present their ideas about innovative instructional methods with other interested educators at staff meetings, professional development sessions, and conferences.

Suggestions for future research

To contribute to the ongoing research of technology integration levels and usage among teachers in urban settings, the following recommendations for future research are suggested:

1. A comprehensive study of Title I and non-Title I schools' LoTi scores would provide a comparison of Title I teachers and non-title I teachers in order to see if Title I teachers have higher LoTi scores than non-Title I teachers. Title I teachers have more opportunities for professional development and receive more equipment for carrying out digital and instructional initiatives and programs. This study will provide evidence to see if teachers' technology integration levels are higher.

2. An analysis of surveys from technology workshops and professional development, along with observation reports from the past five years will be an important way to determine the effectiveness of the professional development offerings in the District. This information will provide useful data in how professional development is carried out and if objectives are implemented effectively.
3. A mixed method study, which included pre- and post-LoTi scores, teacher observations, and interviews are also recommended. This type of study will measure growth of teachers' levels at the beginning and end of the school year. It will help teachers to see where they have improved and in turn, will show areas where growth is necessary. This type of study will be vital to school systems that are making decisions on whether or not to continue with a particular kind of technology initiative or program.
4. A correlational study of teachers' years of experience, instructional content area, and technology integration levels and competencies would help district leaders see if years of experience plays a part in how technology is integrated within the classroom.
5. A mixed method study on what innovative methods are used to promote the integration of technology to enhance and improve student learning. This study would be beneficial to educators and school leaders to see how and what innovative techniques, if any, contribute to student learning and engagement.

APPENDICES AND REFERENCES

Appendices

Appendix A: IRB Application

University of Maryland College Park
Institutional Review Board
IRB Initial Application - Part 1

Last edited by: Terri Jefferson
Last edited on: February 21, 2015
[click for checklist]

☐ **Full**
☐ **Expedited**
☑ **Exempt**

[723711-1] ASSESSING THE LEVEL OF TECHNOLOGY INTEGRATION OF TITLE I TEACHERS IN PRINCE GEORGE□S COUNTY PUBLIC SCHOOLS

Answer all questions on this form completely, include attachments and obtain signatures of Co-Investigators and your department IRB Liaison prior to final submission on IRBNet.

I. Principal Investigator

Name: Terri Jefferson **Status:** Graduate Student
Department: EDHI- Center for Educational Policy and Leadership
Phone: 301-385-8421 **Email:** terri.jefferson@pgcps.org
Address: 7711 Willow Hill Drive Landover, MD 20785

II. Faculty Advisor N/A ☐

Note: A faculty advisor is required if the PI is a student resident or fellow and the Faculty Advisor MUST sign this package through IRBNet.
Name: Thomas Davis
Department: EDHI- Center for Educational Policy and Leadership
Phone: (301) 405-1514 **Email:** davisth4@umd.edu
Address: University of Maryland 2204 Benjamin Building College Park, MD 20742

III. Co-Investigators N/A ☑

Note: All co-investigators MUST sign this package through IRBNet.
Name:
Department:
Phone: **Email:**
Address:

IV. Funding Information N/A ☑

Note: A copy of the awarded grant application (minus budgetary information) must be provided.

Status	Funding Type	Sponsor Name	ORAA #	COI

Funding Title:

V. Project Information

Lay Summary:

The purpose of this study is to assess the levels of technology integration of Title I teachers in Prince George's County Public Schools (PGCPS) in order to determine the technology efficacy of Title I teachers and what other factors play a part in the successful integration of technology resources in Title I schools.

Requested Review Path:

- [ ] Full
- [ ] Expedited
- [x] Exempt

Projected Completion Date: 06/12/2015

Research Category:

- [ ] Faculty or Staff Research
- [x] Graduate Student Research
- [ ] Student/Faculty Collaboration
- [ ] Undergraduate Student Research
- [ ] Other:

Academic Committee Review:

- [ ] Yes - Masters committee
- [ ] Yes - Dissertation committee
- [x] No additional academic review required

Participant Incentives:

- [ ] Cash
- [ ] Check
- [ ] Raffle/ Lottery:
- [ ] Extra Credit/ Course Credit:
- [ ] Gift:
- [ ] Food:

- [ ] Other:

- [x] Not Applicable

VI. Performance Sites

Performance Sites Engaged in Human Subject Research:
(where the research will be conducted)

- [ ] UMCP - Campus:
- [ ] University of Maryland - Extension:
- [ ] Campus Health Center
- [ ] Universities at Shady Grove:
- [x] Schools: 75 Prince George's County Public Schools
- [ ] Prison/Jail:
- [ ] Other:

Is this an international study?

- [ ] Yes *[complete Section 10 of Initial Application Part 2]*
- [x] No

If yes: **International Sites:**

VII. Subject Information

Targeted Populations:

- [x] Normal adult/healthy persons
- [ ] Cognitively impaired persons
- [ ] Economically disadvantaged persons
- [ ] Educationally disadvantaged persons
- [ ] Elderly/aged persons
- [ ] Hospital patients or outpatients
- [ ] Illiterate persons
- [ ] Individuals with physical disabilities
- [ ] Minority group(s)
- [ ] Minors/children
  [inclusion of anyone under 18 requires a Parental Consent Form]
- [ ] Non-English speakers
- [ ] Pregnant women
- [ ] Prisoners

- [ ] Students (non-minors)
- [ ] UMCP employees
- [ ] Other special characteristics and special populations:

Informed Consent Process:

- [ ] Informed consent will be obtained from subjects and documented with a signed, written consent form
- [ ] Informed consent will be obtained from subjects, but no signed consent form will be used. This includes oral consent and implied consent (e.g., completing a survey).
[please see the Requesting a Waiver of Informed Consent Guidance]
- [x] Fully informed consent will not be obtained from all subjects. This includes deception, withholding information, etc.
[please see the Requesting a Waiver of Informed Consent Guidance]

Will health information be collected?
(See the HIPAA section of the IRB website for more information and additional resources.)

- [x] No
- [ ] Yes, data are de-identified or constitute a limited data set.
- [ ] Yes, subject's authorization will be obtained or a waiver or alteration of authorization will be requested.
[complete IRB Form HIPAA]

VIII. Research Procedures

Research Procedures:

- [x] Records review - retrospective
- [ ] Records review - prospective
- [ ] Education research
- [ ] Behavioral experiments
- [ ] Behavioral observation
- [ ] Questionnaires/surveys
- [ ] Interviews
- [ ] Audiotaping/videotaping
- [ ] The Internet
- [ ] Deception
[describe debriefing process in Section 7 of Initial Application Part 2]
- [ ] Cancer Interventions (health promotion, implementation, etc.)
- [ ] None of the above

Biomedical Procedures:

- [ ] Tissue banking
- [ ] Biopsy
- [ ] Blood draw:

- [ ] Use of pre-existing tissues
- [ ] Clinical tests
- [ ] Radiology
- [ ] Radiation/X-ray/DEXA
- [ ] fMRI
  [use IRB fMRI templates]
- [ ] Pregnancy screening
- [ ] EKG
- [ ] EEG
- [ ] Genetic analysis
- [x] None of the above

IX. Assurances and Signatures

Assurances
This research, once approved, is subject to continuing review and approval by the IRB. The principal investigator will maintain records of this research according to IRB guidelines. If these conditions are not met, approval of this research could be suspended or terminated.

Electronic signatures certify that:

- The signatory agrees that he or she is aware of the policies on research involving participants of the University of Maryland College Park and will safeguard the rights, dignity, and privacy of all participants.
- The information provided in this application form is correct.
- The principal investigator will seek and obtain prior written approval from the IRB for any substantive modification in the proposal, including but not limited to changes in cooperating investigators/ agencies as well as changes in procedures.
- Unexpected or otherwise significant adverse events in the course of this study which may affect the risks and benefits to participation will be reported to the IRB.
- The research will not be initiated and subjects cannot be recruited until final written approval is granted.

The following signatures are required for new project submissions:

- Principal Investigator
- Research Advisor(s)
- IRB Liaison (click here for list)

INSTRUCTIONS TO RESEARCHERS

[top]

Now that you have completed this document, check your work, attach all appropriate documents, electronically sign and submit your work. Based on your responses, the following additional documentation must be included with this package before submission. Upload additional documentation in the Designer.

Documents available in the IRBNet Forms and Templates Library:

No additional documents from the Library are required for this project.

Additional required documentation:

- Request for Consent Waiver

If you have any questions, please refer to the guidelines in the IRBNet Forms and Templates Library or contact irb@umd.edu.

Appendix B: IRB Approval Letter – University of Maryland

UNIVERSITY OF MARYLAND
INSTITUTIONAL REVIEW BOARD

1204 Marie Mount Hall
College Park, MD 20742-5125
TEL 301.405.4212
FAX 301.314.1475
irb@umd.edu
www.umresearch.umd.edu/IRB

DATE:	April 6, 2015
TO:	Terri Jefferson
FROM:	University of Maryland College Park (UMCP) IRB
PROJECT TITLE:	[723711-1] ASSESSING THE LEVEL OF TECHNOLOGY INTEGRATION OF TITLE I TEACHERS IN PRINCE GEORGE'S COUNTY PUBLIC SCHOOLS
SUBMISSION TYPE:	New Project
ACTION:	DETERMINATION OF EXEMPT STATUS
DECISION DATE:	April 6, 2015
REVIEW CATEGORY:	Exemption category *#4*

Thank you for your submission of New Project materials for this project. The University of Maryland College Park (UMCP) IRB has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will retain a copy of this correspondence within our records.

If you have any questions, please contact the IRB Office at 301-405-4212 or irb@umd.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Maryland College Park (UMCP) IRB's records.

Appendix C: IRB Approval Letter – Prince George's County Public Schools

PGCPS
Great By Choice

Kola K. Sunmonu, Ph.D.
Director of Research & Evaluation

October 12, 2015

Mrs. Terri Jefferson
7711 Willow Hill Drive
Landover, MD 20785

Dear Mrs. Jefferson:

Your request to conduct the research entitled "*Assessing the Level of Technology Integration of Title I Teacher in a Large Urban School District*" has been reviewed by Prince George's County Public School research application reviewers. Based on the examination, I am pleased to inform you that your dissertation research has been approved by the district. Further, your request to use the SY2014-15 Loti Digital-Age survey data is hereby approved. The approval to use the survey data is conditional on your commitment to store it on a secured computer. You are also required to take all necessary steps to protect the confidentiality of all respondents to the survey.

The approval for this research extends through the 2015-2016 school year only. If you are not able to complete your research during this period, you must submit a written request for an extension. We reserve the right to withdraw approval at any time or decline to extend the approval if the implementation of your study adversely impacts any of the school district's activities. It is important that the procedure detailed in your proposal and related documents submitted be followed while conducting your study. Should you change the procedure, the revised procedure must be approved by the district before being implemented.

An abstract and one copy of the final report should be forwarded to the district within one month of successful defense of your dissertation. Do not hesitate to contact me if you have any questions. I can be reached at 301-780-6807 or by email, kolawole.sunmonu@pgcps.org. I wish you success in your study.

Sincerely,

Kola K. Sunmonu, Ph.D.
Director of Research & Evaluation

KKS:kks

PRINCE GEORGE'S COUNTY PUBLIC SCHOOLS * Department of Testing, Research & Evaluation
1616 Owen Road, Room 19, OXON HILL, MD 20772 **Phone:** 301-780-6807 **Website:** www.PGCPS.org

Appendix D: Permission for use of the LoTi Framework

LoTi Connection, Inc.
PO Box 130037 Carlsbad, CA 92013-0037
(V) 760-431-2232 (F) 760-946-7605
www.loticonnection.com

February 23rd 2015

Permission For Use of the LoTi Framework

To: University of Maryland, College Park
Dissertation Review Boards

Please accept this letter as notification that Terri Jefferson is hereby granted permission to utilize the LoTi Framework and corresponding Digital-Age Survey to collect data for her doctoral dissertation study. Terri is permitted to use the Digital-Age Survey and the LoTi Framework for purposes of the study only. In addition, Terri has permission to review all available LoTI Digital-Age results on the individuals taking place in her study.

The guidelines for using LoTi Connection copyrighted material as part of this dissertation study are as follows:

1. Permission to reprint the LoTi Framework is granted provided that the content remains unchanged and that attribution is given to LoTi Connection.
2. Permission to reprint selected results including graphs and tables in the Appendices of the study is granted provided that the content remains unchanged and that attribution is given to LoTi Connection.
3. Permission to reprint selected questions from the Digital-Age Survey in the Appendices of the study is granted provided that the content remains unchanged and that attribution is given to LoTi Connection.
4. LoTi Connection holds the right to restrict usage of any intellectual property if LoTi Connection finds that the content is being used in an inappropriate manner.

Sincerely,

Dennee Saunders
Assistant Executive Director

Date 02/23/2015

Appendix E: LoTi Digital-Age Survey for Teachers

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LoTi Digital-Age Survey for Teachers

Using the LoTi Digital-Age Survey for professional development planning is part of an ongoing nationwide effort to sharpen educator skillsets as defined by the Partnership for 21st Century Skills. Individual information will remain anonymous, while the aggregate information will provide various comparisons for your school, school district, regional service agency, and/or state. Please fill out as much of the information as possible.

The LoTi Digital-Age Survey takes about 20-25 minutes to complete. The purpose of this questionnaire is to determine your current professional development priorities related to technology and instruction based on your current position (;i.e., pre-service teacher, inservice teacher, building administrator, instructional specialist, media specialist, higher education faculty).

Completing the questionnaire will enable your educational institution to make better choices regarding staff development and future technology purchases. The questionnaire statements were developed from typical responses of educators who ranged from non-users to sophisticated users of technology in the classroom. Survey statements will represent different uses of technology that you currently experience or support, in varying degrees of frequency, and should be recorded appropriately on the scale.

Please respond to the statements in terms of your present uses or support of technology in the classroom. Use the scale to determine your response based on how frequently you experience the activities described in the statement.

Instructional Environment
How often are your students involved in standards-based learning experiences during the instructional day?

- 0 ❑ *Never*
- 1 ❑ *At least once a year*
- 2 ❑ *At least once a month*
- 3 ❑ *At least once a week*
- 4 ❑ *At least once a day*
- 5 ❑ *Multiple times each day*

Teacher Computer Use (TCU):
How often are you (the teacher) using digital tools and resources during the instructional day?

- 0 ❑ *Never*
- 1 ❑ *At least once a year*
- 2 ❑ *At least once a month*
- 3 ❑ *At least once a week*
- 4 ❑ *At least once a day*
- 5 ❑ *Multiple times each day*

Student Computer Use (SCU):
How often are your students using digital tools and resources during the instructional day?

- 0 ❑ *Never*
- 1 ❑ *At least once a year*
- 2 ❑ *At least once a month*
- 3 ❑ *At least once a week*
- 4 ❑ *At least once a day*
- 5 ❑ *Multiple times each day*

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LoTi Digital-Age Survey for Teachers

0 Never

1 At least once a year

2 At least once a semester

3 At least once a month

4 A few times a month

5 At least once a week

6 A few times a week

7 At least once a day

Q1: I engage students in learning activities that require them to analyze information, think creatively, make predictions, and/or draw conclusions using the digital tools and resources (e.g., Inspiration/Kidspiration, Excel, InspireData) available in my classroom.

Q4: Students in my classroom use the digital tools and resources to create web-based (e.g., web posters, student blogs or wikis, basic webpages) or multimedia presentations (e.g., PowerPoint) that showcase digitally their research (i.e., information gathering) on topics that I assign more than for other educational uses.

Q5: I assign web-based projects (e.g., web collaborations, WebQuests) to my students that emphasize complex thinking strategies (e.g., problem-solving, decision-making, experimental inquiry) aligned to the content standards.

Q6: I provide multiple and varied formative and summative assessment opportunities that encourage students to "showcase" their content understanding in nontraditional ways.

Q8: I use the digital tools and resources in my classroom to promote student creativity and innovative thinking (e.g., thinking outside the box, exploring multiple solutions).

Q10: My students identify important real world issues or problems (e.g., environmental pollution, elections, health awareness), then use collaborative tools and human resources beyond the school building (e.g., partnerships with business professionals, community groups) to solve them.

Q12: I promote, monitor, and model the ethical use of digital information and technology in my classroom (e.g., appropriate citing of resources, respecting copyright permissions).

Q13: I use different digital media and formats (e.g, blogs, online newsletters, online lesson plans, podcasting, digital documents) to communicate information effectively to students, parents, and peers.

Q14: My students propose innovative ways to use our school's advanced digital tools (e.g., digital media authoring tools, graphics programs, probeware with GPS systems) and resources (e.g., publishing software, media production software, advanced web design software) to address challenges/issues affecting their local and global communities.

Q15: I model and facilitate the effective use of current and emerging digital tools and resources (e.g., streaming media, wikis, podcasting) to support teaching and learning in my classroom.

Q16: Our classroom's digital tools and resources are used exclusively for classroom management and professional communication (e.g., accessing the Internet, communicating with colleagues or parents, grading student work, and/or planning instructional activities).

Q17: The digital tools and resources in my classroom are used by me during the instructional day and *not* by my students.

Q18: I use different technology systems unique to my grade level or content area (e.g., online courseware, Moodle, WAN/LAN, interactive online curriculum tools) to support student success and innovation in class.

Q19: I employ learner-centered strategies (e.g., communities of inquiry, learning stations/centers) to address the diverse needs of all students using developmentally-appropriate digital tools and resources.

Q20: Students' use of information and inquiry skills to solve problems of personal relevance influences the types of instructional materials used in my classroom.

Q21: My students participate in collaborative projects (e.g., Jason Project, GlobalSchoolNet) involving face-to-face and/or virtual environments with students of other cultures that address current problems, issues, and/or themes.

Q22: My students use the available digital tools and resources for (1) collaboration with others, (2) publishing, (3) communication, and (4) research to solve issues and problems of personal interest that address specific content standards.

Q23: I model for my students the safe and legal use of digital tools and resources while I am delivering content and/or reinforcing their understanding of pertinent concepts using multimedia resources (e.g., PowerPoint, Keynote), web-based tools (e.g., Google Presentations), or an interactive whiteboard.

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LoTi Digital-Age Survey for Teachers

0 Never

1 At least once a year

2 At least once a semester

3 At least once a month

4 A few times a month

5 At least once a week

6 A few times a week

7 At least once a day

Q25: My students model the "correct and careful" (e.g., ethical usage, proper digital etiquette, protecting their personal information) use of digital resources and are aware of the consequences regarding their misuse.

Q26: I participate in local and global learning communities to explore creative applications of technology toward improving student learning.

Q27: I offer students learning activities that emphasize the use of digital tools and resources to solve "real-world" problems or issues.

Q30: I prefer using standards-based instructional units and related student learning experiences recommended by colleagues that emphasize innovative thinking, student use of digital tools and resources, and student relevancy to the real world.

Q31: I seek outside help with designing student-centered performance assessments using the available digital tools and resources that involve students transferring what they have learned to a real world context.

Q32: I rely heavily on my students' questions and previous experiences when designing learning activities that address the content that I teach.

Q36: My students use the classroom digital tools and resources to engage in relevant, challenging, self-directed learning experiences that address the content standards.

Q37: I design and/or implement web-based projects (e.g., WebQuests, web collaborations) in my classroom that emphasize the higher levels of student cognition (e.g., analyzing, evaluating, creating).

Q38: My students use the digital tools and resources in my classroom primarily to increase their content understanding (e.g., digital flipcharts, simulations) or to improve their basic math and literacy skills (e.g., online tutorials, content-specific software).

Q40: My students use digital tools and resources for research purposes (e.g., data collection, online questionnaires, Internet research) that require them to investigate an issue/problem, take a position, make decisions, and/or seek out a solution.

Q41: My students collaborate with me in setting both group and individual academic goals that provide opportunities for them to direct their own learning aligned to the content standards.

Q42: I promote global awareness in my classroom by providing students with digital opportunities to collaborate with others of various cultures.

Q43: My students apply their classroom content learning to real-world problems within the local or global community using the digital tools and resources at our disposal.

Q45: My students and I use the digital tools and resources (e.g., interactive whiteboard, digital student response system, online tutorials) primarily to supplement the curriculum and reinforce specific content standards.

Q46: Problem-based learning occurs in my classroom because it allows students to use the classroom digital tools and resources for higher-order thinking (e.g., analyzing, evaluating, creating) and personal inquiry.

Q47: My students use all forms of the most advanced digital tools (e.g., digital media authoring tools, graphics programs, probeware with GPS systems, handheld devices) and resources (e.g., publishing software, media production software, advanced web design software) to pursue collaborative problem-solving opportunities surrounding issues of personal and/or social importance.

Q48: I advocate for the use of different assistive technologies on my campus that are available to meet the diverse demands of special needs students.

Q49: I promote the effective use of digital tools and resources on my campus and within my professional community and actively develop the technology skills of others.

Q50: I consider how my students will apply what they have learned in class to the world they live when planning instruction and assessment strategies.

Appendix F: Personal Computer Use Framework

Framework Resource

Personal Computer Use Framework

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Personal Computer Use (PCU) Framework

Digital tools and resources represents a variety of technologies to augment and restructure student learning including social learning apps (EduBlogs, Skype, Ning), productivity apps (Edmodo, Google Apps, Socrative, Animoto), content apps (Kahn Academy, BrainPop, Smithsonian Channel), and support apps (Prezi, Wordle, Quizlet, Google Earth, YouTube).

PCU Intensity Level 0

A PCU Intensity Level 0 indicates that the participant does not possess the inclination or skill level to use digital tools and resources for either personal or professional use. Participants at Intensity Level 0 exhibit a general disinterest toward emerging technologies relying more on traditional devices (e.g., use of overhead projectors, chalkboards, paper/pencil activities) than using digital tools and resources for information gathering,, management tasks, or student learning.

PCU Intensity Level 1

A PCU Intensity Level 1 indicates that the participant demonstrates little fluency with using digital tools and resources for student learning. Participants at Intensity Level 1 may have a general awareness of conventional digital resources including word processors, spreadsheets, or the internet, but generally are not using them. Participants at this level are generally unaware of copyright issues or current research on the impact of existing and emerging digital tools and resources on student learning.

PCU Intensity Level 2

A PCU Intensity Level 2 indicates that the participant demonstrates little to moderate fluency with using digital tools and resources for student learning. Participants at Intensity Level 2 may occasionally browse the internet, use email, or use a word processor program; yet, may not have the confidence or feel comfortable using existing and emerging digital tools and resources beyond classroom management tasks (e.g., online grade book and attendance program) or substitution activities (e.g., accessing the Kahn Academy website to introduce a standards-based math concept, administering an online test). Participants at this level are somewhat aware of copyright issues and maintain a cursory understanding of the impact of existing and emerging digital tools and resources on student learning.

PCU Intensity Level 3

A PCU Intensity Level 3 indicates that the participant demonstrates moderate fluency with using digital tools and resources for student learning. Participants at Intensity Level 3 may begin to become “regular” users of conventional digital-age media and formats (e.g., internet, word processor, multimedia) to (1) communicate with students, parents, and peers and (2) augment an existing lesson with technology. Participants at this level are aware of copyright issues and maintain a moderate understanding of the impact of existing and emerging digital tools and resources on student learning.

PCU Intensity Level 4

A PCU Intensity Level 4 indicates that the participant demonstrates moderate to high fluency with using digital tools and resources for student learning. Participants at Intensity Level 4 commonly use a broader range of digital-age media and formats to modify lessons in support of their curriculum and instructional strategies. Participants at this level model the safe, legal, and ethical uses of digital information and technologies and participate in local discussion forums that advocate the positive impact of existing digital tools and resources on student success in the classroom.

PCU Intensity Level 5

A PCU Intensity Level 5 indicates that the participant demonstrates a high fluency level with using digital tools and resources for student learning. Participants at Intensity Level 5 are commonly able to use an expanded range of existing and emerging digital-age media and formats to modify existing lessons in support of their curriculum and instructional strategies. Participants at this level advocate the safe, legal, and ethical uses of digital information and technologies and participate in local and global learning that advocate the positive impact of existing digital tools and resources on student success in the classroom.

Framework Resource

Personal Computer Use Framework

PCU Intensity Level 6

A PCU Intensity Level 6 indicates that the participant demonstrates high to extremely high fluency level with potentially using digital tools and resources to redefine student learning. Participants at Intensity Level 6 are sophisticated in the use of most, if not all, existing and emerging digital-age media and formats. They begin to take on a leadership role as advocates for technology infusion as well as the safe, legal, and ethical uses of digital resources in the schools. Participants at this level continually reflect on the latest research discussing the impact of digital tools on student success.

PCU Intensity Level 7

A PCU Intensity Level 7 indicates that the participant possesses an extremely high fluency level with potentially using digital tools and resources to redefine student learning in ways not possible without technology. Participants at Intensity Level 7 are sophisticated in the use of any existing and emerging digital-age media and formats. Participants at this level set the vision for technology infusion based on the latest research and continually seek innovative uses of digital tools and resources that impact learning. They actively participate in global learning communities that seek creative uses of digital tools and resources in the classroom.

Appendix G: Current Instructional Practices Framework

Framework Resource

Current Instructional Practices Framework

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Current Instructional Practices (CIP) Framework

CIP Intensity Level 0

At a CIP Intensity Level 0, the student is not involved in a formal classroom setting (e.g., independent study).

CIP Intensity Level 1

At a CIP Intensity Level 1, the participant's current instructional practices align exclusively with a teacher-directed approach relating to the content, process, and product of instruction. Teaching strategies tend to lean toward lectures and/or teacher-led presentations. The use of curriculum materials aligned to specific content standards serves as the focus for student learning. Learning activities tend to be sequential and uniform for all students. The use of differentiated strategies is non-existent. Evaluation techniques focus on traditional measures such as essays, quizzes, short-answers, or true-false questions. Student projects are teacher-directed in terms of identifying project outcomes as well as requirements for project completion.

The use of research-based best practices focuses on basic classroom routines (e.g., providing homework and practice, setting objectives and providing feedback, students summarizing and note taking, providing adequate wait time).

CIP Intensity Level 2

Similar to a CIP Intensity Level 1, the participant at a CIP Intensity Level 2 supports instructional practices consistent with a teacher-directed approach relating to the content, process, and product, but not at the same level of intensity or commitment. Teaching strategies tend to lean toward lectures and/or teacher-led presentations. The use of curriculum materials aligned to specific content standards serves as the focus for student learning. Learning activities tend to be sequential and uniform for most students. The use of horizontal differentiated strategies are sometimes employed based on the teacher's interests, modality strengths, and/or learning profile. Evaluation techniques focus on traditional measures such as essays, quizzes, short-answers, or true-false questions. Student projects tend to be teacher-directed in terms of identifying project outcomes as well as requirements for project completion.

The use of research-based best practices focuses on basic classroom routines (e.g., providing homework and practice, setting objectives and providing feedback, students summarizing and note taking, providing adequate wait time).

CIP Intensity Level 3

At a CIP Intensity Level 3, the participant supports instructional practices aligned somewhat with a teacher-directed approach—an approach characterized by sequential and uniform learning activities for all students, teacher-directed presentations, and/or the use of traditional evaluation techniques. However, the participant may also support the use of horizontal differentiated strategies that provide opportunities for students to determine the "look and feel" of a final product based on student's interests.

Evaluation techniques continue to focus on traditional measures with the resulting data serving as the basis for curriculum decision-making. The use of research-based best practices expands beyond basic classroom routines (e.g., providing opportunities for non-linguistic representation, offering advanced organizers).

CIP Intensity Level 4

At a CIP Intensity Level 4, the use of a teacher-directed approach is the norm, but there is an increased frequency of student-directed decision-making or input into the content, process, or product of instruction. In a student-directed 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. The use of limited horizontal and/or vertical differentiated strategies are present based on student interests, modality strengths, learning profile and/or readiness levels.

Framework Resource

Current Instructional Practices Framework

CIP Intensity Level 4 (continued)

Although traditional learning activities and evaluation techniques are used, students are also encouraged to contribute to the assessment process when appropriate based on the content standards. The use of research-based best practices expands beyond basic classroom routines (e.g., providing opportunities for non-linguistic representation, offering advanced organizers).

CIP Intensity Level 5

At a CIP Intensity Level 5, the participant's instructional practices tend to lean more toward a student-directed approach. The essential content embedded in the standards emerges based on students "need to know" as they attempt to research and solve issues of importance to them using critical thinking and problem-solving skills. The types of learning activities and teaching strategies used in the learning environment are diversified and driven by student questions. Both students and teachers are involved in devising appropriate assessment instruments (e.g., performance-based, journals, peer reviews, self-reflections) by which student performance will be assessed. The use of expanded horizontal and vertical differentiated strategies are present based on student interests, modality strengths, learning profile and/or readiness levels.

Although student-directed learning activities and evaluations are the norm, the use of teacher-directed activities (e.g., lectures, presentations, teacher-directed projects) may surface based on the nature of the content standards and at the desired level of student cognition. The use of research-based best practices delves deeper into complex classroom routines (e.g., students generating and testing hypotheses, implementing cooperative learning, students identifying similarities and differences).

CIP Intensity Level 6

The participant at a CIP Intensity Level 6 supports instructional practices consistent with a student-directed approach, but not at the same level of intensity or commitment as a CIP Intensity Level 7. The essential content embedded in the standards emerges based on students "need to know" as they attempt to research and solve issues of importance to them using critical thinking and problem-solving skills. The types of learning activities and teaching strategies used in the learning environment are diversified and driven by student questions.

Students, teacher/facilitators, and occasionally parents are all involved in devising appropriate assessment instruments (e.g., performance-based, journals, peer reviews, self-reflections) by which student performance will be assessed. The amount of differentiation is substantial based on the readiness level, interests, learning styles, and readiness levels of the students. The use of research-based best practices delves deeper into complex classroom routines (e.g., students generating and testing hypotheses, implementing collaborative problem-solving).

CIP Intensity Level 7

At a CIP Intensity Level 7, the participant's current instructional practices align exclusively with a student-directed approach to the content, process, and product of instruction. The essential content embedded in the standards emerges based on students "need to know" as they attempt to research and solve issues of importance to them using critical thinking and problem-solving skills. The types of learning activities and teaching strategies used in the learning environment are diversified and driven by student questions.

Students, teacher/facilitators, and occasionally parents are all involved in devising appropriate assessment instruments (e.g., performance-based, journals, peer reviews, self-reflections) by which student performance will be assessed. Differentiation is ubiquitous since students completely guide the pace and level of their learning. The use of research-based best practices delves deeper into complex classroom routines (e.g., students generating and testing hypotheses, implementing collaborative problem-solving).

Appendix H: Research Study Request- Prince George's County Public Schools

PRINCE GEORGE'S COUNTY PUBLIC SCHOOLS
UPPER MARLBORO, MARYLAND 20772

Research Application

Research Title: Assessing the Level of Technology Integration of Title I Teacher in Prince George's County Public Schools

INSTRUCTIONS: Type requested information in the spaces provided. Enter check marks in appropriate blocks where answer options are provided. All requests to conduct research must be accompanied by one copy of each of the following: a complete research proposal, summary of that proposal (summary should contain no more than five pages and must include no less than: (1) Research Project Description; (2) Hypotheses/Assumptions; (3) Significance; (4) Methodology/Procedures; and (5) Specific Benefits to PGCPS), completed research application, parental consent form/letter, and all data gathering instruments. Please note that failure to provide all requested information will affect the time required to process your research application.

A. IDENTIFICATION OF APPLICANT

1. Name of Applicant

[ ] Mr. [X] Mrs. [ ] Miss [ ] Ms. [ ] Dr.

Terri Jefferson

Home Address 7711 Willow Hill Drive

Landover, Maryland 20785

Home Telephone Number 301 - 385 - 8421
(Area Code) (Number)

Business Address 7711 Willow Hill Drive

Landover, Maryland

Zip Code 20785

Business Telephone ______-______
(Area Code) (Number)

Business Fax ______-______
(Area Code) (Number)

E-mail address ______

Your Professional Position (check one)

[ ] Principal
[ ] Teacher
[ ] Research Assistant
[ ] Project Director
[ ] Student Teacher/Intern
[ ] Professor
[ ] Teaching Asst.
[ ] Research Associate
[X] Instructional Technology Specialist
Other (please specify)

1

2. a) Are you employed by the Prince George's County Public Schools?
   [X] Yes [ ] No
   b) If yes, check which of these answers applies to you?
   [X] Full-time employee [ ] Part-time Employee
   [ ] Employee on Leave

3. Indicate whether you are proposing this study as:

   [ ] A PGCPS Office, Department or Program Unit

   ____
   (please specify)

   [ ] In response to a request for proposals (RFP) or grant announcement.

   Specify source of RFP:______________________________

   [X] An individual researcher

   [ ] An external research organization

4. a) Are you proposing this study in connection with the degree requirements of a college or a university, for yourself or any other person(s)?

   [X] Yes (If yes, answer parts b and c of this question.)
   [ ] No (If no, skip to question 5.)

   b) Which degree requirements?
   [ ] Masters [X] Doctoral [ ] Other ______________
   (please specify)

   c) Who is your advisor or committee chairperson?

   Name Thomas Davis Tel. No. 301-405-1514

   Institution University of Maryland College Park

   Department in Institution Teaching and Learning Policy and Leadership

   d) What is the approval status of your proposal at your college or university?

   [ ] Formally approved (attach approval form)
   [X] Approved by advisor but not yet by dissertation committee
   [ ] Not yet at the approval stage
   [ ] Other (specify)

5. a) List the name(s), position(s) of individuals related to this study, institutional affiliations and of all persons who will use the data generated by this study for higher education degrees, grant applications, or publication purposes (attach additional sheets if necessary):

Name	Institution	Department	Position

b) Indicate your current degree status:
[ ] Non-degree [ ] Baccalaureate
[X] Master's [ ] Doctoral

c) If you are applying as an individual, briefly describe your area of research specialization and your credentials: Instructional Technology and Education Leadership Title I Office, Instructional Technology Specialist in PGCPS

6. How are the costs of this proposed study being financed?
[X] by applicant [ ] By PGCPS program funds
[ ] by government foundation, or other research grant
(Identify source and/or briefly explain: ________________________
____

7. **Budget**

a) Total budget for research related to this project
[X] no external budget [ ] $100,000 - $150,000
[ ] less than $5,000 [ ] $150,000 - $200,000
[ ] $10,000 - $50,000 [ ] $200,000 - $250,000
[ ] $50,000 - $100,000 [ ] $250,000 +

b) What amount will be budgeted for conducting this research in PGCPS?
$ 0 (dollar figure)

c) What amount will PGCPS receive for participating in this research?
$ 0 (dollar amount)

d) What amount will researcher budget as in-kind contribution?
$ 0 (dollar figure) Type (salaries, equipment, etc.):
____

e) What amount is budgeted to compensate research participants?

Participant______________________ $ 0
(student, teacher, etc.) (dollar amount)

B. PROPOSED STUDY FRAMEWORK

1. Title of Research Assessing the Level of Technology Integration of Title I Teachers in Prince George's County Pubic Schools

2. The area of research (Sp. Ed., Mathematics, cognition, teacher in-service, etc.):

   [ ] Special Education [ ] Mentoring
   [ ] Multicultural Education [ ] Instructional Personnel
   [ ] School Climate [ ] Guidance/Counseling
   [ ] Early Childhood Education [ ] Adolescent Pregnancy
   [ ] SAFE Drug Free Education [ ] Other (specify) Technology Integration

3. Hypotheses and/or objectives of research To asses the levels of technology integration of teachers in PGCPS in order to determine the technology efficacy of Title I Teachers.

4. Type of school research site(s) required:

   [ ] Intact Classrooms [ ] Student's home environment
   [X] Other (specify) N/A Pre-existing survey data of teachers' technology levels

5. Name (if known)/type of proposed PGCPS school/site(s):
   Online profile: www.loticonnection.com

6. Proposed starting date March 2015

7. Proposed completion date August 2015
   (Proposals approved for one year; must request extension if needed)

C. REQUIREMENTS FOR SUBJECTS

1. Will pupils be required as subjects for this study?
   [ ] Yes (If yes, answer parts a, b, c and d of this question.)
   [X] No (If no, skip to question 2.)

   a) Enter grade and number of students requested under the headings provided here. **<u>(This information must be provided if student subjects are included.)</u>**

			Total
Grade ___	Male ___	Female ___	___
Grade ___	Male ___	Female ___	___
Grade ___	Male ___	Female ___	___
Total	___	___	___

b) Check and describe any specific criteria for selection of students to take part in the study:

[ ] Ability level (specify)____________________
[ ] Socioeconomic level(s) ____________________
[ ] Ethnic, racial background ____________________
[ ] Physical characteristics ____________________
[ ] Clinically identified conditions ____________________
[ ] History of personal problems (explain): ____________________
[ ] Other (specify) ____________________

c) Procedures which will be used to gather data from students:

[ ] Group Testing
[ ] Individual testing
[ ] Interviews - face to face
[ ] Interviews - telephone
[ ] Questionnaires
[ ] Observation
[ ] Inventories
[ ] Other (specify)

d) Are file data on students required?
[ ] Yes [ ] No

If yes, specify tests, scores, type(s) of other information and the period for which data are needed: ____________________
____

2. Will school staff, parents, or former students be subjects in the study?

[ ] Yes (If yes, answer parts a, b, c, and d of this question.)
[X] No (If no, skip to E)

a) Give subject category and number (REQUIRED):

Subjects	Total Number of Subjects
[ ] Classroom Teachers	__________
[ ] Counselors	__________
[ ] School-based Administrators	__________
[ ] Central Office Administrators	__________
[ ] Parents	__________

b) Are file data on staff requested? [ ] Yes [ ] No
(If yes, specify and discuss how data will be used)

c) Are file data on parents requested? [ ] Yes [ ] No
(If yes, specify and discuss how data will be used)

d) Are archival data on former students or graduates and/or their families requested? [ ] Yes [ ] No
(If yes, specify and discuss how data will be used)

D. REQUESTED PARTICIPATION OF PGCPS STAFF

a) Will the PGCPS staff assistance be requested?
[ ] Yes [ ] No

b) If yes, which staff?
[ ] Teachers [ ] Principals
[ ] Other (specify)________________________

c) Describe tasks staff will be asked to perform.

____

____

____

d) Will staff be compensated? [ ] Yes [ ] No

If Yes, how and/or in what amount? $____________________
(total staff compensation)

OR $____________ (per________________________)
(dollar amount) (as designated by researcher)

E. INSTRUMENTS, EQUIPMENT AND INSTRUCTIONAL MATERIALS

1. What tests, observation guides, questionnaires, attitude scales, interest inventories, and other typed or printed instruments will be used? Specify below and enclose one (1) copy:

Type of Instrument	Name or Description of Instrument	Is Instrument Researcher Made? Yes	No	Est. Time Required to Administer
[ ] Group Test	__________	[ ]	[ ]	______
[ ] Individual Test	__________	[ ]	[ ]	______
[ ] Questionnaire	__________	[ ]	[ ]	1
[ ] Interview protocol	__________	[ ]	[ ]	______
[ ] Observation guide	__________	[ ]	[ ]	______
[ ] Attitude/interest inventory	__________	[ ]	[ ]	______
[ ] Other (spec.)	__________	[ ]	[ ]	______

Data used will be pre-existing data collected by the researcher of surveys .

2. What instructional materials will be used for research purposes? (Specify or indicate "none.") [X] None

F. ATTACHMENTS

Check items which you are attaching to this application:

[X] One copy of application
[X] One complete proposal (REQUIRED)
[X] One copy of the proposal summary (REQUIRED)
[ ] Parental consent letter/form (**In addition to a space for the parent's or guardian's signature, the parent consent form <u>MUST</u> have spaces to write out the student's and the parent/guardian's name)**
[ ] All instruments
[ ] Thesis committee approval form (STUDENT REQUIREMENT)
[ ] Other (describe)____

G. SIGNATURES

1. Studies proposed by School System employees require the signature of the applicant's immediate PGCPS supervisor (i.e., principal, director, regional director, etc.).

Acknowledged:____
Signature

Date________Title____

Office/School____

2. SIGNATURE OF THESIS COMMITTEE CHAIRPERSON
The following is to be signed by the chairperson of the applicant's thesis committee:

I have reviewed the enclosed research proposal and find it to be technically competent, theoretically sound, and significant in focus.

Name ________________________________ Date __________________

Title____

Note: A copy of the results of the proposal review will be sent to the above-named chairperson.

3. APPLICANT SIGNATURE
I understand that acceptance of this request for approval of a research proposal in no way obligates Prince George's County Public Schools to participate in this research. I also understand that approval does not constitute commitment of resources or

Appendix I: ISTE Permission Agreement Letter

ISTE International Society for Technology in Education

Connected learning.**Connected world.**™

December 2, 2015

Terri Jefferson
Instructional Technology Specialist and Doctoral Candidate
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Dear Ms. Jefferson:

Thank you for your request for permission to use the ISTE Standards for Teachers in your doctoral dissertation for the University of Maryland.

We are pleased to grant you permission to use the ISTE Standards for Teachers under the following terms:

1. This permission allows you to use the ISTE Standards as requested for your dissertation and in all copies to meet university requirements, including University Microfilms edition.

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3. There will be a standard credit to our material, including the copyright and usage information below.

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5. No other rights are granted with this request.

Thank you for your interest in the International Society for Technology in Education. Please don't hesitate to contact me if you have any questions.

Sincerely,
Sarah Stoeckl
International Society for Technology in Education

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When linking to the ISTE Standards pages on the ISTE website, use the following URLs. It is preferred that content is linked to rather than posted.

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Phrasing of the ISTE Standards in context

ISTE prohibits the use of the word "aligned" when referring to the ISTE Standards. Because ISTE's Seal of Alignment program specifically recognizes resources that have gone through a rigorous review process by experts, only resources participating in this program can be referred to as being "aligned" with the standards.

For non-participating programs appropriate wording alternatives include "guided by" or "addresses" to indicate correlation with the standards.

> For more information on the Seal of Alignment program, please contact Mindy Frisbee, mfrisbee@iste.org.

Please sign and date below to indicate that you acknowledge and agree to the terms above.

Signature: Teri Jefferson Date: 12-2-15

Glossary

21st century skills: refers to certain core competencies such as collaboration, digital literacy, critical thinking, and problem-solving that educational advocates believe schools need to help students thrive in today's world (Partnership for 21st Century Skills, 2015).

Best Practices: A best practice is a validated education practice successfully produced at several education settings with similar positive student outcomes. It is a method or practice that has steadily shown results superior to those achieved with other means. (Ermeling, Hiebert, & Gallimore, 2015).

Clickers: A device or mobile app that allows students to answer a multiple-choice question. The teacher presents a question to the class, then students use their clickers to input their answer (Januszewski & Molenda, 2013).

Current Instructional Practices (CIP): "…classroom teachers' current instructional practices relating to a subject matter versus a learner-based instructional approach in the classroom" (Moersch, 2010, p. 20).

Digital natives: Digital native is referred to as individuals born between 1980 and 1994 who have grown up during the early digital era with technology and are indigenous speakers of the digital language of computers, video games, and the Internet (Tyger, 2011).

Highly qualified teacher: A highly qualified teacher is one that is fully certified, has at least a bachelor's degree, and demonstrates competencies in subject knowledge and teaching (ESEA, 2010).

Instructional technology: a complex integrated process involving people, procedures, ideas, devices, and organizations for analyzing problems and devising, implementing, evaluating, and managing solutions to those problems in situations in which learning is purposeful and controlled.

One-to-one (1:1): a program where a school provides one device (e.g. laptop, tablet, etc) per student (Januszewski & Molenda, 2013).

Personal Computer Usage (PCU): "…classroom teachers' fluency level in using digital tools and resources for student learning" (Moersch, 2010, p. 20).

Professional Development (PD): A term for the growth of one's career-oriented and professional competencies. Used in education for teachers' trainings, workshops, and conferences (Januszewski & Molenda, 2013).

Teacher efficacy: "Self-efficacy is the extent or strength of one's belief in one's own capacity to complete tasks and reach goals. Therefore, teacher efficacy is a teacher's level of confidence in their ability to promote students' learning" (Hoy, 2000).

Technology implementation: The carrying out, execution, or practice of a plan, method, or design for using technology. Technology implementation is the action that must follow the preliminary thinking in order for integration to happen (Januszewski & Molenda, 2013).

Technology integration: Integration technology for learning is the use of technology resources such as computers, mobile devices like smartphones and tablets, digital cameras, social media platforms and networks, software applications, the Internet, etc. in daily classroom practices, and in the management of a school environment (Ertmer & Ottenbreit-Leftwich, 2010; ISTE, 2008; NETS-T, 2013).

Technophobia: Fear or dislike of technology or complex devices, especially computers (Instructional Technology Resource Teacher, 2008; Hicks, 2010).

Title I Part A: The Elementary and Secondary Education Act (ESEA), as amended, provides financial assistance to local educational agencies (LEAs) and schools with high numbers or high percentages of children from low-income families to help ensure that all children meet challenging state academic standards (US Department of Education).

Web 2.0: refers to the second generation of the World Wide Web and is characterized by applications and data residing on the web as a combination of concepts, trends, and technologies that focus on user collaboration, sharing of user-generated content, and social networking. (Domine, 2009).

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