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FACTORS AFFECTING TECHNOLOGY INTEGRATION IN INTERNSHIP-BASED TEACHING EXPERIENCES

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DISSERTATION APPROVAL PAGE

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ABSTRACT

Factors Affecting Technology Integration in Internship-based Teaching Experiences

David E. Robinson

Reform efforts of the early 21st century emphasizing standardized testing have indirectly led to a movement of curriculum standardization, direct instruction, and ultimately driving teachers to teach "to the test". Research presented in this study supports that PreK-12 students learn best in technology integrated, constructivist learning environments. College-based teacher preparation programs strive to prepare preservice teachers based on this research, yet the environments in which they conduct their internships and learn to implement what they have been taught are littered with barriers often inhibiting success. The purpose of this research study was to examine preservice teacher technology integration in internship-based teaching experiences. Using mixed methodologies, particular focus was placed on the mentor teacher/preservice teacher relationship and its impact on classroom technology integration. The data collected in this study presented contrasting results. Qualitative journal entries indicated cases of preservice teacher technology integration consistent with constructivist teaching practices, while quantitative data indicated the preservice teacher participants' levels of technology integration were consistent with direct instruction. Recommendations are provided to elevate the overall internship-based instructional paradigm from that of direct instruction to more technology-integrated constructivist learning.

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Chapter 1. Introduction

Longitudinal research data from the *Apple Classrooms of Tomorrow Project* (Ringstaff, Yocum and Marsh, 1996) indicates that in student centered or technology-integrated, constructivist learning environments (TICLE), students learn better than in traditional teacher directed learning environments. The research by Apple Computer (1991), and a host of contemporary constructivist theorists, supports the effectiveness of student centered or TICLE (Jonassen, 1991; Jonassen & Carr, 2000; Jonassen, Carr & Yueh, 1998; Papert, 1993; Prensky, 2009; Ringstaff et al., 1996). Subsequently, college teacher preparation programs have, using this research based-data, become more focused on technology-integrated, constructivist teaching practices (Gordon, 2009).

As future teachers, preservice teachers embark on their internship-based teaching experiences (IBTE), where they often encounter barriers while attempting to integrate technology in a constructivist manner (National Center for Educational Statistics, 2007). These barriers to technology integration include entering traditional classroom environments with mentor teachers who espouse traditional teaching methods (National Center for Educational Statistics, 2007). This dissertation contains five chapters: introduction, literature review, methodology, analysis and results, and discussion.

The purpose of this chapter is to introduce a dissertation focused on technology integration in IBTE. This chapter contains the following sections: background research, statement of problem, purpose of the study, significance of the study, research design, research questions, limitations and assumptions, definition of terms, and summary.

Beginning with the publication of *A Nation at Risk*, by the National Commission on Excellence in Education (1983), contemporary political and educational leaders launched multiple educational reforms aimed at improving student achievement. The earliest of these reforms were largely driven by state and local governments. As the United States entered the new millennium, President George W. Bush and Senator Edward Kennedy were instrumental in passing the Federal bipartisan *No Child Left Behind Act*, which granted incentives for state governments to provide standardized testing of essential skills for public school students (United States Department of Education, 2000). Reform efforts emphasizing standardized testing, like the *No Child Left Behind Act*, indirectly led to a movement of curriculum standardization, direct instruction, and ultimately driving teachers to "teach to the test" (Amrein & Berliner, 2002; Birkmire, 1993; Darling-Hammond, 1994; Franklin & Snow-Gerono, 2007; Gordon & Reese, 1997; Moon, Brighton, Jarvis & Hall, 2007; Pedulla, 2003).

President Barack Obama and Education Secretary Arnie Duncan extended the principles of the *No Child Left Behind* legislation, with new legislation under the *American Recovery and Reinvestment Act of 2009 (ARRA)*, Section 14005-6, Title XIV, (Public Law 111-5), commonly known as the *Race to the Top* (Whitehouse, 2010; United States Department of Education, 2010b). The *Race to the Top* legislation is a competitive grant program rewarding states that are implementing significant reforms in four education areas: enhancing standards and assessments, improving the collection and use of data, increasing teacher effectiveness and achieving equity in teacher distribution, while turning around struggling schools (United States Department of Education, 2010b). The *Race to the Top* legislation is focused on connecting student test scores to teacher and administrative accountability measures (Whitehouse, 2010). The *American Recovery and Reinvestment Act of 2009 (ARRA)* (Public Law 111-5) provides grant incentives for

State Departments of Education to link student standardized test results to a teacher's annual evaluation. This places increased pressure on teachers, administrators, and subsequently students to increase student performance (Dearth, 2010).

The United States Department of Education, under the direction of the Obama administration, drafted a *National Technology Plan*, which is not tied to nor supported through the financially incentive-based *Race to the Top* legislation (United States Department of Education, 2010a). In an age of electronic information, in which children socialize via online social networking sites like Facebook, converse via texting, and are surrounded daily by iPods/iPhones, Play Stations, X-Boxes, and Wii's, there is no mention of technology nor technology integration in the initial *Race to the Top Legislation* (*American Recovery and Reinvestment Act of 2009 (ARRA)*, Section 14005-6, Title XIV, (Public Law 111-5). More recently, new *Race to the Top* related legislation has emerged from the United State Department of Education in the form of the *Race to the Top District* (2012) legislation (United States Department of Education, 2012). This *Race to the Top District* (2012) legislation narrowly acknowledges the use of digital technology via student Personalized Learning Environments (PLEs). In response to this new legislation, the International Society for Technology Education (ISTE), an organization representing over 100,000 technology professionals, formally proposed to the United States Department of Education that the definition of PLEs as outlined, in the *Race to the Top District* (2012) legislation, too narrowly defines personalized learning, and thus limits the potential for students to truly experience a PLE. ISTE also recommended making the language of the legislation more student–centered, providing students to be the architects of their own learning, with less emphasis on using digital technology for tracking test scores and data (International Society for Technology in Education, 2012).

The lack of emphasis towards technology integration in the *Race to the Top* legislation and subsequent *Race to the Top District* legislation is rather ironic, as integrating technology into the classroom is one proven method for increasing performance (Ringstaff et al., 1996). This research-based method (technology-integrated, constructivist teaching) for improving student performance is also relevant to the electronic world in which 21st century students live and naturally learn (Prensky, 2009).

Colleges of Education have utilized the proven methods (i.e. student centered or TICLE) in preparing preservice teachers for their IBTE. Mentor teachers are often pressured to utilize direct instruction methods like drill and practice, which are indirectly driven by the aforementioned educational reforms and standardized tests (Moon, Brighton, Jarvis & Hall, 2007; Sacks, 2000). Preservice teachers having been trained in technology-integrated, constructivist learning methodologies, then enter their internship-based teaching environments where direct instruction methods are in use by mentor teachers.

The effectiveness of TICLE drives the need for further research into the integration of technology in internship-based teaching environments. This research study examines factors affecting technology integration in IBTE based on three research questions and related sub-questions.

Background Research

The purpose of this section is to introduce the background research related to this inquiry into technology integration in internship-based teaching environments. This background research will be presented in five parts: background educational philosophies that support technology-integrated learning; constructivist learning theory; cognitive apprenticeship theory; preservice teacher technology preparation technology dispositions; and barriers to technology integration in internship-based teaching environments.

Educational learning theory (Essentialism and Progressivism)

The case for TICLE in American schools can be traced to competing educational philosophies of the early 20th century. A traditional education philosophy, known as Essentialism, was challenged by the Progressive Movement. Essentialism is based on the premise that children should learn basic subjects through a traditional and rigorous curriculum. Essentialism focuses students on the "essentials" of academic knowledge in core subjects. Knowledge is transmitted from the teacher to the student in a systematic, disciplined manner (Bagley, 1934; Copperman, 1978; Koerner, 1959; Rickover, 1963). Hirsch (1987) provided a more contemporary perspective on essentialism, noting that schools should define core knowledge and develop textbooks that outline the core knowledge; tests should then be developed to test the core knowledge from textbooks.

The Progressive education movement of the early 20th century was led by John Dewey. Progressivism is premised on school reflecting a democratic society. Dewey and his followers were proponents of schools in which children direct learning based on their own personal interests (Dewey, 1916; Brameld, 1971; Kilpatrick, 1951). Dewey (1916) was an advocate for schools moving from traditional teaching environments to environments of experimentation and practice. Progressivism rejects learning based on rote memorization and traditional forms of assessment (Dewey, 1916; Kilpatrick, 1951).

Dewey (1916, 1938) felt it imperative for knowledge acquired in schools to be presented in a medium related to associated life.

Progressivism forms the foundation for contemporary constructivist teaching practices. Constructivism, as it has evolved, seeks to place the learner at the center of learning. Late 20th century constructivist theorists embraced the evolution of technology resources, particularly the integration of computer based-technology in schools. A variety of learning theorists experimented with child-centered learning and the personal computer. Papert (1993) used *Logo* software as a tool for students to direct their own learning via programming a turtle to move across a computer screen to solve higher level problems. Jonassen and Carr (2000) developed Mind Tools theory in which the computer, via interactive software programs, becomes an extension of the child's mind. The *Apple (1991) Classrooms of Tomorrow Research Studies* provided longitudinal evidence that the constructivist teaching practices, espoused by Dewey, Papert, Jonassen and Carr, help students learn better and faster in technology integrated classrooms.

The philosophical debate (traditional vs. constructivist teaching) continues into the 21st century. Caught in the middle of this philosophical debate are preservice teachers, whose college preparatory programs emphasize the benefits of student centered TICLE (National Center for Educational Statistics (NCES), 2007; International Society of Technology in Education (ISTE) and National Council for Accreditation of Teacher Education (NCATE), 2002; ISTC-NCATE, 2012), while their respective mentor teachers face the pressures of school reform legislation and the subsequent push to utilize traditional teaching methods (Moon, Brighton, Jarvis, & Hall, 2007; Sacks, 2000). The preservice teachers involved in this study completed their IBTE in Professional

Development Schools (PDS) under the guidance of their respective mentor teachers. PDS are “collaborative organizations in which participants support student learning; provide a professional induction program for teacher candidates; develop the skills, knowledge, and dispositions of practicing teachers; and systematically inquire in and on practice so that it can be improved” (Trachtman, 2007, p. 197). The roles of the mentor teachers and preservice teachers in PDS environments are defined through cognitive apprenticeship theory.

Cognitive apprenticeship

Cognitive apprenticeship theory, as it applies to the internship-based teaching experience, builds on the foundation of a traditional apprenticeship, with the mentor teacher serving in the role of master teacher and the preservice teacher serving as the apprentice (Keough, Dole, and Hudson, 2006). Collins, Brown and Newman (1989) noted that a cognitive apprenticeship differs from the traditional apprenticeship in that the cognitive apprenticeship is more focused on learning through guided experience. As with constructivism, the preservice teacher assumes responsibility for their own learning under the guidance of their mentor teacher. The role of the mentor teacher changes in this process, moving from a traditional mentor to a guide for the preservice teacher to construct their own knowledge (Keough, et al., 2006). Cognitive apprenticeship theory served as the theoretical framework and lens to interpret the mentor and preservice teacher relationship in IBTE related to this research study.

Preservice teacher preparation

Colleges of Education have recognized the importance of preparing teacher candidates to integrate technology in their IBTE by offering courses in technology integration, and/or embedding technology integration strategies within teacher candidates' programs of study (National Center for Educational Statistics, 2007). Lambert and Gong (2010) determined that preservice teachers enrolled in technology integration courses demonstrated improved self-efficacy towards integrating technology in the classroom, while developing more advanced knowledge and skills in classroom technology integration. While a majority of Colleges of Education offer coursework in technology integration or embed technology integration strategies in multiple teacher preparation courses, additional strategies have been employed to encourage technology integration in the internship-based teaching experiences. Some of these strategies include the use of internship-based technology communities of practice (Kopcha, 2010), technology integration-based situated learning (Hernández-Ramos & Giancarlo, 2004), laptop initiatives (Parker, Robinson & Hannifan, 2008) and internship-based action research or capstone projects focused on technology integration (Wentworth, Graham & Tripp, 2008). Colleges of Education have recognized the benefits of TICLE. The range of strategies used to prepare preservice teachers to integrate technology is based on the aforementioned research indicating that students will learn better in TICLE. These efforts appear to pay off in the mindset of preservice teachers' beliefs towards TICLE, but problems occur when the preservice teachers are not able to implement technology integration strategies in the internship-based experiences (NCES, 2007).

Technology dispositions

Preservice teachers who have taken a college-based technology integration course have positive attitudes towards technology integration (National Center for Educational Statistics, 2007; Anderson & Maniger, 2007). Bai and Ertmer (2008) determined that courses focused on technology integration are helpful in "improving preservice teachers' technology attitudes related to educational benefits" (p. 93). Milman and Molebash (2008) concluded in a longitudinal study of practicing K-12 teachers that that the post personal confidence and instructional scores in relation to technology integration were higher in teachers who had taken an educational technology course. Preservice teachers are also less anxious about computers and their beliefs about the value and application of technology in teaching and learning are greatly improved after having taken an educational technology course (Lambert & Gong, 2010).

A mentor teacher’s negative philosophical approach towards technology integration can be an obstacle to preservice teacher technology integration in IBTE (Dexter & Riedel, 2003; Doering, Hughes, & Huffman, 2003; Stuhlmann & Taylor, 1999). The National Center for Educational Statistics (NCES, 2007) found 53% of mentor teachers do not demonstrate a willingness to integrate technology into their classrooms. Colleges of Education technology integration efforts with preservice teachers are dependent on the cooperation of the mentor teacher for there to be successful practical application of the technology integration strategies in internship-based field experiences. A knowledgeable mentor teacher and adequate access to technology is needed for preservice teachers to practice and implement "student-centered" technology lessons (Grove, Strudler, & Odell, 2004; Brush, Galeski, & Hew, 2008). Even when the mentor teacher has positive technology integration predispositions, the complexity of PreK-12 classrooms presents an array of potential barriers to technology integration.

Barriers to technology integration

In a NCES (2007) survey of 1439 colleges with teacher education programs, only 49% of the schools indicated that their preservice teachers were able to practice the technology related skills and knowledge they acquired in their coursework during their field experiences. Barriers contributing to the inability to practice these skills in field experiences include (a) competing priorities in the classroom (74 %), (b) available technology infrastructure in the schools (73 %), (c) lack of training or skill (64 %), (d) time (62 %), and (e) willingness (53 %) on the part of supervising teachers/mentor teacher to integrate technology in their classrooms (NCES, 2007). Ultimately, PreK-12 students may be denied the learning tools and pedagogical strategies proved most effective for their learning. Given the effectiveness of technology-integrated, constructivist learning methods, a further examination of preservice teaching environments and the barriers potentially inhibiting technology integration in those environments is needed for Colleges of Education and public school systems to better prepare preservice and mentor teachers to optimally integrate technology in the classroom.

Statement of the Problem

Preservice teachers have been prepared to effectively use technology to improve student learning, but as preservice teachers enter their internship-based teaching experiences, they encounter numerous barriers related to the complexities of PreK-12 classrooms (NCES, 2007). The mentor teacher’s technology integration predispositions are a crucial factor in the preservice teacher being supported in technology integration efforts (Grove et al., 2004; Brush, et al., 2008; Bai & Ertmer, 2008). There are little data to account for opportunities for technology integration in internship-based teaching experiences in relation to the technology integration predispositions of the preservice teachers, the technology integration predispositions of the respective mentor teachers, and classroom environmental factors unique to internship-based teaching experiences.

Purpose of the Study

The purpose of this research study is to examine preservice teacher technology integration in internship-based teaching experiences. Particular focus was placed on the mentor teacher/preservice teacher relationship and its impact on technology integration in internship-based teaching experiences.

Significance of the Study

Preservice teachers have been effectively prepared to integrate technology in internship-based teaching experiences (IBTE). Preservice and mentor teacher predispositions towards technology integration impact the degree to which technology is integrated in the classroom (Grove et al., 2004; Brush et al., 2008; Bai & Ertmer, 2008; Milman & Molebash, 2008). The contemporary movements toward standardized testing and school accountability have resulted in many mentor teachers utilizing traditional teaching methods which are inconsistent with the methodologies promoted by many Colleges of Education (Amrein & Berliner, 2002; Birkmire, 1993; Darling-Hammond, 1994; Franklin & Snow-Gerono, 2007; Gordon & Reese, 1997; Moon, Brighton, Jarvis & Hall, 2007; Pedulla, 2003).

There is little research examining the relationships between the preservice/mentor teacher predispositions and technology integration in IBTE. An examination of this relationship must also account for the unique factors in preservice teaching environments that contribute to the levels of technology integration. This study examined the preservice teaching environment in relation to variables that impact the ability of the preservice teacher to integrate technology in a constructivist manner.

Research Design

Given the multitude of factors taking place in the preservice teaching environment, both quantitative and qualitative methodologies were needed to address the research questions. This study implemented mixed methods using a concurrent triangulation approach to validate results. The concurrent triangulation model supports the simultaneous collection of quantitative and qualitative research data (Creswell, 2003). The preservice teachers who participated in this study were administered three assessment instruments: the *Select Project Skills Survey Items (SPSSI),* the *LoTi Digital Age Survey (LoTiP),* and the *Preservice Teacher Technology Journal Entries (PTTJE)* to assess their technology integration competencies. The *SPSSI,* developed by Wizer, Sadera, and Banerjee (2005), was administered to all preservice teachers at the beginning of their internship experiences. The *SPSSI* was designed based on technology competencies used in the *LoTi Digital Age Survey*.

The LoTi Digital Age Survey (Moersch, 2009) provides a validated tool for assessing the technology dispositions of the mentor teachers and the preservice teachers in this proposed research study. *The LoTi Digital Age Survey* was administered to the preservice teachers upon completion of (post) the internship-based teaching experience. The *LoTi Digital Age Survey (LoTiM)* was also administered to the respective mentor teachers prior to the IBTE.

Given the range of classroom challenges and the unpredictable nature of instructional environments, the *LoTi* survey alone, cannot account for all the distal variables in classroom environments that impact the ability of the preservice teacher to integrate technology in the classroom. To address this, additional qualitative data collection tools were utilized. Preservice teachers maintained semi-structured journals, via the *PTTJE*, to account for their use of technology. Survey questions addressing the classroom environment were added to the *LoTiP* and *LoTiM*.

The triangulation of research data from the *SPSSI, LoTiP, LoTiM*, and *PTTJE*, about the learning environment presented a more complete picture of preservice teacher technology integration than the use of a singular methodology.

The quantitative data from the *SPSSI* and the *LoTi Digital Age Survey* were entered into *SPSS*. Qualitative data were collected and coded by predominant themes. The coded qualitative data were then entered into a Research Questions Responses Databases (*RQR*). A cross-validated detailed analysis was conducted using the concurrent triangulation approach. This cross-validation strategy provides validation by using the strengths of both qualitative and quantitative approaches (Creswell, 2003). A decision making matrix assisted the researcher in interpreting the results.

Research Questions

The following questions were used to guide the research study:

1. Is there a relationship between preservice teacher predispositions towards technology integration and the level in which preservice teachers integrate technology in internship-based teaching experiences?

2. Is there a relationship between mentor teacher predispositions towards technology integration and the level in which preservice teachers integrate technology in internship-based teaching experiences?
3. Is there a relationship between technology integration variables/barriers and the level in which preservice teachers integrate technology in internship-based teaching experiences?
   - 3a. Is there a relationship between technology resources available and the level in which preservice teachers integrate technology in internship-based teaching experiences?
   - 3b. Is there a relationship between other variables (e.g. time, emphasis on traditional teaching methods etc.) and the level in which preservice teachers integrate technology in internship-based teaching experiences?

Limitations and Assumptions

This research was conducted while acknowledging the following limitations and assumptions:

1. There are multiple variables in classroom environments affecting the integration of technology. Each classroom contains unique students. Effective teachers continually modify their instruction to meet the distinctive needs of their students.
2. There are other personnel (beyond the mentor teacher) in the school who may contribute to the preservice teachers' levels of technology integration. The availability and accessibility of technology specialists, library media specialists

and other personnel who support technology integration can have an impact on preservice teachers' technology integration opportunities

3. Qualitative results from this study, like all qualitative results, are not generalizable.
4. Convenience sampling will limit the generalizability of quantitative results. Participants were volunteer participants from a pool of preservice teachers entering internship-based teaching experiences (IBTE) in the spring 2011.
5. Preservice and mentor teachers who elected to participate in the study may have more interest in technology integration than those who did not. Those preservice and mentor teachers who participated in the study, may have been more inclined to participate in the study because of their intrinsic interest in technology integration.

Definition of Terms

1. Constructivism - A complex term often used to identify a range of teaching environments and strategies. For the purposes of this research study, the following definition of constructivism will be used: "constructivism is a philosophy that instruction should be learner controlled; i.e., students take responsibility for their own learning and the teacher's role changes to that of being a mentor or coach who guides them in their construction of knowledge" (Apple, 1991, p.1).
2. IBTE – acronym for internship-based teaching experiences.
3. Instructional Environment - any environment in which instruction occurs including classrooms, the library media center, and computer labs.

4. Internship Experience – guided practice teaching under the supervision of a mentor teacher.
5. ISTE – acronym for the International Society for Technology Education.
6. LoTi – acronym for the levels of technology implementation.
7. LoTiM - acronym for the levels of technology implementation instrument administered to the mentor teachers.
8. LoTiP - acronym for the levels of technology implementation instrument administered to the preservice teachers.
9. Mentor Teacher - a trusted counselor or teacher to (another person).
10. NCATE – acronym for the National Council for Accreditation of Teacher Education
11. NCES - acronym for the National Center of Educational Statistics
12. Preservice teacher - a College of Education student participating in their professional placement.
13. PBL – acronym for problem-based learning approaches that provide authentic experiences for learners, including preservice teachers, without being directly in a PreK-12 classroom (Hernández-Ramos & Giancarlo, 2004; Park & Ertmer, 2007).
14. PDS – acronym for Professional Development Schools
15. Professional Development Schools – “collaborative organizations in which participants support student learning; provide a professional induction program for teacher candidates; develop the skills, knowledge, and dispositions of practicing teachers; and systematically inquire in and on practice so that it can be improved” (Trachtman, 2007, p. 197).

16. PTTJE – acronym for the Preservice Teacher Technology Journal Entries assessment instrument.
17. SPSSI – acronym for the Select Project Skills Survey Instrument.
18. TICLE – acronym for technology-integrated constructivist learning environments
19. TPACK – acronym for a framework of *Technological Pedagogical Content Knowledge (TPACK),* Mishra and Koehler (2006), and Thompson and Mishra (2007), identified the intersection of three primary forms of knowledge: Content (CK), Pedagogy (PK), and Technology (TK) needed for optimal technology integration.

Summary

Colleges of Education use multiple strategies to prepare preservice teachers to engage students in TICLE. Colleges of Education espouse the use of TICLE, based on the Apple Classrooms of Tomorrow (1996) longitudinal research studies, and the research of progressivists like Dewey (1916) and contemporary constructivists like Papert (1993) and Jonassen and Carr (2000). A mentor teacher's negative philosophical approach to technology integration is one obstacle to a preservice teacher successfully integrating technology in IBTE (Dexter & Riedel, 2003; Doering et al., 2003; Stuhlmann & Taylor, 1999). The NCES (2007) found 53% of mentor teachers do not demonstrate a willingness to integrate technology into their classrooms. Colleges of Education make good faith efforts to prepare preservice teachers to integrate technology into the classroom by providing a foundation of integration strategies through coursework and other experiences (NCES, 2007). These efforts are dependent on the cooperation of the mentor teacher for there to be successful practical application of the strategies in internship-based field experiences. A knowledgeable mentor teacher and adequate access to technology is needed for preservice teachers to implement technology-integrated, constructivist based lessons (Grove et al., 2004; Brush et al., 2008). This research study has a three-fold focus: to examine the relationship between preservice teacher predispositions towards technology integration and the level in which preservice teachers integrate technology in internship-based teaching experiences; to examine the mentor teacher predispositions towards technology integration and the level in which preservice teachers integrate technology in internship-based teaching experiences; and to examine the relationship between technology integration variables/barriers and the level in which preservice teachers integrate technology in internship-based teaching experiences.

Chapter II. Literature Review

Imagine the year is 1870, and you are walking into a traditional one room school house. The students' desks are neatly aligned in rows; the students are focused on the teacher lecturing from a textbook. The most modern technological innovation in the school house is a chalkboard. Now, imagine walking into a 21st century classroom. The picture evolving in your mind may be that of a diverse classroom in which students are working in small groups. One group is exploring iPads for multimedia files to support a classroom activity. Another small group of students are engaged in an activity at an interactive whiteboard. In reality, an actual 21st century classroom may more reflect that of the 18th century classroom with students sitting in rows listening to a teacher lecture at the chalkboard. Given the technological resources available to 21st century schools, it is fair to examine why some PreK-12 teachers continue to rely heavily on traditional teaching tools and methods. If 21st century medical schools trained future physicians using 18th century methods and technologies, there would be societal outrage. If schools of forensic science trained future criminologists to solve crimes using 18th century science, those schools would likely be chastised for not properly preparing their students. Medical school preparation programs are based on the landmark research in the medical field. These programs provide future physicians with practical experience and training using the most modern technological tools available. Based on the models used in medical schools, and fields like forensic science, it is then fair to question why public schools persist in using centuries' old methodologies in preparing PreK-12 students. It is then logical to query, what other research-based approaches to education may more optimize learning for PreK-12 students? The landmark educational research studies from the *Apple Classrooms for Tomorrow* (*ACOT*) project serve as a starting point for the examination of optimal approaches to PreK-12 education.

The *Apple Classrooms for Tomorrow* (*ACOT*) studies revealed as early as 1991, that students who have access to computer technology demonstrated differences in self-confidence levels, problem solving skills, and positive attitudes, in comparison to students who had little or no learning access to computer technology (Apple, 1991). The *ACOT* project and related studies of the 1990's are still considered groundbreaking, landmark research because Apple Computer was given unprecedented access to PreK-12 public schools. The *ACOT* research team compared computer integrated instructional environments to classrooms using traditional teaching methods. The range of national, state, and local education reforms and mandates since the early 1990's has created an environment in which experimentation and innovation in schools are in competition with the pressures of accountability. This prohibits replication of the open access to public school classrooms, students, and curriculum provided to Apple Computer in the 1990's. The *ACOT* studies stand as the landmark research examining constructivist teaching principles and technology integration in public school classrooms.

The principles of constructivism and cognitive apprenticeship are the interpretive framework for this research study. Cognitive apprenticeship forms the framework of exploring the mentor teacher and preservice teacher relationship by encouraging authentic activity and assessment through situated learning and providing a culture of expert practice. The landmark *ACOT* longitudinal research project was based on constructivist philosophy. "Constructivism is a philosophy that instruction should be learner controlled" (Apple, 1991, p.1); students take responsibility of their own learning and the teacher's role changes from traditional instructor to that of being a mentor or coach who guides them in their construction of knowledge. Applying the principles of constructivism in technology-integrated learning environments provided the *ACOT* researchers with evidence that students learn better in this type of technology integrated, constructivist learning environments (TICLE) than in traditional learning environments.

Teacher education programs use the *ACOT* research for preparing preservice teachers to integrate educational technology into the classroom using varied approaches. A NCES study (2007) noted that strategies used in teacher preparation programs, to encourage technology integration in IBTE, included: (1) offering stand-alone courses in educational technology in their program, (2) teaching technology within methods courses, teaching technology within content courses, and (3) teaching technology strategies in field experiences of teacher candidates. While a majority of teacher preparation programs made efforts to incorporate technology integration strategies into field experiences, many barriers were encountered. In the NCES (2007) survey of 1439 colleges with teacher education programs, slightly less than half of the schools indicated that their preservice teachers were able to practice the technology related skills and knowledge they acquired in their coursework during their field experiences. In essence, teacher education programs have been using the landmark *ACOT* research in preparing their preservice teachers to integrate technology into 21st century classrooms, while public school pedagogy has been based on 18th century methodologies.

The purpose of this chapter is to present a review of research and literature supporting technology-integrated, constructivist teaching practices in preservice teachers' IBTE, while addressing the numerous barriers preservice teachers encounter in PreK-12 classrooms. The barrier paramount to preservice teachers' technology integration has historically been the mentor teachers' attitudes toward technology integration, as the mentor teacher serves as the gatekeeper for their respective preservice teaching environment (Smith, 2001). Preservice teachers have encountered additional barriers while attempting to integrate technology in the constructivist manner modeled in the *ACOT* studies (Ringstaff et al., 1996). This literature review contains the following sections: professional development schools (PDS), constructivism, preservice teacher technology integration preparation and practice, levels of technology implementation, theoretical framework, preservice and mentor teacher dispositions and barriers, and summary.

Preservice teachers are being prepared to effectively use technology to improve student learning, but as preservice teachers enter their IBTE, they have encountered numerous barriers related to the complexities of PreK-12 classrooms (NCES, 2007). The mentor teacher's technology integration predispositions are a crucial factor in the preservice teacher being supported in technology integration efforts (Grove et al., 2004; Brush et al., 2008; Bai & Ertmer, 2008). All the preservice teachers involved in this study completed their IBTE in Professional Development Schools (PDS); PDS provide a framework for the mentor teachers to indoctrinate preservice teachers into the craft of the teaching profession.

Professional Development Schools (PDS)

Dewey's progressive ideas for the classroom were placed into practice in the first Dewey Lab School which opened in January 1896. The lab school was a predecessor of the modern professional development schools (Mayhew, and Edwards, 1966). The modern day PDSs emerged in 1980s as an evolution of the Dewey's lab school concept.

The Holmes Group (1986), a consortium of Universities, first proposed the Professional Development Schools (PDS) concept. A PDS was envisioned as more than a laboratory school, or a setting for clinical supervision of novice teachers (Holmes, 1990). Trachtman (2007) provided a composite definition of professional development schools (PDSs) as "collaborative organizations in which participants support student learning; provide a professional induction program for teacher candidates; develop the skills, knowledge, and dispositions of practicing teachers; and systematically inquire in and on practice so that it can be improved" (p. 197).

The National Council for Accreditation of Teacher Education (NCATE) (2001) outlined five standards for professional development schools. These standards include (a) Learning Community, (b) Accountability and Quality Assurance, (c) Collaboration, (d) Diversity and Equity, and (e) Structures, Resources and Roles. The PDS standards provide a nurturing clinical environment for preservice teachers to complete IBTE.

Dewey's constructivist teaching practices have long been espoused by other learning theorists dating to Lev Vygotsky in the early part of the 20th century (Dewey, 1916; Vygotsky, 1978). The case for constructivist-based or student centered learning has since been supported by a continuum of learning theorists including Jerome Bruner, Jean Piaget, Seymour Papert and David Jonassen.

Constructivism

Constructivism is a term used to describe a variety of teaching styles, learning theories and environments in the education field. Educators often view constructivism as the converse of behaviorism. Ertmer & Newby (1993) defined behaviorism as "an emphasis on producing observable and measurable outcomes in students" (p 56). In reality, constructivism is a broad term used to describe a variety of learning theories and teaching environments often credited to attributes in education that are not necessarily constructivist. Molenda (1997) stated that "constructivism comes in different strengths, from moderate to extreme" (p. 47). A consistent theme among constructivist learning theories is that an individual learner must build knowledge and skills (Bruner, 1990). This is in contrast to traditional directed teaching models rooted in essentialism. Directed teaching models involve the instructor delivering knowledge, typically by lecture, and the students feeding the knowledge back in rote manner via an exam or other similar assessment (Bagley, 1934; Copperman, 1978; Koerner, 1959; Rickover, 1963). The constructivist framework approaches understanding learning from multiple perspectives, and challenges learners' thinking (Duffy & Cunningham, 1996; Jonassen, Mayes & McAleese, 1993). Proponents of constructivism view that it is an individual's processing of environmental stimuli and the resulting cognitive structure that produce behavior, not the stimuli themselves (Harnard, 1982). Teacher education programs have utilized this multiple perspective, student-centered learning approach to learning in preparing preservice teachers to integrate technology in the classroom. The *ACOT* studies provided longitudinal research data indicating that students learn better in TICLE in comparison to traditional teacher directed learning environments (Ringstaff et al., 1996). This marriage of constructivist theory and technology integration is the pedagogical approach found to be most effective in the *ACOT* studies (Ringstaff et al., 1996). While the *ACOT* studies revealed the value student centered or TICLE, the effectiveness of constructivist teaching practices has been documented for nearly 100 years, dating to the early progressive writings of John Dewey.

Dewey's (1916) progressivism movement evolved into several schools or subsets of constructivism. Dewey was an advocate for schools moving from traditional teaching environments, to environments of experimentation and practice. Dewey (1916, 1938) felt it imperative for knowledge acquired in schools to be presented in a medium related to associated life. Ironically, nearly 100 years after Dewey's (1916) writings, educational reforms today largely ignore Dewey's recommendations for learning environments of experimentation and practice.

Dewey and his contemporary, Lev Vygotsky, both valued an emphasis on student-centered learning and the development of thinking skills. Vygotsky felt that teachers could provide good instruction by finding out where each child was in his or her development and building on the child's experiences. Vygotsky (1978) described this Zone of Proximal Development as, "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p. 86). Progressivism rejects learning based on rote memorization and traditional forms of assessment. Kilpatrick (1951) and Brameld (1971) provided research that further supported the progressivists' beliefs that knowledge acquired in schools be presented in a medium related to associated life. Jean Piaget's (1962) research on the developmental stages of the child provided a foundation for connecting cognitive development with the presentation of knowledge in relation to the real world. Piaget identified cognitive development in children from birth to age 15.

Piaget's research had an effect on learning and the use of computers, specifically as an outcome of his many years of research with Seymour Papert at the University of Switzerland. According to Papert (1993), the computer presents unique opportunities for student-centered learning. Papert's theories were built on constructivist teaching practices and based on having the learner consciously creating a public entity using the computer. Papert (1993) utilized a computer-based Geometry program titled, *Logo*. *Logo* allowed students to program the computer and to determine the path in which the *Logo* turtle was directed to solve complex math problems. *Logo* permitted students to build computer based objects and to provide interaction between the user and the objects. Papert's theory of constructivism is referred to as constructionism. Constructionism differs from constructivism in that it closely looks at the concept of mental construction in the use of computers (Papert, 1993). Papert was at the forefront of exploring the relationship between technology and constructivism. Papert’s (1993) pioneering success in using computer applications to have students direct their own learning and problem solving, provided research-based evidence, early in the evolution of the microcomputer in education, as to the effectiveness of technology applications in the classroom. Papert’s (1993) research on constructionism provided further evidence that the blending of constructivism and technology optimizes learning.

Like Papert, Jonassen and his colleagues purported that learners should function as designers of their own learning (Jonassen & Carr 2000; Jonassen & Reeves, 1996). In the development of their Mindtools theory, Jonassen and Reeves (1996) presented the notion that technologies should be used as construction tools that students learn with, not from (Jonassen & Reeves, 1996). Jonassen acknowledged that it would be impossible for individuals to master all content areas; therefore, "instruction was to be anchored in some meaningful, real-world context" (Jonassen, 1991, p. 29). Jonassen (1991) indicated that everyone's view of the external world differs from others because we each have a unique set of experiences, and that students should be provided with tasks that have real world relevance and utility. Jonassen effectively incorporated the constructivist theories of his predecessors into an integrated view of technology and instruction. Jonassen's constructivism focused on knowledge construction via computer applications, not knowledge reproduction, with the belief that one constructs knowledge from one's experiences, mental structures, and beliefs that are used to interpret objects and events. The progressivism movement of the early and mid-20th century led by Dewey (1916, 1938), Vygotsky (1978), Kilpatrick (1951) and Brameld (1971) demonstrated the efficacy of learning being presented in a medium related to associated life. Based on Piaget’s (1962) research on the stages of development, Papert (1993), Jonassen (1991), Jonassen and Reeves (1996), and Jonassen and Carr (2000) demonstrated that constructivist teaching practices, when used in technology-based learning environments, help students learn in contextual fashions that better approach real world situations than traditional directed-teaching models. Given the documented effectiveness of TICLE, further research is needed to investigate why more than half of all preservice teachers have not been able to integrate technology in their preservice teaching experiences (NCES, 2007). Teacher education programs prepare preservice teachers based on effectiveness of TICLE, yet when placed in internships, a majority of preservice teachers are placed in traditional teaching environments; this dilemma requires further examination.

Given the range of constructivist principles addressed by the theorists in this review, developing a singular definition of constructivism is a challenge. For the purposes of this research study, the aforementioned *ACOT* definition of constructivism will serve as a summative statement of constructivism. The *ACOT* definition states that, "constructivism is a philosophy that instruction should be learner controlled" (Apple, 1991, p.1); students take responsibility of their own learning and the teacher's role changes from traditional instructor to that of being a mentor or coach who guides them in their construction of knowledge. The application of constructivist teaching principles in the *ACOT* teaching environment provided strong evidence of the effectiveness of TICLE in helping students learn more than in traditional teaching environments (Apple, 1991). The theories implemented through the *ACOT* research and successful integration of the classroom computer is counter to many traditional teaching environments that preservice teachers encounter in their IBTE (Frederick, Schweizer & Lowe, 2006).

The internship-based teaching experience is a time in which preservice teachers can implement technology integration strategies acquired in their University coursework. The contemporary research by Jonassen (1991), Jonassen & Reeves (1996) Jonassen & Carr (2000), Papert (1993) and Ringstaff et al., (1996) provided evidence documenting that students learn better in (TICLE). Recent efforts made toward improving technology integration in preservice teaching experiences are driven by this research.

Preservice Teacher Technology Integration Preparation and Practice

Internship experiences present an authentic context for preservice teachers to apply the knowledge, skills, and pedagogy acquired in their teacher preparatory program of study.

Colleges of Education have prepared preservice teachers to integrate technology in their IBTE by offering standalone technology integration courses (Brown & Graham, 2008; Brush et al., 2003) and/or by modeling technology integration strategies in campus-based coursework (Dawson & Dana, 2007). IBTE provide preservice teachers with an opportunity to utilize, in an authentic context, the technology integration strategies acquired in their campus-based coursework.

Lei (2009) noted that preservice teachers need to be made aware that there are barriers to technology integration, prior to embarking on internship experiences. Presenting preservice teachers with campus-based technology integration experiences that are authentic (in their PreK-12 nature), can increase preservice teachers' awareness of these barriers and assist them in developing integration strategies and problem-solving strategies before entering their internship experiences. Situated learning and problem-based learning (PBL) are approaches that provide authentic experiences for learners, including preservice teachers, without being directly in a PreK-12 classroom (Hernández-Ramos & Giancarlo, 2004; Park & Ertmer, 2007). Learners are presented with a conceived problem or a real case requiring preservice teachers to use strategies and resources including technology resources to solve the problem. While effective for all learners, situated learning and problem-based learning has been a particularly effective strategy in preparing future teachers (Kain, 2003). In presenting preservice teachers with authentic scenarios via video cases, Derry and Hmelo-Silver (2005) demonstrated belief change as a result of PBL.

As a follow-up to campus-based preparation, some teacher preparation programs have utilized additional technology integration strategies to assure preservice teachers have the opportunity to integrate technology in their preservice teaching experiences. Gronseth et al. (2010) conducted a study into the types of technology experiences offered by preservice teacher programs. While 60% of the participating institutions indicated that all of their preservice teacher preparation programs offered a standalone technology course, 60% also required preservice teachers to develop and implement technology lessons in their field experiences. Parker et al., (2008) noted that the inclusion of an internship-based technology assignment and a corresponding rubric improved connections between college faculty and mentor teachers. Internship-based action research or capstone projects focused on technology integration have also been found effective in creating opportunities for technology integration (Dawson, 2005; Wentworth et al., 2008).

Colleges of Education, as noted by Mishra and Kolher (2006), have moved towards expanding the integration skills acquired by preservice teachers in a standalone technology course. In addition to the standalone course, the preservice teachers have taken take the skills, dispositions, and technologies acquired in their standalone technology course into their other teacher education courses. Lei (2009) noted that teachers often are confident with their personal use of computers, but are much less comfortable and less confident in their knowledge of technology integration in their future PreK-12 classrooms. This current generation of teachers are digital natives, a phrase coined by Prensky (2001) as the first generation to grow up “surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age” (p.1).

Digitally native preservice teachers' experiences with technology have involved social networking and web surfing; teacher education programs need to find ways to expose preservice teachers to more advanced technologies and to assure that media can be used for inquiry and construction (Prensky, 2009; Lei, 2009). Developing effective technology integration skills requires content knowledge and effective pedagogical strategies. Teacher preparation programs have emphasized the efficacy of technology integration in a variety of campus-based experiences including standalone technology courses, content courses, and simulations. Existing research data indicates a disconnection between the campus-based preparation experience and practice, as a majority of preservice teachers have not been given opportunities to integrate technology in the IBTE (NCES, 2007). Further examination of technology integration in IBTE is needed to address this disconnection.

Keating and Evans (2001) determined that preservice teachers lacked pedagogical content knowledge in relation to technology. Mishra and Koehler (2006) attempted to identify the type of knowledge required for technology integration in the classroom, while addressing the complex nature of the classroom. Building a framework of *Technological Pedagogical Content Knowledge (TPACK),* Mishra and Koehler (2006), and Thompson and Mishra (2007), identified the intersection of three primary forms of knowledge: Content (CK), Pedagogy (PK), and Technology (TK) needed for optimal technology integration. While the *TPACK* framework offers promise in assessing knowledge needed for technology integration, it is the *LoTi Digital Age Survey* (Moersch, 2009) that offers a time tested and valid instrument that measures levels of technology integration in teaching environments. The levels of technology integration are the construct most relevant to this research study.

Levels of Technology Implementation

Moersch (1995) developed the *"Levels of Technology Implementation"* (*LoTi*) as a further elaboration of the *ACOT* models for measuring technology integration. The *LoTi* model details eight levels of technology implementation. The eight *LoTi* levels include: non-use (level 0), awareness (level 1), exploration (level 2), infusion (level 3), integration-mechanical (level 4a), integration- routine (level 4b), expansion (level 5) and refinement (level 6).

At level 0 (Non-Use), the instructional focus can range anywhere from a traditional direct instruction approach to a collaborative student-centered learning environment. The use of research-based best practices may or may not be evident, but those practices do not involve the use of digital tools and resources. The use of digital tools and resources in the classroom is non-existent due to (1) competing priorities (e.g., high stakes testing, highly-structured and rigid curriculum programs), (2) lack of access, or (3) a perception that their use is inappropriate for the instructional setting or student readiness levels. The use of instructional materials is predominately text-based (e.g., student handouts, worksheets).

At level 1 (Awareness), the instructional focus emphasizes information dissemination to students (e.g., lectures, teacher-created multimedia presentations) and supports the lecture/discussion approach to teaching. Teacher questioning and/or student learning typically focuses on lower cognitive skill development (e.g., knowledge, comprehension). Digital tools and resources are either (1) used by the classroom teacher for classroom and/or curriculum management tasks (e.g., taking attendance, using grade book programs, accessing email, retrieving lesson plans from a curriculum management system or the Internet), (2) used by the classroom teacher to embellish or enhance teacher lectures or presentations (e.g., multimedia presentations), and/or (3) used by students (usually unrelated to classroom instructional priorities) as a reward for prior work completed in class.

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) using the available digital assets. Digital tools and resources are used 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.

At a level 3 (Infusion), the instructional focus emphasizes student higher order thinking (i.e., application, analysis, synthesis, evaluation) and engaged learning. Though specific learning activities may or may not be perceived as authentic by the student, instructional emphasis is, nonetheless, placed on higher levels of cognitive processing and in-depth treatment of the content using a variety of thinking skill strategies (e.g., problem-solving, decision-making, reflective thinking, experimentation, scientific inquiry). Teacher-centered strategies including the concept attainment, inductive thinking, and scientific inquiry models of teaching are the norm and guide the types of products generated by students using the available digital assets. Digital tools and resources are used by students to carry out teacher-directed tasks that emphasize higher levels of student cognitive processing relating to the content under investigation.

At level 4a (Integration: Mechanical) students are engaged in exploring real-world issues and solving authentic problems using digital tools and resources; however, the teacher may experience classroom management (e.g., disciplinary problems, internet delays) or school climate issues (lack of support from colleagues) that restrict full-scale integration. Heavy reliance is placed on prepackaged materials and/or outside resources (e.g., assistance from other colleagues), and/or interventions (e.g., professional development workshops) that aid the teacher in sustaining engaged student problem-solving. Emphasis is placed on applied learning and the constructivist, problem-based models of teaching that require higher levels of student cognitive processing and in-depth examination of the content.

Students' use of digital tools and resources is inherent and motivated by the drive to answer student-generated questions that dictate the content, process, and products embedded in the learning experience.

At level 4b (Integration: Routine) students are fully engaged in exploring real-world issues and solving authentic problems using digital tools and resources. The teacher is within his/her comfort level with promoting an inquiry-based model of teaching that involves students applying their learning to the real world. Emphasis is placed on learner-centered strategies that promote personal goal setting and self-monitoring, student action, and issues resolution that require higher levels of student cognitive processing and in-depth examination of the content.

Students’ use of digital tools and resources is inherent and motivated by the drive to answer student-generated questions that dictate the content, process, and products embedded in the learning experience

At a Level 5 (Expansion), collaborations extending beyond the classroom are employed for authentic student problem-solving and issues resolution. Emphasis is placed on learner-centered strategies that promote personal goal setting and self-monitoring, student action, and collaborations with other diverse groups (e.g., another school, different cultures, business establishments, governmental agencies) using the available digital assets. Students’ use of digital tools and resources is inherent and motivated by the drive to answer student-generated questions that dictate the content, process, and products embedded in the learning experience. The complexity and sophistication of the digital resources and collaboration tools used in the learning environment are now commensurate with (1) the diversity, inventiveness, and spontaneity of the teacher's experiential-based approach to teaching and learning and (2) the students' level of complex thinking (e.g., analysis, synthesis, evaluation) and in-depth understanding of the content experienced in the classroom.

At level 6 (Refinement), collaborations extending beyond the classroom that promote authentic student problem-solving and issues resolution are the norm. The instructional curriculum is entirely learner-based. The content emerges based on the needs of the learner according to his/her interests, needs, and/or aspirations and is supported by unlimited access to the most current digital applications and infrastructure available.

At this level, there is no longer a division between instruction and digital tools/resources in the learning environment. The pervasive use of and access to advanced digital tools and resources provides a seamless medium for information queries, creative problem-solving, student reflection, and/or product development. Students have ready access to and a complete understanding of a vast array of collaboration tools and related resources to accomplish any particular task (Moersch, 2009).

A new expanded version of the 1995, *LoTi* framework emerged in 2009. This new version, titled, *LoTi Digital Age Survey*, focused on other areas of technology integration. The new *LoTi Digital Age Survey* determines a *LoTi* score based on the original eight levels established in 1995 (Moersch, 2009). The most significant change in the 2009 *LoTi Digital Age Survey* from the original *LoTi Survey* is that the new *LoTi Digital Age Survey*'s primary focus is what the PreK-12 students are doing with technology in the classroom. The older version of the survey focused on the respective classroom teacher's levels of technology integration. The *LoTi* survey questions and *LoTi* scale can be found in appendix C.

Both validity and reliability analyses have been conducted for the original *LoTi Questionnaire*, and the new *LoTi Digital Age Survey*. The *LoTi* instrument demonstrated an internal consistency of $r = 0.7427$, 0.8148, and 0.7353 on the *LoTi*, *PCU*, and *CIP* components of the Questionnaire, respectively. Additional factor analysis showed *LoTi* levels to be significantly correlated to *PCU* ($r = 0.579$) and *CIP* ($r = 0.422$) (Learning Quest Inc., 2004). The *LoTi Digital Age Survey* is a validated tool for the levels of technology integration in PreK-12 preservice teaching environments (Stoltzfus, 2006).

The *LoTi Digital Age Survey* with its emphasis on the PreK-12 students' use of technology, and its application of the *ACOT* studies principles, is an assessment tool aligned with the goals of this study. The *LoTi Digital Age Survey* provides data in alignment with the problems being addressed in this study. The *Loti Digital Age Survey* provides the key data to account for technology integration, in IBTE, including: the technology integration predispositions of the preservice teachers, the technology integration predispositions of the respective mentor teachers, and classroom environmental factors unique to IBTE.

The *LoTi Digital Age Survey* is in alignment with the framework of the *ACOT* model, measuring technology integration in purposeful, authentic problem-solving environments. The ideal internship experience presents the preservice teacher with authentic opportunities to integrate technology under the direction of the mentor teacher. The preservice teacher serves in the role of an apprentice, while being guided by the mentor teacher's pedagogical practices and beliefs. The internship-based teaching experience has historically resembled an apprenticeship where the preservice teacher serves as an apprentice to the mentor teacher (Szuberla, 1997). Apprenticeship theory provides a theoretical framework for the constructivist use of technology in preservice teaching environments. The theoretical foundations of this proposed research study combine elements of traditional apprenticeship and constructivism into the concept of Cognitive Apprenticeship (Brown et al., 1989; Lave, 1993; Lave & Wenger, 1991).

Theoretical Framework

Cognitive apprenticeship

Tracing its roots to medieval Europe, an apprentice is one who is learning practical experience under skilled workers or experts. The opportunity for preservice teachers to practically refine their teaching skills is found in the practicum or internship-based teaching experience. A teaching internship is traditionally viewed as an apprentice-model, where the "naive apprentice is immersed into the work situation, observing, absorbing, and ultimately imitating the master (mentor teacher)" (Keough, Dole, and Hudson, 2006, p. 1). This perspective portrays the supervising teacher as an expert and the preservice teacher in the role of novice. This ties well with constructivist theory, because in both apprenticeship theory and constructivism, the student or the apprentice both take responsibility for their own learning, while the expert or teacher's role changes to that of being a mentor or coach who guides the students/apprentices in their construction of knowledge. Keough et al., (2006) noted that this traditional view of supervising teacher has evolved into a mentorship role implying a more collaborative and mutually beneficial relationship. This contemporary view of the mentor teacher has implications for the practical teaching experience framework and the evolution of the preservice teacher's apprenticeship. A cognitive apprenticeship is focused on learning through guided experience using cognitive and metacognitive skills, while traditional apprenticeships are focused on physical skills and processes (Collins, Brown & Newman, 1989).

Cognitive apprenticeship methodology targets the processes that experts use to handle complex tasks (Brown et al., 1989; Collins, 1991; Collins, Brown & Holum, 1991;

Collins, et al., 1989). Applying apprenticeship methods to largely cognitive skills requires the externalization of processes that are usually carried out internally. Observing the processes by which an expert listener or reader thinks and practices these techniques, can teach students to learn on their own more adeptly (Collins et al., 1989). Brown et al. (1989) described cognitive apprenticeship methods as trying to acculturate practices through activity and social interaction in a way similar to that evident in craft apprenticeship.

Cognitive apprenticeship encourages authentic activity and assessment through situated learning and providing a culture of expert practice (Brown et al., 1989; Collins, 1991; Collins et al., 1991; Collins et al., 1989; Stewart & Lagowski, 2003). In the case of the IBTE, the learning activities of the preservice teacher are the practices of real-world experts. Cognitive apprenticeship is anchored in real-world constructivist context (Jonassen, 1991) occurring in Vygotsky's (1978) zone of proximal development.

Cognitive apprenticeships permit learners to observe experts dealing with problems in an authentic context. The learners then solve the same or similar type problems by learning "through guided experience in authentic activities" (Collins et al., 1991, p. 457).

Collins et al. (1989) devised six major steps aimed at improving reading, writing and mathematics via cognitive apprenticeship. The six major steps include: (a) modeling, (b) coaching, (c) scaffolding, (d) articulation, (e) reflection, and (f) exploration. Modeling involves an expert carrying out a task so that students can observe and build a conceptual model of the processes that are required to accomplish the task. The experts demonstrate and explain their way of thinking for students to observe and understand.

Learners practice the methods, while the experts advise and correct in the coaching phase. Through scaffolding, the complexity of problems is increased. While decreasing the level of assistance according to the learners' progress, the experts progressively help the learners successively approximate the objective, accomplishing a task independently. Articulation gives the learners opportunities to articulate and clarify their own way of thinking prior to the final steps in which the learners explore and reflect.

LeGrand, Farmer, and Buckmaster (1993) presented a six stage adaption of the Collins et al. (1989) cognitive apprenticeship model applicable to continuing professional education. These six stages form a potential conceptual framework for the mentor and preservice teacher. The six stages in this adapted model include (a) modeling, (b) approximating, (c) scaffolding, (d) fading, (e) self-directed learning, and (f) generalization. Modeling occurs in two forms: behavioral modeling and cognitive modeling. Behavioral modeling permits learners to observe performance of an activity by experienced members of a community. Cognitive modeling permits experienced members to share "tricks of the trade" with newer members. Approximating allows learners to try out the activity while expressing their thoughts about the activity, reflecting about what they did and how it is different from the expert's performance. Role models provide scaffolding at this stage to minimize risk, while approximating the authentic experience. Scaffolding takes the form of layering physical aids, modeling tasks, and coaching. Fading involves a reduction in scaffolding and other support. The learners' abilities increase as the support decreases. Self-directed learning involves learners practicing doing the real thing, while receiving assistance only at their request.

Generalization involves making connections by discussing and relating what the preservice teachers have learned to subsequent practice situations.

This framework is not resolute when applied to IBTE. A variety of potential difficulties limit the total application of the framework in all IBTE. Mentor teachers are not experts in all content areas or in all pedagogical methods. Liu (2005) noted that a preservice teacher would have to connect with more than one mentor teacher in order to connect with expert teachers in all these areas. The time for expert teachers to design and implement “expert instruction” can be significant, so the preservice teacher in a six to eight week internship-based teaching placement can’t be exposed to all criteria needed to deliver expert instruction.

In relation to this proposed study, the cognitive apprenticeship framework presents an ideal mode to acculturate the preservice teacher into “authentic” opportunities for technology integration. This assumes the mentor teacher is an expert in technology integration. The cognitive apprenticeship model may have an inverse application in IBTE, placing the preservice teacher in the role of temporary mentor in the case of technology integration. The preservice teacher may have the requisite skills to be the expert in the integration of some classroom technologies providing a mutually beneficial relationship between the mentor and preservice teacher. Keough et al. (2006) noted that the preservice teacher could be in the role of providing the authentic context for the mentor teacher to begin the process of technology integration in the classroom. As preservice teachers embark on their IBTE, their relationship with the mentor can be influenced by their prior educational experiences and University based coursework.

The cognitive apprenticeship model can be well-suited for preservice teachers to integrate technology, but the preservice teaching environment must also be conducive to technology integration. It is hoped that the mentor teacher has the most recent tools and knowledge available so that the preservice teacher has the opportunity to practice and use, in authentic situations, the pedagogy and tools espoused by their teacher education programs.

Unfortunately, a majority of preservice teachers enter internship-based experiences in which the mentor teachers have not integrated technology into the classrooms on a regular basis (NCES, 2007). The success of the cognitive apprenticeship model, in relation to IBTE, is dependent on the respective internships' environmental factors. While respective dispositions of the mentor teachers are integral to preservice technology integration in internship experiences, several other barriers to technology integration in preservice teaching environments can inhibit preservice teachers from integrating technology in the classroom.

Preservice and Mentor Teacher Dispositions and Barriers

Preservice teachers who have taken a college-based technology integration course have positive attitudes towards technology integration (Bai & Ertmer, 2008; Lambert & Gong, 2010; Milman & Molebash, 2008; NCES, 2007), but this potential enthusiasm is dependent on the mentor teachers' cooperation in the role of gatekeeper (Jaworski & Watson, 1994; Williams, 1994). Opportunities for preservice teacher technology integration in IBTE are dependent on a variety of factors including the mentor teachers' willingness to integrate technology in the classroom (NCES, 2007). Teacher education programs must meet this challenge of preservice teachers' having positive attitudes towards technology while engaged in campus-based programs, and then entering teaching environments in which mentor teachers have negative attitudes towards technology integration. Examining factors highly correlated with successful technology integration in PreK-12 classrooms can help teacher preparation programs deal with this challenge.

Three factors highly correlated with successful technology integration include: professional development, positive teacher attitudes towards technology, and teacher's self-confidence towards technology integration (Allsopp, McHatton, & Cranston-Gingras, 2009; Penuel, 2006; Watson, 2006). Ideally, a preservice teacher with positive attitudes towards technology integration will be assigned a mentor teacher who has positive attitudes, self-confidence and access to technology integration professional development, but again only slightly more than half of mentor teachers support technology integration in preservice teaching experiences (NCES, 2007).

Frederick et al., (2006) noted that preservice teachers found the traditional styles of mentor teachers complicated constructivist use of computer technology. Palacio-Cayetano, Schmier, Dexter, and Stevens (2002) found in a study comparing preservice teachers and in-service (mentor) teachers, that the preservice teachers implement more technology integration principles as they view technology more as a learning tool than the mentor teachers. Singer and Maher (2007) found that the preservice teacher, who enacts a technology rich curriculum in their practical teaching placements, can have a positive effect on mentor teacher's ability to integrate technology in their classrooms. These findings indicate that the preservice teacher is often more focused than the mentor teacher with regard to the key elements of technology integration. Even when the mentor teacher has positive technology integration predispositions, barriers present in internship-based environments inhibit the preservice teacher's levels of technology integration (Bartlett, 2002; Brush et al., 2003; NCES, 2007; Russell, Bebell, O'Dwyer, & O'Connor, 2003).

Competing barriers inhibiting preservice teachers to practice these skills in field experiences include: competing priorities in the classroom (74 %), (b) available technology infrastructure in the schools (73 %), (c) lack of training or skill (64 %), (d) time (62 %), and (e) willingness (53 %) on the part of supervising teachers/mentor teachers to integrate technology in their classrooms (NCES, 2007), and (f) the attitudes of the school administration regarding technology integration (Dexter & Riedel, 2003; Doering et al., 2003).

Since the mentor teacher serves a pivotal gate keeping role in preservice teaching experiences (Jaworski & Watson, 1994; Williams, 1994), the preservice teacher entering an internship-based teaching experience with positive attitudes (predispositions) towards technology integration can be thwarted in their technology integration efforts by a mentor teacher who is unwilling to integrate technology in the classroom. The technology integration predispositions of the mentor teacher can have a profound effect on the ability of the preservice teacher to integrate technology in the classroom as demonstrated by the NCES Study (2007) indicating 53% of mentor teachers were unwilling to have technology integrated in their respective classrooms. As teacher preparation programs continue to prepare the next generation of preservice teachers for 21st century classrooms, additional data are needed to account for the levels of technology integration in IBTE and to unite the research-based pedagogy of teacher preparation programs to PreK-12 internship placements. These data are needed to advance and improve IBTE and to be assured that efforts towards preservice teachers' technology integration preparation are not lost.

Summary

The purpose of this chapter was to establish that, despite the wide-ranging efforts of teacher preparation programs to prepare preservice teachers for technology integration in their preservice teaching placements, too many barriers exist in those respective placements, for effective technology integration to occur. This literature review provided a historical overview of constructivism, while documenting the effectiveness of constructivist-based technology-integrated classrooms. The cognitive apprenticeship model, in which the preservice teacher serves in the role of apprentice under the direction of the mentor teacher, was presented as the theoretical framework for this study. This literature review outlined known barriers to preservice teacher technology integration. All sections of this literature review support the argument for more constructivist-based technology integration in PreK-12 education, and in particular in PreK-12 teaching environments.

The *ACOT* project and related longitudinal studies provided the supporting evidence that students can learn more in PreK-12 TICLE than traditional teaching environments (Ringstaff et al., 1996). Since the introduction of the microcomputer in education, learning theorists have explored the benefits TICLE (Jonassen & Carr, 2000; Jonassen et al., 1998; Jonassen et al., 1993; Jonassen & Reeves, 1996; Papert, 1993).

Significant barriers to technology integration have existed in PreK-12 IBTE including: the technology integration dispositions of the mentor teacher, competing priorities in the classroom, available technology infrastructure in the schools, lack of training or skill, and time (NCES, 2007). While the research on preservice teacher technology integration preparation, via campus based teacher preparation programs, is robust, comprehensive research on preservice teacher technology integration in internship experiences is less abundant. There is little data to account for opportunities for technology integration in complex internship-based teaching environments in relation to the technology integration predispositions of the preservice teachers, the technology integration predispositions of the respective mentor teachers, and classroom environmental factors unique to IBTE. This literature review supports the need for further examination of the preservice teaching environment, utilizing a mixed-methods approach, to account for the complexities of preservice teaching learning environments. Data generated from this study can advance and improve IBTE.

Chapter III. Research Methodology

Many teacher education programs train preservice teachers to integrate technology in the classroom based on historical research indicating that PreK-12 students learn better in technology integrated classrooms (Apple, 1991). As preservice teachers embark on IBTE in PreK-12 schools, their ability to integrate technology into the curriculum is dependent on a variety of factors, including potential barriers to technology integration. These barriers to technology integration, in preservice teaching experiences, include: the technology integration dispositions of the mentor and preservice teachers, access to technology resources, time to learn (including training) and practice new technology resources, and competing priorities in the classroom (Bartlett, 2002; Brush et al., 2003; NCES, 2007; Russell et al., 2003).

The purpose of this research study was to examine technology integration in IBTE. A primary focus of this study was the mentor teacher/preservice teacher relationship and its impact on technology integration in IBTE; additional barriers affecting technology integration in IBTE were also examined.

This chapter describes the methodology used to execute this research study. This chapter contains the following sections: sample; research questions; research design; instruments, settings and procedures; data collection and analysis; pilot study; and summary.

Sample

A convenience sampling technique was used in this research study. The convenience sample consisted of preservice teachers and their respective mentor teachers engaged in IBTE in the spring of 2011. The preservice teachers were enrolled in a teacher preparation program at a mid-Atlantic University, while the mentor teachers were employed by a local public school system. Attempts for permission to complete the research study in several other local public schools systems were not successful. The pool of preservice teachers was limited to those preservice teachers assigned to complete internships in the school system that had provided IRB approval for the study. From a pool of 106 preservice teachers and 106 mentor teachers, 29 preservice teachers and 46 mentor teachers fully participated in the study and completed all the assessment instruments. Prior to the start of the research study, a letter of introduction was sent to University supervisors asking for their support in encouraging their respective preservice teachers to participate in the survey. There were varying numbers of preservice teachers who completed each of three data collection instruments used.

The assessment instruments included the *Select Project Skills Survey Items (SPSSI),* the *LoTi Digital Age Survey (LoTiP and LoTiM)* and the *Preservice Teacher Technology Journal Entries (PTTJE).* Forty-six mentor teachers completed the *LoTiM*. Twenty-nine preservice teachers completed the *SPSSI*, 21 preservice teachers completed the *PTTJE*, and 33 preservice teachers completed the *LoTiP*. Twenty-one preservice teachers completed all three assessments, the *SPSSI,* the *PTTJE,* and the *LoTiP*. Stipends, in the form of a gift card, were offered for the completion of each assessment instrument. Those preservice teachers, who completed all five assessment instruments, received five stipends. E-mail requests and reminders were sent to all the mentor and preservice teachers a minimum of three times for each of their respective assessment implementations. Table 1 provides a summary of the research instruments, time for completion of the instruments and the number of respondents for each instrument.

Table 1

Research Instruments Implemented

Survey Instruments	Completers N	Sample N	Responders	Timeline for Completion
LoTi Digital Age Survey (LoTiM)	46	46	Mentor Teachers	Prior to the internship
Select Project Skills Survey Items Assessment (SPSSI)	29	35	Preservice Teachers	Prior to the internship
Preservice Teacher Technology Journal Entries (PTTJE).	21	35	Preservice Teachers	End of weeks 2, 4 and 6
LoTi Digital Age Survey (LoTiP)	35	35	Preservice Teachers	Conclusion of the internship

Note. Statement of overlap: Twenty-one preservice teachers completed all three assessments, the SPSSI, the PTTJE, and the LoTiP.

All 35 preservice teachers, who completed the *LoTiP*, completed their IBTE in grades P-12 classrooms. Of the 35 preservice teachers, 33 (94%) were under the age of 30, one (3%) was between 31-40 years of age, and one (3%) was between 41 and 50 years of age. Thirty-three (94%) of the preservice teachers were female and two (6%)

were male. Thirty two preservice teachers (91%) were in bachelor's degree programs, while three (9%) were completing master's degree programs.

Of the 35 preservice teachers, 31 (89%) were placed in elementary school settings, one (3%) in a middle school, and three (8%) in high school settings. Thirty-one (88%) of the preservice elementary school teachers were classroom generalists, certified to teach across the curriculum. All four (11%) secondary preservice teachers' specialty areas were in mathematics. No special education or special area teachers were in the sample. Thirty-four (97%) of the preservice teachers had no previous teaching experience, and one (3%) preservice teacher had five or more years of teaching experience.

Thirty-two (91%) of the preservice teachers identified themselves as daily computer users, while three (9%) preservice teachers indicated using the computer a few times per week. Thirty-one (88%) of the preservice teachers indicated having taken technology integration University coursework. Two (6%) of the preservice teachers identified their instructional style as behaviorist, zero (0%) identified their instructional style as constructivist, and 33 (94%) as other.

In summary, the data indicate the following profile of the preservice teachers: 31 (89%) were placed in elementary school settings; 34 (97%) had no previous teaching experience; and 32 (91%) were daily computer users. Table 2 summarizes the profile data for the preservice teachers/participants.

Table 2

Preservice Teachers Descriptive Data

Parameter	Preservice Teacher Responses	N
Age	<30 (94%)	33
	31-40 (3%)	1
	41-50 (3%)	1
Gender	Male (6%)	2
	Female (94%)	33
Education	Bachelor’s candidate (91%)	32
	Master’s candidate (9%)	3
Setting	Elementary (88%)	31
	Middle (3%)	1
	High (9%)	3
Subject area	Elementary generalist	31
	Secondary math	4
Experience	None (97%)	34
	> Five years (3%)	1
Daily computer use	Daily computer use (91%)	32
	A few times per week (9%)	3
Technology integration coursework	Yes (88%)	31
	No (12%)	4
Instructional Style	Behaviorist (6%)	2
	Constructivist (0%)	1
	Other (94%)	33

Note. Source *LoTiP*

With regard to the 46 mentor teachers who completed the *LoTiP*, 21 (46%) were under the age of 30, 12 (26%) were between 31 and 40 years of age, six (13%) were between 41 and 50 years of age, and seven (15%) over the age of 50. Thirty-nine (87%) of the mentor teachers were female and six (13%) were male.

Eleven (24%) mentor teachers highest level of education was a bachelor's degree, 33 (72%) mentor teachers highest level of education was master's degree, and two (4%) indicated their highest level of education was an educational specialist degree. Of the 46 mentor teachers, 34 (89%) held positions in elementary school settings, three (7%) in middle school settings, six (14%) in high school settings, and one (2%) at all grade levels. Twenty (43%) of the mentor teachers were classroom generalists (multiple subjects), certified to teach across the curriculum. Twelve (11%) mentor teachers' specialty areas were in mathematics, one (2%) in the sciences, and 13 (28%) identified themselves as other (elementary or special area teachers).

Five (11%) of the mentor teachers had one to five years of previous teaching experience, and 21 (3%) mentor teachers had five to nine years of teaching experience, 12 mentors (26%) had 10 to 20 years of teaching experience, and eight (17%) mentors had more than 20 years of experience.

Forty-two (91%) of the mentor teachers identified themselves as daily computer users (in relation to their job as an educator), while three (7%) mentor teachers indicated using the computer a few times per week, and one (2%) mentor teacher indicated using a computer a few times per month.

The mentors also rated their respective students' use of computers. Twenty-one (46%) mentors indicated that their students used computers on a daily basis, 11 (24%)

indicated their students used computers a few times per week, 10 (22%) indicated their students used computers a few times per month, and four (9%) indicated that their students used computers a few times per year.

Twenty-nine (63%) of the mentor teachers indicated having taken technology integration University coursework. Over the course of the last five years, 12 (26%) of the mentors received more than 30 hours of technology training, six (13%) received from 21 to 30 hours of technology training, 17 (37%) received 11 to 20 hours of technology training, and 11 (24%) received less than 10 hours of technology training.

In rating the content of the technology training received over the last five years, 20 (66%) mentor teachers classified the content as a combination of technology skills and curriculum integration training. Twelve (12%) mentors classified the training as mostly curriculum integration training, and three (7%) mentors classified the training received as mostly technology skills training.

Forty-five (98%) of the mentor teachers participated in, either formal or informal, technology sharing sessions over the past five years. When rating technology integration importance, 30 (67%) of the mentor teachers rated it as very important, 14 (31%) rated technology integration as important, one (2%) preservice teacher rated technology integration as marginally important, and zero (0%) rated technology integration as not important.

Ten (22%) of the mentors identified their instructional style as behaviorist. None of the mentors (0%) identified their instructional style as constructivist, and 36 (78%) identified their instructional style as other, indicating a combination of behaviorist and constructivist instructional styles.

Collectively, this descriptive mentor teacher data portrays a group of highly educated mentor teachers (78% with master's degrees) who use varied instructional styles (78%). These same mentor teachers acknowledged the significance of technology integration as either important or very important (98%). Only 26% had received more than 30 formal hours of technology training over the past five years, but 98% participated in technology sharing sessions. These data indicate mentor teachers who were receptive to technology integration in their classrooms. Thirty-one percent of the students in the mentors' classrooms used computers a few times a month or less. Table 3 summarizes the profile data for the mentor teachers.

Research Questions

Using a mixed-methods approach, this study examined technology integration in IBTE, with particular emphasis on the preservice teacher and mentor teacher relationship. The following questions were used to guide this research study:

1. Is there a relationship between preservice teacher predispositions towards technology integration and the level in which preservice teachers integrate technology in internship-based teaching experiences?
2. Is there a relationship between mentor teacher predispositions towards technology integration and the level in which preservice teachers integrate technology in internship-based teaching experiences?
3. Is there a relationship between technology integration variables/barriers and the level in which preservice teachers integrate technology in internship-based teaching experiences?

Table 3

Mentor Teachers Descriptive Data

Parameter	Mentor Teacher Responses	N
Age	< 30 = (46%)	21
	31- 40 = (26%)	12
	41-50 = (13%)	6
	Over 50 = (15%)	7
Gender	Male = (13%)	6
	Female = (87%)	39
Education	Bachelors = (24%)	11
	Masters = (72%)	33
	Educational Specialist = (4%)	2
Setting	Elementary = (77%)	34
	Middle = (7%)	3
	High = (14%)	6
	All Grade Levels = (2%)	1
Subject area	Elementary or other = (28%)	13
	Secondary math = (26%)	12
	Sciences = (2%)	1
	Generalist = (43%)	20
Experience	Less than five years = (11%)	5
	Five to nine years = (46%)	21
	Ten to 20 years = (26%)	12
	More than 20 years = (17%)	8
Teacher daily computer use	Daily computer use = (91%)	42
	A few times per week = (9%)	3
	A few times per month = (2%)	1

Parameter	Mentor Teacher Responses	N
Student daily computer use	Daily computer use (46%)	21
	A few times per week (24%)	11
	A few times per month (22%)	10
	A few times per year (9%)	4
Technology coursework	Yes (63%)	29
	No (0%)	0
	Other (37%)	17
Technology Training (5 years)	Less than 10 hours (24%)	11
	11-20 hours (37%)	17
	21-30 hours (13%)	6
	More than 30 hours (26%)	12
Technology Training Content	No training (0%)	0
	Mostly technology skills training (7%)	3
	Mostly curriculum integration training (27%)	12
	Technology skills/ integration training (66%)	20
Technology Sharing Sessions	Yes (98%)	45
	No (2%)	1
Integration Importance	Not Important (0%)	0
	Marginally Important (2%)	1
	Important (31%)	14
	Very Important (67%)	30
Instructional Style	Behaviorist (22%)	10
	Constructivist (0%)	0
	Other (78%)	36

Note. Source *LoTiM*

3a. Is there a relationship between technology resources available and the level in which preservice teachers integrate technology in internship-based teaching experiences?

3b. Is there a relationship between other variables (e.g. time, emphasis on traditional teaching methods etc.) and the level in which preservice teachers integrate technology in internship-based teaching experiences?

Research Design

This study implemented a combination of qualitative and quantitative research methods. This mixed methods approach provides the strengths of qualitative and quantitative methodologies, while providing a stronger corroboration of research findings than the use of a single methodology (Johnson & Onwuegbuzie, 2004). The use of triangulation strategies can improve the reliability and validity of a research study and permits the strengths of each approach to complement one another (Creswell, 2003; Jaeager, 1997). The use of both quantitative and qualitative strategies in the same study is a viable option to obtain complementary findings and to strengthen research results. Thurmond (2001) noted that triangulation is intended to counterbalance deficiencies in one strategy. This research study was conducted using concurrent triangulation design. Creswell, Plano Clark, et al. (2003) indicated that concurrent triangulation design involves the concurrent, but separate collection and analysis of qualitative and quantitative data.

Instruments, Setting and Procedures

As previously noted, the setting for the study was a large mid Atlantic public school system. Data were collected while preservice teachers were participating in IBTE in P-12 classrooms. Each internship-based teaching experience involved a 6-8 week, full-time placement under the supervision of a mentor teacher. The schools involved in the study were Professional Development Schools (PDS). A PDS is a collaboratively planned partnership between a local school system and a University; PDS partnerships are designed for the academic and clinical preparation of interns under the guidance of a mentor classroom teacher and a University faculty member (Towson University, 2012).

The research study began in February, 2011 and concluded in May, 2011. All participants were provided with an overview of the research study, were notified that the results of all data collected would remain confidential, and were informed of all the data collection instruments (i.e. *SPSSI, PTTJE, LoTiP and LoTiM*). Participants were informed that participation was voluntary, and all the participants were asked to sign a consent form. The study adhered to the IRB policies of Towson University and the local public school system. Copies of approval notices from the Institutional Review Boards of both institutions are located in Appendix A.

Instruments

Data were collected using three instruments: the *Select Project Skills Survey Items (SPSSI),* the *LoTi Digital Age Survey (LoTiP and LoTiM)* and the *Preservice Teacher Technology Journal Entries (PTTJE).* Table 4 provides a summary of the validity, reliability, and timeline for the assessment instruments. Each instrument is described in the following section.

Table 4

Research Instruments Reliability, Validity and Timeline

Survey Instrument	Validity	Reliability Cronbach's α	N	Responders	Timeline for Completion
LoTi Digital Age Survey (LoTiM)	r = 0.7427	.912	46	Mentor teachers	Prior to the internship
Select Project Skills Survey Items Assessment (SPSSI)	Expert analysis	.929	29	Preservice teachers	Prior to the internship
Preservice Teacher Technology Journal Entries (PTTJE).	Expert analysis and Pilot Study	NA	21	Preservice teachers	End of weeks 2,4 and 6
LoTi Digital Age Survey (LoTiP)	r = 0.7427	.922	35	Preservice teachers	Conclusion of the internship

Select Project Skills Survey Items assessment

Preservice teachers completed the *Select Project Skills Survey Items (SPSSI)* prior to their IBTE. Stipends of $5.00, in the form of a gift card, were offered to all the preservice teachers who completed the *SPSSI.* Wizer, Sadera, and Banerjee (2005) designed the *SPSSI* as an assessment tool for the *Mentoring to Master Technology Integration Project*. This *SPSSI* was used to measure technology integration in teacher preparation courses and in Towson University PDS. The *SPSSI* was also used to measure the technology integration competencies of Towson University preservice teachers upon completion of a technology integration course.

The *SPSSI* was based on Moersch's (1995) *LoTi* survey, which in its original form, measured teacher technology integration competencies. The *SPSSI* adapted Moersch's *LoTi* criteria to a Likert-type scale questionnaire matching competencies taught in a Towson University technology integration course. Validation of the *SPSSI* was achieved via review by experts in the educational technology field. The Cronbach's Alpha for the 28 *SPSSI* items implemented in this study was .929. For the purposes of this study, the *SPSSI* was delivered in an online format via *Student Voice*, an online survey tool. Two items assessing proficiency in the use of wikis and blogs were added to the *SPSSI* for the purposes of this study. The newly revised items were validated through a Pilot Study conducted in the fall, 2010. Participants were required to rate their proficiency on 28 technology integration competencies using the following Likert-type Scale:

1. Nonuse - I am not familiar and do not use
2. Awareness - I have a basic awareness, but am not comfortable using
3. Exploration - I occasionally use or am somewhat comfortable and can do basic tasks
4. Infusion - - I am comfortable and use often
5. Integration - I am proficient and use as a regular part of my work
6. Expansion - I am very confident and am able to occasionally adapt the technology to fit my needs

7. Refinement - I am completely confident and frequently adapt the technology to fit my needs

Figure 1 provides examples of items from the *SPSSI*. The full *SPSSI* can be found in Appendix B.

The LoTi digital age survey.

The mentor teachers completed the *LoTi Digital Age Survey* (*LoTiM*) prior to the beginning of the IBTE. The preservice teachers completed the *LoTi Digital Age Survey* (*LoTiP*) upon the conclusion of their IBTE. Stipends of $5.00, in the form of a gift card, were offered to all mentor and preservice teachers who completed the *LoTi Digital Age Survey*. The *LoTi Digital Age Survey* is a descendant of the original *LoTi Survey*. Moersch developed the original version of the *LoTi Survey* in 1995. This original survey was based on the *ACOT Model*. It consisted of 50 questions focused on eight technology implementation levels ranging from non-use (level 0) to refinement (level 6) (Moersch, 1995).

Several iterations of the original *LoTi* instrument resulted in the 2009 release of the *LoTi Digital-Age Survey* which provides an empirically-validated tool that is aligned with the National Educational Technology Standards (NETS for Teachers - NETS-T). This newer *LoTi Digital Age Survey*, like its predecessor, is focused on measuring technology integration in purposeful, authentic problem-solving environments. The *LoTi Digital Age Survey* yields a Level of Teaching Innovation (*LoTi*) score, Current Instructional Practices (*CIP*) score, and Personal Computer Use (*PCU*) score. The *LoTi Digital Age Survey* is a 37 question assessment tool that has maintained a constant scoring algorithm for the *LoTi*, *CIP*, and *PCU* (Moersch, 2009).

Please rate your current level of proficiency with the following:

Nonuse - I am not familiar and do not use

Awareness - I have a basic awareness, but am not comfortable using

Exploration - I occasionally use or am somewhat comfortable and can do basic tasks

Infusion - I am comfortable and use often

Integration - I am proficient and use as a regular part of my work

Expansion - I am very confident and am able to occasionally adapt the technology to fit my needs

Refinement - I am completely confident and frequently adapt the technology to fit my needs

		1	2	3	4	5	6
E-mail	○	○	○	○	○	○	○
Spreadsheets	○	○	○	○	○	○	○
Online databases for research	○	○	○	○	○	○	○

*Figure 1.*Sample *SPSSI* Survey Items

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There is one key contextual difference between the new *LoTi Digital Age Survey* and prior versions of the *LoTi Survey*; the emphasis of the *LoTi Digital Age Survey* is focused on the P-12 students' use of technology. The original 1995 version of the *LoTi Survey* was focused on the classroom teacher's use of technology

The new *LoTi Digital Age Survey* determines a *LoTi* score based on eight levels of technology implementation established in 1995. The *LoTi* levels include: level 0 (non-use), level 1 (awareness), level 2 (exploration), level (infusion), and level 4a (integration - mechanical), level 4b (integration-routine), level 5 (expansion), and level 6 (refinement).

The *LoTi Digital Age Survey* calculates the *LoTi* scale results based on a participant's response to 37 questions that address student use of classroom technology. The *LoTi Digital Age Survey* also includes ten standard demographic questions; eight additional demographic questions were added to the *LoTi Digital Age Survey* for use in this research study. Demographic information collected about the preservice and mentor teachers from the *LoTi Digital Age Survey* included: subject area taught, grade level, years of experience, importance of technology integration, instructional style, and greatest obstacles to technology integration. Figure 2 provides examples of questions from the *LoTi Digital Age Survey.* A copy of the full *LoTi Digital Age Survey* administered in this study can be found in Appendix C.

The *LoTi Survey* has proven to be a valid and reliable assessment tool for assessing classroom technology implementation. Content validity for the original *LoTi Survey* was established through a representative item sampling of the survey's different content domains. Stoltzfus (2009) completed a criterion related validation of the *LoTi Digital Age Survey* of the core *LoTi* levels determining the construct validity and reliability. The criterion related validation compared the *LoTi Digital Age Survey* items to items on another similar assessment, the *Texas School Technology and Readiness*

(STaR) assessment. The Cronbach's Alpha for the *LoTiM* and *LoTiP* used in this research study were .912 and .922 respectively.

1: 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.

0	1	2	3	4	5	6	7
Never	At least once a year	At least once a semester	At least once a month	A few times a month	At least once a week	A few times a week	At least once a day

2: Students in my classroom use the digital tools and resources to create web-based (e.g., web posters, student blogs or wikis, basic webpage) 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.

0	1	2	3	4	5	6	7
Never	At least once a year	At least once a semester	At least once a month	A few times a month	At least once a week	A few times a week	At least once a day

Figure 2. Sample LoTi Digital Age Survey Items

Preservice Teacher Technology Journal Entries.

The preservice teachers were also asked to respond to a series of three online journal prompts as part of the *PTTJE*. The *PTTJE* is a qualitative journaling instrument designed to capture data at three points during the IBTE. This online instrument was completed by the preservice teachers at two week intervals during the IBTE. An additional stipend of $10.00 was offered to all preservice teachers who completed the qualitative survey instruments.

The *PTTJE* included the following open-ended writing prompts:

- What teaching resources, specifically technology resources, have you found helpful in meeting the instructional needs of your students?
- Describe how access to technology resources might have contributed to, or inhibited student learning.
- If you did not utilize technology resources during this past journal period, briefly explain the circumstances.

Given the complexities of P-12 classrooms, the open-ended journal prompts permitted collecting data unique to each internship environment. This type of data, via journals, cannot be reached using quantitative instruments. Given (2008) noted that journals provide one of the most effective tools for documenting participant experiences. While journal entries can be unstructured, researchers may provide guiding questions so that participants write more specifically about events related to the research problem.

Data Collection and Analysis

This research study utilized concurrent triangulation methodology for data analysis. This method was selected to cross-validate the data findings using both quantitative and qualitative data. Creswell and Plano-Clark (2007) noted that concurrent triangulation methodology is used to validate quantitative results with qualitative data. The concurrent triangulation design occurs in phase one of the research design. Researchers implement the quantitative and qualitative methods during this same time frame providing a process that reduces bias and combines the strengths of quantitative and qualitative methods (Creswell & Plano-Clark, 2007; Patton, 1990; Wetzel, 2001).

The use of quantitative and qualitative methods better captures the complexities of P-12 classrooms than the use of a single methodology. Triangulation design is a one-phase design in which concurrent and separate data collection analyses are used to best understand a research problem (Creswell, 2003; Morse, 1991). Concurrent triangulation permits the modification and expansion of the research design and data collection methods. Ultimately, the researcher merges the separate data sets in an effort to analyze the problem being studied. Quantitative data analysis was primarily used in analyzing research questions 1 and 2, while a mixed methods approach was used in analyzing questions 3a and 3b. The following sections describe the data analysis methodology for each research question.

Research question 1

Is there a relationship between preservice teacher predispositions towards technology integration and the level in which preservice teachers integrate technology in internship-based teaching experiences?

Quantitative data were collected from the *SPSSI* (administered to the preservice teachers), and the *LoTiP and LoTiM* (administered separately to both the preservice and mentor teachers). The statistical package, *SPSS*, was used to conduct statistical analysis for each research question using data from the *SPSSI*, *LoTiP* and/or *LoTiM*.

The quantitative analysis, for research question 1, involved two processes. Process one involved using *SPSS* to conduct a correlation analysis between the overall *SPSSI* technology competencies and related *LoTiP* competencies. This analysis was conducted to determine if a relationship existed between the overall preservice teacher predispositions towards technology integration and the overall level in which preservice teachers' integrated technology in the IBTE. A scatter plot graph for each correlation was produced and analyzed to see if the graphic view of the related competency scores was consistent with the correlation coefficient. A descriptive analysis of the frequencies of responses was also conducted to determine if any relationships existed not evident in the correlation analysis, and the scatter plot graph.

Process two involved using *SPSS* to conduct a correlation analysis between individual *SPSSI* technology competencies and related *LoTiP* competencies. This analysis was conducted to determine if a relationship existed between the individual preservice teacher predispositions towards technology integration and the overall level in which preservice teachers' integrated technology in the IBTE. A scatter plot graph for the correlation data was produced and analyzed to see if the graphic view of the related competency scores was consistent with the correlation coefficient. A descriptive analysis of the frequencies of responses was also conducted to determine if any relationships existed not evident in the correlation analysis, and the scatter plot graph.

Research question 2

Is there a relationship between mentor teacher predispositions towards technology integration and the level in which preservice teachers integrate technology in internship-based teaching experiences?

The quantitative analysis for research question 2 involved two processes. Process one involved using *SPSS* to conduct a correlation coefficient analysis between the overall *LoTiM* score and related overall *LoTiP score.* This analysis was conducted to determine if a relationship existed between the overall mentor teacher predispositions towards technology integration and the overall level in which preservice teachers' integrated technology in the IBTE. A scatter plot graph for the correlation coefficient was produced and analyzed to see if the graphic representation of the overall *LoTiP* and overall *LoTiM* scores was consistent with the correlation coefficient.

Process two involved determining if a relationship existed between the individual mentor teacher technology predispositions (as measured by 37 individual competencies via the *LoTiM*) and the level in which preservice teachers' integrated technology in IBTE for those same respective 37 competencies (as measured by the *LoTiP*). Correlation coefficient analyses were conducted between the mentor teacher and preservice teachers' responses for each of the *LoTi Digital Age Survey* competencies. This analysis was completed to determine if there was a relationship between the mentor and preservice teacher competencies for each of the items. A scatter plot graph for each correlation was produced and analyzed to see if the graphic view of the data was consistent with the correlation coefficient. The frequencies of responses for each of the *LoTiM* technology competencies and related *LoTiP* competencies was determined to see if any relationships existed not evident in the correlation analysis, and the scatter plot graph.

Research question 3

Is there a relationship between technology integration variables/barriers and the level in which preservice teachers integrate technology in internship-based teaching experiences?

Research question three addressed factors, other than the technology integration dispositions of the preservice and mentor teachers, identified as the greatest obstacles to technology integration in teaching environments. Those variables included: access to technology resources, time to learn (including training) and practice new technology resources, and competing priorities in the classroom (Bartlett, 2002; Brush et al., 2003; NCES, 2007; Russell et al., 2003). To account for the complexity of these barriers to technology integration, research question three was subdivided into the following two sub-research questions.

Research question 3a data collection and analysis.

3a. Is there a relationship between technology resources available and the level in which preservice teachers integrate technology in internship-based teaching experiences?

Quantitative analysis.

The quantitative analysis for research question 3a involved using *SPSS* to conduct a descriptive analysis of *LoTiM* and *LoTiP* items related to the availability of resources. Several *LoTiP* and *LoTiM* demographic questions and survey items served as data points for question 3a. The *LoTiP* survey prompted preservice teachers to list the three greatest obstacles to technology integration in their internship-based teaching based on the aforementioned four research-driven variables. It was originally intended to have the preservice teachers rank their obstacles to technology integration for a potential multiple regression analysis. This process was amended due to an unanticipated issue caused by adding additional demographic questions to the *LoTiP*. The addition of the demographic questions regarding obstacles to technology integration resulted in the preservice teachers being given an additional opportunity to list their greatest obstacles to technology integration. Upon review of the data, it was apparent that the preservice teachers multiple responses provided an aggregate accounting of their obstacles to technology integration. These aggregate data were analyzed to provide a listing of all possible barriers to integration. *SPSS* was used to aggregate the responses to provide a profile of all the barriers encountered in the IBTE including access to resources.

Qualitative analysis.

Qualitative data for research question 3a were obtained through the *PTTJE* journal entries. The *PTTJE* journal entries were collected online. The preservice teachers were contacted via e-mail reminders at each implementation of the *PTTJE*. The e-mail message reminders were distributed three times, per journal cycle, to each preservice teacher.

All qualitative data collected were coded by the researcher and then separately by two graduate assistants. The data were coded based on themes determined by each coder. Using multiple coders to obtain intercoder agreement in qualitative inquiry can improve the reliability of qualitative data (Lombard, Snyder-Duch, and Bracken, 2002). The intercoder analysis was completed for each of the three *PTTJE* prompts. The merging of the three coding themes revealed accord among the coders across several categories/themes.

The process for coding the *PTTJE* related to journal prompt one is presented as an illustrative example of the intercoding process. *PTTJE* journal prompt one queried the preservice teachers to identify the teaching resources**,** specifically technology resources, they found helpful in meeting the instructional needs of their PreK-12 students in IBTE. Each of the three coders used a word processing-based, color coding scheme to identify/code entries related to resources found helpful in meeting the instructional needs of students. One consensus theme related to journal prompt one was the use of Promethean/whiteboards in the IBTE. Coder one identified 15 (71%) entries citing instances of the use of Promethean/whiteboards among the 21 preservice teachers' responses, coder two identified 14 (66%) entries, and coder three identified 16 (76%) entries. Intercoder agreement on the use of Promethean/whiteboards by the three coders was revealed in 11 (52%) of the *PTTJE* entries.

The use of *ActivInspire* software was identified by each of the coders in 3 (14%) of the journal entries. The intercoder consensus for the use of educational websites for students and teachers was noted in 8 (38%) journal entries; the intercoder consensus for the use of the *BrianPop* website was noted in 5(23%) journal entries. The coding process was replicated for *PTTJE* prompt two and three. Tables 5, 6, and 7 list the respective PTTJE prompts, consensus themes/categories identified by the coders, the respective N for journal entries identified by each coder, and the intercoder consensus N for each consensus theme.

Themes and categories were determined while examining the qualitative data in relation to the technology integration barriers identified in the literature. The resulting thematic data were then merged into consensus themes and categories. The categories were then correlated with the research question. A *Master Content Coding (MCC)* scheme was used for the qualitative data in which the research instrument, categories, and themes were assigned a code. This process was based on a variation of a coding theme by Barkin, Ryan, and Gelberg (1999) in which data are converted into pile sort data and then into a quote-by-quote similarity matrix. The *MCC* was subdivided by research questions 3a and 3b (i.e. there was one *MCC* produced for each research question 3, subquestion). An abbreviation code was assigned to each point in the content code. For example the *MCC* abbreviation code of Q3aJS represents: question three (Q3a), journal entries (J), and Smartboards (S).

Table 5

PTTJE Intercoder Consensus. Data- PTTJE Prompt 1: What teaching resources, specifically technology resources, have you found helpful in meeting the instructional needs of your students?

PTTJE Prompt 1 - Themes and Categories of Responses	PTTJE N	Coder 1	Coder 2	Coder 3	Intercoder Consensus
Whiteboard/Promethean Board and related software	21	15 (71%)	14 (66%)	16 (76%)	11 (52%)
Students using ActivInspire software	21	3 (14%)	3 (14%)	3 (14%)	3 (14%)
Educational Websites for Teachers and Students Internet websites/ Safari Montage	21	12 (58%)	9 (43%)	12 (57%)	8 (38%)
BrainPop	21	5 (23%)	5 (23%)	5 (23%)	5 (23%)
Document Cameras/ELMO	21	10 (48%)	11 (52%)	11 (52%)	9 (43%)
PowerPoint	21	1 (4%)	3 (14%)	1 (4%)	1 (4%)

Table 6

PTTJE Intercoder Consensus. Data- PTTJE Prompt 2: Describe how access to technology resources might have contributed to, or inhibited student learning.

PTTJE Prompt 2 - Themes and Categories of Responses	PTTJE N	Coder 1	Coder 2	Coder 3	Intercoder Consensus
Help/Increase/ Expand student achievement/Contributing	21	12 (58%)	9 (43%)	17 (81%)	11 (52%)
Engaging/ Engages	21	10 (48%)	9 (43%)	8 (38%)	8 (38%)
Motivational/ Motivates	21	9 (43%)	8 (38%)	7 (33%)	7 (33%)
Inhibiting	21	4 (19%)	3 (14%)	4 (19%)	4 (19%)

Table 7

PTTJE Intercoder Consensus Data- PTTJE Prompt 3: If you did not utilize technology resources during this past journal period, briefly explain the circumstances.

PTTJE Prompt 3 - Themes and Categories of Responses	PTTJE N	Coder 1	Coder 2	Coder 3	Intercoder Consensus
Desire for More Technology	21	2 (9%)	2 (9%)	3 (14%)	2 (9%)
Lack of Resources	21	2 (9%)	2 (9%)	2 (9%)	2 (9%)

Table 8 illustrates a sample from the *Master Content Coding (MC*C) scheme used for research question 3a. The *MCC* delineates the *PTTJE* qualitative data by research question, research instrument, theme, and an assigned code. The full *MCC* can be found in Appendix D.

Table 8

Sample Master Content Code

Research Question	Research Instrument	Themes	Content Code
(Q3a) The relationship between technology resources available and the level in which preservice teachers integrate technology in IBTE?	(J) Journal Entries	(S) Smartboard/Promethean Board Use	Q3aJCS
		(A)ActivInspire	Q3aJCA
		(EL) ELMO (Document Camera)	Q3aJCE
		(WS) Websites for Students	Q3aJCWS
		(WT) Websites for Teachers	Q3aJCWT
		(WI) Wiki	Q3aJCW
		(G) General Contributions	Q3aJCG
		(L) General Limitations	Q3aJLGL

Note. Within the first table entry, Q3a = the research question correlated with the data, (J) = the research instrument (*PTTJE*) used to collect the data, and (S) = the specific theme (Smartboard) identified by the researcher. The content code (e.g. Q3JCS) = a combination of the abbreviations for each heading in the *MCC*.

Building on the *MCC*, journal responses were then organized into a *Research Question Responses Database* (*RQR*) by adding the categories associated with the themes determined by the researcher. This categorization of the qualitative data within the *RQR* permitted the researcher to analyze the preservice teachers' responses that were related to the technology integration themes and trends identified by the participants.

The *RQR* includes: a unique identifier for each response; the *MCC* scheme determined for each response; the preservice teacher's responses from the *PTTJE*; and the categories and themes assigned to each respective preservice teacher response. A portion of the *RQR* classification for question 3 is represented in table 9. The full *RQR* can be found in Appendix E.

Table 9

Sample Research Question Responses Database (RQR)

Research Question (RQ)	Master Content Code (MCC)	Participant (P)	Preservice Teacher Responses (PR)	Categories	Themes
3a	Q3aJCS	1	ActivInspire on the Smartboard, ELMO, Brain Pop Jr!, Safari Montage, (Internet source)	(C) Contributing Resources	(S) Smartboard/ Promethean Board Use
3b	Q3bJLGL	5	In my placement this semester, the only technology I have is an overhead projector and a computer which is connected to the TV.	(L) Limitations	(GL) General Limitations

Note. Within the first table entry, Q3a = the research question correlated with the data, (J) represents the research instrument (*PTTJE*) used to collect the data, C = the category correlated with the guiding question, and (S) = the specific theme (Smartboard) identified by the researcher. The content code (e.g. Q3aJCS) = a combination of the abbreviations for each heading in the *MCC*.

Triangulation of data.

Data triangulation worksheets were used to analyze the qualitative and quantitative data for research question 3a. The *Decision Making Matrix* (*DMM*) was included in the data triangulation worksheets to analyze the *LoTiM*, *LoTiP*, and *PTTJE* data. Applicable data from the *LoTiM* and *LoTiP*, *PTTJE* were posted in the worksheets. Figure 3 contains a sample of the *DMM* for research question 3a. The full *DMM* for research question 3a can be found in Appendix F.

Research question 3b data collection and analysis.

3b. Is there a relationship between other variables (e.g. time, emphasis on traditional teaching methods etc.) and the level in which preservice teachers integrate technology in internship-based teaching experiences?

Quantitative analysis.

The quantitative analysis for research question 3b involved using *SPSS* to conduct a descriptive analysis of *LoTiP* items related to other technology integration variables. The *LoTiP* survey prompted the preservice teachers to rank their greatest obstacles to technology integration in their IBTE. Several *LoTiP* demographic questions and survey items served as data points for question 3b (other variables related to technology integration). The selection criteria were based on other barriers to technology integration including time to learn, practice, and plan; other priorities; and lack of staff development opportunities. As outlined in research question 3a, *SPSS* was used to aggregate the responses to provide a profile of the barriers encountered in the IBTE including access to resources.

Qualitative analysis.

The *PTTJE* survey data was also used to analyze question 3b. One of the open-ended *PTTJE* prompts was directly related to research question 3b. This journal prompt provided an opportunity for the preservice teachers to reflect on how access to technology resources might have contributed to, or inhibited student learning.

Greatest obstacles to technology integration

Criteria	N
Access to technology	29 (24%)
Time to learn, practice, and plan	32 (27%)
Other priorities (e.g., statewide testing, new textbook adoptions)	30 (26%)
Lack of staff development opportunities	26 (21%)

Computers in the preservice classrooms

Criteria	N
More than five computers	2 (6%)
Three to five computers	17 (45%)
One to two computers	14 (40%)
Zero computers	2 (6%)

Summary of *PTTJE* Data
MCC for contributing resources

Category	Themes	N (use)
(C) Contributing Resources	(S) Smartboard/Promethean Board use	11 (52%)
	(A)ActiveInspire	3 (14%)
	(EL) ELMO (Document Camera)	9 (43%)
	(WS) Websites for students	8 (38%)
	(WT) Websites for teachers	8 (38%)
	(WI) Wiki	1 (4%)
	(P) *PowerPoint*	1 (4%)
	(S) *Safari Montage* (Multimedia Database)	4 (19%)
	(C) Computers /Laptops/IPods(general)	4 (19%)
	(V) Video, Audio, and Images File	1 (4%)
	(G) General Contributions	

LoTiP Data - The data presents a mixed picture. Twenty-four percent of the preservice teachers' responses indicated (via LoTiP) access to technology as a barrier to technology integration in IBTE. Ninety- four percent of the preservice classrooms had one or more computer in the classroom; two (6%) of the preservice classrooms had no computers available.

PTTJE Data - Eleven (52%) of the preservice teachers indicated using Promethean boards. Other technology resources used by greater than 30% of the preservice teachers included: ELMO *document cameras (43%), Websites for students (38%), and websites for teachers (38%).*

Conclusions – While not systemic, three (14%) of the preservice teachers noted limited access to resources as a barrier (via the PTJJE); two of the three preservice teachers noted a lack of resources in their classroom, while the other noted problems with the technology not working in their classroom. Eight (23%) noted limited access to resources (via the LoTiP). Two preservice teachers noted (via the LoTiP) not having any computers in their teaching environment; the remaining 33 preservice teachers expressed varying access. Access to subscription web-based digital media was provided for student classroom use and as resources for preservice teachers lesson planning. The primary focus of the journal entries related to access to technology in the preservice placements *was positively focused on resources available. The LoTiP data provides confounding results in that access to resources was listed as a barrier to technology integration, in the IBTE (24%) of responses.*

Figure 3. Decision Making Matrix –Research Question 3a

Table 10 outlines an extension of the *MCC* to include categorization and assignment of themes in the *MCC* for responses related to question 3b. The full Master Content Code (*MCC*) can be found in Appendix D.

Table 10

MCC Categories and Themes for Other Variables Affecting Technology Integration

Categories	Themes
(L) Limitations	(GL) General Limitations
(E) Effect on Integration	(H) Help / increase / expand student learning
	(E) Engaging
	(M) Motivating
	(I) Inhibiting
	(D) Distracting
	(U) Used properly / correctly
	(O) Overwhelming- too much information

Triangulation of data.

Data triangulation worksheets were again used to analyze the qualitative and quantitative data for research question 3b. The *Decision Making Matrix* (*DMM*) was included in the data triangulation worksheets to analyze the *LoTiP and PTTJE* data. Applicable data from *the LoTiM and PTTJE* was posted in the worksheets. Figure 4 contains the *DMM* for question 3b. The full *DMM* can be found in Appendix F.

Greatest obstacles to technology integration

Criteria	N
Access to technology	29 (24%)
Time to learn, practice, and plan	32 (27%)
Other priorities (e.g., statewide testing, new textbook adoptions)	30 (26%)
Lack of staff development opportunities	26 (21%)

Summary of the *PTTJE* Data

Categories	Themes	N
(L) Limitations	(GL) General Limitations	
(E) Effect on Integration	(H) Help / increase / expand student learning (52%)	11 (52%)
	(E) Engaging	8 (38%)
	(M) Motivating	7 (33%)
	(I) Inhibiting	4 (19%)
	(D) Distracting	4 (19%)
	(U) Used properly / correctly	1 (4%)
	(O) Overwhelming- too much information	3 (14%)

Data Summary –
LoTiP Data - LoTiP Data - Twenty-four percent of the preservice teachers' responses noted access to technology as a primary barrier to technology integration. The remaining research proven variables of time to learn, practice, and plan (27%); other priorities (26%), and lack of staff development opportunities (21%) were also relatively ranked as an obstacle by the 35 preservice teachers who completed the LoTiP survey.

PTTJE Data - Preservice teachers responses to this journal prompt were largely focused on descriptors related to the effect on technology integration. Non-thematic or general concerns by individual preservice teachers included: students needed a computer class as they lacked the basic computer skills which got in the way of learning; technology can be restricting if used incorrectly; students can be inhibited if tech is overused; technology can't be exclusive of processes; technology provides opportunities for cheating; hardware is unreliable, and sources on the Internet are not permanent.

Eleven (52%) of the preservice teachers cited ways in which technology was used to help and/or expand student learning. This included comments like, "the internet resources help students think beyond themselves," "technology helps students with different learning styles," and "resources help me develop more challenging lessons."

Eight (38%) of the preservice teachers cited ways in which the technology was engaging; seven (33%) cited ways in which the technology was motivating. Responses included, "the students want to pay attention because the technology is more fun than direct instruction," "technology engages and motivates students - they want to be the one who gets to press the buttons for Brain Pop or come up and write on the ELMO*," and "technology motivates students to participate in the lesson, this usually contributes to their learning."*

Four preservice teachers (19%) noted instances, in which technology was

inhibiting, particularly when the use of technology is not well-planned, over-used or not used properly, and when resources are not working or are temporarily unavailable (e.g. Internet connection is lost).   *Three (14%) students cited instances where the technology provides too much information, and gets in the way of learning.*
Conclusions - The preservice teachers' PTTJE responses were predominantly focused on themes related to how technology impacts student learning. Journal responses addressing research question 4 criteria (i.e. other variables in preservice teaching placements that affect the level in which preservice teachers integrate technology in IBTE) were focused on: expanding ways in which technology integration can make learning engaging, motivating, inhibiting and distracting. All four research proven variables were selected (via the LoTiP) by the preservice teachers as obstacles to technology integration in their IBTE. Twenty nine percent of the preservice teachers' responses noted access to technology as a primary barrier to technology integration. The remaining research proven variables of time to learn, practice, and plan (27%); other priorities (26%), and lack of staff development opportunities (21%) were also relatively ranked as the greatest obstacle by the 35 preservice teachers who completed the LoTiP survey. There was no mention, in the PTTJE, of several research documented factors affecting technology integration, most notably, time (to learning practice, and plan), other priorities (e.g. statewide testing), and lack of staff development opportunities

Figure 4. Decision Making Matrix Research Question 3b

Pilot Study

A pilot study was conducted, during the fall of 2010, implementing the research design and strategies outlined in this study. Eleven preservice teachers participated in the pilot study.

Once the data were collected, the quantitative data from the *SPSSI* and the *LoTi Digital Age Survey* were analyzed using *SPSS* statistical software. Based on this analysis, it was determined that the *LoTi Digital Age Survey* should be administered to mentor teachers, prior to the IBTE in the ensuing research study. Analysis of the *PTTJE* was conducted with the purpose of determining trends and common themes in the journal entries. The qualitative journal entries were then coded using a *Master Content Coding Scheme* into a *Guiding Questions Database*.

Based on this analysis, it was determined that a *Decision Making Matrix (DMM)* was also needed for the triangulation of the qualitative *PTTJE* journal entries with the *LoTiP* and *LoTiM* quantitative data in the ensuing research study. The qualitative and quantitative data were then triangulated using the *DMM*. The pilot study revealed that the *SPSSI, PTTJE, LoTiP* and *LoTiM* were appropriate assessment tools for the ensuing research study.

The preservice teachers were participating in internship-based experiences for two days per week, over fourteen weeks. Each participant signed a written consent form, and confidentiality was maintained in accordance with the University IRB guidelines.

Data were collected using the *SPSSI*, the *LoTi Digital Age Survey*, the *PTTJE* and a *Technology Checklist.* The *SPSSI* was administered online to the preservice teachers at the beginning of their internship placement. The preservice teachers completed the online *PTTJE* after weeks two, four and six of their internship placements. The preservice teachers completed the *LoTi Digital Age Survey* upon completion of the internships. University supervisors completed the *Technology Checklist* which provided an inventory of technology resources available in each respective internship environment. This process proved very time consuming for the University supervisors. The researcher determined that these data could be more easily obtained from the mentor teachers as they completed the demographic questions built into the *LoTi Digital Age Survey.*

Summary

A local school system's PreK-12 classrooms were the setting for this study. Twenty-nine preservice teachers and forty-six mentor teachers fully participated in this study by completing all the required assessments.

Using concurrent triangulation, a mixed-methods approach, this study examined variables affecting technology integration in PreK-12 internship-based environments. This approach minimizes threats to validity when quantitative and qualitative data are being concurrently collected and analyzed. A pilot study was conducted to check the efficacy of the research design and instruments used in this study, and to limits threats to internal validity.

Quantitative data were collected from the *LoTi Digital Age Survey* administered to the mentor teachers at the beginning of the internship experiences. The *SPSSI* was administered to the preservice teachers at the beginning of the internship experiences, and the *LoTiP* was administered to the preservice teachers upon completion of their internship experiences. The quantitative data were entered into the *SPSS* statistical software program for analysis.

Qualitative data were collected through the *PTTJE* assessment administered at three intervals during the internship placements. The qualitative data points were coded using the *MCC* and then entered into the *RQR*. The qualitative and quantitative data were then triangulated using the *DMM*. The *DMM* assisted the researcher in applying the triangulated data to each guiding research question. The researcher then was able to draw conclusions about factors affecting the levels of technology integration in the internship-based experiences addressed in this study.

Chapter IV. Analysis and Results

This research study examined technology integration in IBTE. Particular focus was placed on barriers to preservice teacher technology integration in IBTE. These barriers included: the technology dispositions of mentor teachers, access to technology resources, time to learn (including training) and practice new technology resources, and competing priorities in the classroom (Bartlett, 2002; Brush et al., 2003; NCES, 2007; Russell et al., 2003). To more specifically understand the intricacies of technology integration in IBTE, the following research questions guided this study:

1. Is there a relationship between preservice teacher predispositions towards technology integration and the level in which preservice teachers integrate technology in internship-based teaching experiences?
2. Is there a relationship between mentor teacher predispositions towards technology integration and the level in which preservice teachers integrate technology in internship-based teaching experiences?
3. Is there a relationship between technology integration variables/barriers and the level in which preservice teachers integrate technology in internship-based teaching experiences?

    3a. Is there a relationship between technology resources available and the level in which preservice teachers integrate technology in internship-based teaching experiences?

    3b. Is there a relationship between other variables (e.g. time, emphasis on traditional teaching methods etc.) and the level in which preservice teachers integrate technology in internship-based teaching experiences?

The purpose of this chapter is to present the results of four assessment instruments used to collect data in this study. Quantitative data and qualitative data were collected and triangulation strategies were utilized to improve the reliability and validity of this research study (Creswell, 2003). The following results include descriptive statistics about the research participants, followed by the data analysis which is organized by research question. This chapter consists of the following five sections: descriptive statistics, levels of technology implementation, research question one, research question two, research question three, and summary.

Descriptive Statistics

Descriptive statistics were collected from the *LoTi Digital Age Survey*. The survey was administered to the mentor teachers (*LoTiM*) at the beginning (in week one) of the internship-based experiences, and to the preservice teachers (*LoTiP*) upon conclusion of the internship-based experiences. The *LoTi Digital Age Survey* contained 37 items used to derive the level of technology implementation score for each respective user. An additional seventeen demographic items were included in the *LoTi Digital Age Survey* for the purpose of collecting descriptive demographic data about the research study participants.

As outlined in chapter 3, the descriptive data collected from the *LoTiM* provides a collective profile of the mentor teachers, while the *LoTiP* provides a collective profile of the preservice teachers. Additional descriptive preservice teacher information was collected using the *SPSSI* survey.

Preservice teacher technology skills, dispositions and competencies

The *SPSSI* survey instrument was used to have the preservice teachers self-score several categories of technology integration skills and competencies. These categories include: software and hardware technology integration competencies; basic web-based competencies; web 2.0 competencies; and technology integration strategies, skills and dispositions. Twenty-nine preservice teachers completed this survey instrument prior to their IBTE. The preservice teachers rated their integration level on 28 *SPSSI* technology integration competencies using the following levels of use: (a) nonuse, (b) awareness, (c) exploration, (d) infusion, (e) integration (f) expansion, and (g) refinement. Table 11 lists these levels of use, a description of each level, and the mean range for each level.

Table 11

SPSSI Levels of Use, Description and Range

Integration Rating	Description	Mean Range
Nonuse	I am not familiar and do not use	0-.99
Awareness	I have a basic awareness, but am not comfortable using	1.00-1.99
Exploration	I occasionally use or am somewhat comfortable and can do basic tasks	2.00-2.99
Infusion	I am comfortable and use often	3.00-3.99
Integration	I am proficient and use as a regular part of my work	4.00-4.99
Expansion	I am very confident and am able to occasionally adapt the technology to fit my needs	5.00-5.99
Refinement	I am completely confident and frequently adapt the technology to fit my needs	6.00-6.99

The following *SPSSI* data provide a profile of the preservice teachers' technology integration skills and competencies, delineated by: software and hardware technology integration competencies; basic web-based competencies; web 2.0 competencies; and technology integration strategies, skills and dispositions.

Software and hardware technology integration competencies.

The following software and hardware technology integration competencies were included in the *SPSSI:* word processing, assistive technologies, *PowerPoint*, *Inspiration*, computer hardware peripherals such as microphones and digital cameras, editing digital media and spreadsheets. The preservice teachers self-rated scores for these *SPSSI* software and hardware competencies varied over a mean range of 1.75 to 5.31, on a 7 point scale. On the high end of this range, integration with word processing scored at the mean *SPSSI* expansion level (5.31). On the low end of this range, were assistive technologies (1.75). The overall mean for software and hardware integration policies was 3.43.

Preservice teachers rated themselves at the integration level (4.79), noting their comfort with *PowerPoint*. The software application, *Inspiration* scored at the infusion level (3.06). The preservice teachers were also comfortable in using computer hardware peripherals such as microphones and digital cameras at the infusion level (3.90).

Less comfort was expressed by the preservice teachers in editing digital media (2.34), and in the use of spreadsheets (2.89). Table 12 provides a summary of the software and hardware competencies, respective mean scores and integration levels.

Table 12

SPSSI – Software and Hardware Technology Integration Competencies

Competencies	Mean	N	Integration Rating
Word processing	5.31	29	Expansion
PowerPoint	4.79	29	Integration
Inspiration	3.06	29	Infusion
Peripherals (cameras, microphones)	3.90	29	Infusion
Spreadsheets	2.89	29	Exploration
Editing digital media (audio and graphics)	2.34	29	Exploration
Assistive technologies	1.75	29	Awareness
Overall mean for Software and Hardware Technology Integration Competencies	3.43	29	Infusion

Note. Refinement (6.00-6.99) I am completely confident and frequently adapt the technology to fit my needs. Expansion (5.00-5.99) = I am very confident and am able to occasionally adapt the technology to fit my needs. Integration (4.00-4.99) = I am proficient and use as a regular part of my work. Infusion (3.00-3.99) = I am comfortable and use often. Exploration (2.00-2.99) = I occasionally use or am somewhat comfortable and can do basic tasks. Awareness (1.00-1.99) = I have a basic awareness, but I am not comfortable using. Nonuse (0.00-0.99) = I am not familiar and do not use.

Basic web-based tools and competencies.

A wide range of mean scores was also revealed in the preservice teachers' self-assessment of the following basic web-based tools and competencies: e-mail, Blackboard, online databases, and developing web pages. The preservice teachers were very comfortable in their use and adaptation of e-mail (5.51). The preservice teachers rated themselves proficient in the regular use of Blackboard (4.55).

The preservice teachers expressed comfort and frequent use of online data bases (3.76) and online digital media resources (3.24). The preservice teachers expressed little comfort in developing web pages (1.97). The lack of confidence in developing web pages may be related to advances in web 2.0 tools like wikis and blogs. The overall mean for basic web competencies was 3.80. Table 13 provides a summary of the *SPSSI* basic web-based competencies, respective mean scores, and integration levels.

Table 13

SPSSI - Basic Web-Based Competencies

Competencies	Mean	N	Integration Scale
E-mail	5.51	29	Expansion
Blackboard	4.55	29	Integration
Online databases	3.76	29	Infusion
Online digital media resources	3.24	29	Infusion
Web page development	1.97	29	Awareness
Overall mean for Basic Web-Based Competencies	3.80	29	Infusion

Note. Refinement (6.00-6.99) I am completely confident and frequently adapt the technology to fit my needs. Expansion (5.00-5.99) = I am very confident and am able to occasionally adapt the technology to fit my needs. Integration (4.00-4.99) = I am proficient and use as a regular part of my work. Infusion (3.00-3.99) = I am comfortable and use often. Exploration (2.00-2.99) = I occasionally use or am somewhat comfortable and can do basic tasks. Awareness (1.00-1.99) = I have a basic awareness, but I am not comfortable using. Nonuse (0.00-0.99) = I am not familiar and do not use.

Web2.0 competencies.

Three web 2.0 competencies were self-scored by the preservice teachers via the *SPSSI*. These web 2.0 competencies were online social networking, blogs and wikis. Among the web 2.0 competencies self- scored, online social networking received the highest integration rating (4.41). The preservice teachers indicated comfort and regular use of blogs (3.00), and indicated the occasional use of wikis (2.76). The overall mean for web 2.0 competencies was 3.38. Table 14 provides a summary of the *SPSSI* web 2.0 competencies, mean scores, and respective integration levels.

Table 14

SPSSI - Web2.0 Competencies

Competencies	Mean	N	Integration Scale
Online social networking	4.41	29	Integration
Blogs	3.00	29	Infusion
Wikis	2.76	29	Exploration
Overall mean for Web 2.0 Competencies	3.38	29	Infusion

Note. Refinement (6.00-6.99) I am completely confident and frequently adapt the technology to fit my needs. Expansion (5.00-5.99) = I am very confident and am able to occasionally adapt the technology to fit my needs. Integration (4.00-4.99) = I am proficient and use as a regular part of my work. Infusion (3.00-3.99) = I am comfortable and use often. Exploration (2.00-2.99) = I occasionally use or am somewhat comfortable and can do basic tasks. Awareness (1.00-1.99) = I have a basic awareness, but I am not comfortable using. Nonuse (0.00-0.99) = I am not familiar and do not use.

Technology integration strategies and dispositions.

The preservice teachers, via the *SPSSI,* self-scored the following technology integration skills, strategies and dispositions: awareness of how technology is used in your field of study; using technology to locate, evaluate, and collect information; proficiency in evaluating technology enhanced learning; knowledge in discussing diversity issues related to accessing and using technology; using help files; using a variety of media and formats, including telecommunications, to collaborate; collaborate in constructing technology-enhanced models; use technology resources to facilitate higher order and complex thinking skills; and evaluating digital media. The most confidence was expressed in awareness of how technology is used in your field of study (4.28) and using technology to locate, evaluate, and collect information (4.24). Evaluating technology enhanced learning (3.86); knowledge in discussing diversity issues related to accessing and using technology (3.31); using help files (3.24); and using a variety of media and formats, including telecommunications to collaborate (3.10) provided scores indicating that the preservice teachers were comfortable using the respective technologies. Occasional basic use by the preservice teachers was represented for the following technology integration skills, strategies and dispositions: collaborating in constructing technology-enhanced models (2.97), using technology resources to facilitate higher order and complex thinking skills (2.97), and evaluating digital media (2.83). The overall mean for technology integration skills, strategies and dispositions competencies was 3.42. Table 15 provides a summary of the *SPSSI* technology integration skills, strategies and dispositions competencies, respective mean scores, and integration levels.

While the preservice teachers felt extremely confident in their use and adaptation of e-mail, word processing, and *PowerPoint*, they expressed lesser confidence in their use of other basic technology tools like *Inspiration*, spreadsheets and web page development. High levels of confidence were also expressed in the use of online learning resources like Blackboard and the use of online social networking, but lesser competencies were expressed using other web 2.0 tools such as wikis and blogs. This basic knowledge, but lack of comfort in using assistive technologies is consistent with a profile of preservice teachers who are confident in their use of basic tools like word processing, e-mail, and some web 2.0 technologies, but much less confident and knowledgeable in their use of more complex technologies like spreadsheets, assistive technologies, and digital editing.

Table 15

SPSSI - Technology Integration Skills, Strategies and Dispositions

Technology Integration Strategies and Dispositions	Mean	N	Integration Scale
Awareness of how technology is used in your field of study	4.28	29	Integration
Using technology to locate, evaluate, and collect information	4.24	29	Integration
Proficiency in evaluating technology enhanced learning	3.86	29	Infusion
Knowledge in discussing diversity issues related to accessing and using technology	3.31	29	Infusion
Using help files	3.24	29	Infusion
Using a variety of media and formats, including telecommunications, to collaborate	3.10	29	Infusion
Collaborate in constructing technology-enhanced models	2.97	29	Exploration
Use technology resources to facilitate higher order and complex thinking skills	2.97	29	Exploration
Evaluating digital media	2.83	29	Exploration
Overall mean for technology integration skills, strategies and dispositions	3.42	29	Infusion

Note. Expansion (5.00-5.99) = I am very confident and am able to occasionally adapt the technology to fit my needs. Integration (4.00-4.99) = I am proficient and use as a regular part of my work. Infusion (3.00-3.99) = I am comfortable and use often. Exploration (2.00-2.99) = I occasionally use or am somewhat comfortable and can do basic tasks. Awareness (1.00-1.99) = I have a basic awareness, but I am not comfortable using.

The *LoTiP* and *LoTiM* provided additional comparative data for the analysis of the research questions.

Levels of Technology Implementation

Forty six mentor teachers completed the *LoTiM;* twenty-nine preservice teachers completed the *LoTiP*. The mentor teachers completed the *LoTiM* prior to the internship-based teaching experiences. Twenty six (56%) of the mentor teachers self-rated scores were at *LoTi* levels 1 and 2. Seven (15%) of the mentor teachers scored at level 3, 7 (15%) scored at level 4a, and 6 (13%) scored at level 4b. None (0%) of the mentor teachers scored at the levels 5 or 6, the highest levels of the *LoTi* scale. The overall mentor teachers' *LoTi* level was at level 2, the exploration level. "At the exploration level, 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) using the available digital assets" (LoTi Connection, 2012, p. 6). Table 16 presents the *LoTiM* scoring profile for the 46 mentor teachers.

Twenty-nine preservice teachers completed the *LoTiP;* twenty-nine preservice teachers completed the LoTiP. The preservice teachers completed the *LoTiP* at the conclusions of their internship-based teaching experiences. Thirty-one (60%) of the preservice teachers self-rated scores were at *LoTi* levels 1 and 2. Four (11%) of the mentor scored at level 3, 9 (26%) scored at level 4b, and 1 (3%) scored at level 6. The overall preservice teachers' *LoTi* level was a level 2, the exploration level; this is consistent with the overall *LoTi* level of the mentor teachers.

Table 16.

Mentor Teachers LoTi Levels

LoTi Level	Description	N
Level 0: Non-use	Instructional focus may vary; digital tools and resources are not used during the instructional day.	0 (0%)
Level 1: Awareness	Instructional focus emphasizes information dissemination; teachers use digital tools and resources for classroom management tasks or instructional presentations.	7 (15%)
Level 2: Exploration	Instructional focus emphasizes content understanding; students use digital tools and resources to generate multimedia products.	19 (41%)
Level 3: Infusion	Instructional focus emphasizes engaged higher order learning; students use digital tools and resources to solve teacher-directed problems related to the content under investigation.	7 (15%)
Level 4a: Integration	Instructional focus emphasizes student-directed exploration of real-world issues; students use digital tools and resources to answer self-generated questions that dictate the content, process, and product.	7 (15%)
Level 4b: Integration (Routine)	Instructional focus emphasizes student-directed exploration of real-world issues; students use digital tools and resources to answer self-generated questions that dictate the content, process, and product. Level 4b teachers facilitate full-scale inquiry-based teaching regularly with minimal implementation issues.	6 (13%)
Level 5: Expansion	Instructional focus emphasizes global student collaboration to solve world issues; students use digital tools and resources for authentic problem-solving opportunities beyond the classroom.	0 (0%)
Level 6: Refinement	Instructional focus is entirely learner-based; students experience seamless integration of digital tools and resources	0 (0%)

"At the exploration level, 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) using the available digital assets" (LoTi Connection, 2012, p. 6). Table 17 presents the *LoTiP* scoring profile for the 29 preservice teachers.

This profile of the preservice teachers' technology competency skills, derived from the *LoTiP*, *LoTiM*, and *SPSSI* data provide a baseline for comparing the preservice teachers' technology skills to the levels in which the preservice teachers' integrated technology in their IBTE. This baseline of preservice teacher skills provides the context for the analysis of each research question.

Research question one was analyzed in two parts. Part one examined the relationship between the overall *SPSSI* mean score with the overall *LoTiP* score. Part two examined the relationship between individual technology integration competencies, prior to the IBTE, with the actual technology integration competency implementation in the IBTE. This process involved matching similar competencies from the *SPSSI* and the *LoTiP*.

Research Question One

Is there a relationship between preservice teacher predispositions towards technology integration and the level in which preservice teachers integrate technology in internship-based teaching experiences?

Once matched, the correlation coefficients, frequency tables and scatter plot graphs for the similar competencies were calculated. All correlation coefficients scatter plot graphs, and frequencies of responses were calculated using *SPSS*.

Table 17.

Preservice Teachers LoTi Levels

LoTi Level	Description	N
Level 0: Non-use	Instructional focus may vary; digital tools and resources are not used during the instructional day.	0 (0%)
Level 1: Awareness	Instructional focus emphasizes information dissemination; teachers use digital tools and resources for classroom management tasks or instructional presentations.	6 (17%)
Level 2: Exploration	Instructional focus emphasizes content understanding; students use digital tools and resources to generate multimedia products	15 (43%)
Level 3: Infusion	Instructional focus emphasizes engaged higher order learning; students use digital tools and resources to solve teacher-directed problems related to the content under investigation.	4 (11%)
Level 4a: Integration	Instructional focus emphasizes student-directed exploration of real-world issues; students use digital tools and resources to answer self-generated questions that dictate the content, process, and product.	0 (0%)
Level 4b: Integration (Routine)	Instructional focus emphasizes student-directed exploration of real-world issues; students use digital tools and resources to answer self-generated questions that dictate the content, process, and product. Level 4b teachers facilitate full-scale inquiry-based teaching regularly with minimal implementation issues.	9 (26%)
Level 5: Expansion	Instructional focus emphasizes global student collaboration to solve world issues; students use digital tools and resources for authentic problem-solving opportunities beyond the classroom.	0 (0%)
Level 6: Refinement	Instructional focus is entirely learner-based; students experience seamless integration of digital tools and resources	1 (3%)

Part one: Overall *SPSSI* and overall *LoTiP* results

Twenty-nine preservice teachers completed both the *SPSSI* and the *LoTiP*. The *SPSSI* was administered, at the beginning of the internship-based teaching experience, to assess the preservice teachers' technology skills and predispositions. The *LoTiP* was administered, upon conclusion of the IBTE, to assess the levels of technology implementation that occurred in the IBTE. A correlation coefficient was calculated to determine if there was a relationship between the preservice teachers' overall technology skills and predispositions (as measured by the *SPSSI*) with the preservice teachers' overall levels of technology implementation (as measured by the *LoTiP*).

The overall *SPSSI* mean was 3.53, and the mean *LoTiP* score was 2.63. The overall scores of both survey instruments were not significantly correlated ($r = .190$, $n = 29$, $p = .324$). Additionally, there was no significant relationship between the overall preservice teacher predispositions towards technology integration and the level in which preservice teachers' integrated technology in IBTE.

The second part in answering research question one, involved determining if there were significant relationships between the preservice teachers' individual *SPSSI* predispositions and technology skills, and the actual levels of implementation of those skills (as measured by the *LoTiP*) in the IBTE.

Part two: *SPSSI* individual competencies and *LoTiP* individual competencies results

The individual *SPSSI* competencies served as indicators of the preservice teachers' technology predispositions and skills prior to their IBTE. These *SPSSI* items were matched with related competencies from the *LoTiP*. The *LoTiP* related items served as an indicator of levels of individual integration use in the IBTE. The preservice teachers' individual predispositions and technology integration competencies (via scores on the *SPSSI* scale) were then correlated with related items from the *LoTiP* to determine if relationships existed between the following *SPSSI* and *LoTiP* technology integration competencies.

The statistical analysis revealed that significant positive relationships existed between several *SPSSI* and *LoTiP* technology integration competencies including: web page development ($r = .540$, $n = 29$, $p = .003$); wikis for multimedia projects ($r = .588$, $n = 29$, $p = .001$); wikis for communication to parents, peers and students ($r = .378$, $n = 29$, $p = .043$); assigning web projects ($r = .477$, $n = 29$, $p = .009$); digital tools to collaborate, publish or interact ($r = .429$, $n = 29$, $p = .02$); and using technology resources for higher order thinking ($r = .389$, $n = 29$, $p = .037$). These analyses indicate a relationship existed between the preservice teacher competency levels (and preservice teacher competency preparation) with preservice teacher rates of implementation in the IBTE. A common theme among these significantly correlated competencies was the use of the Internet/Web based tools for classroom use. Table 18 lists, for each of the correlated technology competencies, the mean *SPSSI* and mean *LoTiP*, the number of preservice teachers who completed the *SPSSI* and *LoTiP*, the correlation coefficient, and level of significance.

Additional analysis, of the significant correlations, was conducted by using frequency charts in conjunction with the scatter plot graph data to further investigate any potential relationships that might exist among the data not revealed with the correlation coefficients.

Table 18

SPSSI Individual Competencies and LoTiP Competencies

Competency (21 items)	*SPSSI* Mean	*LoTiP* Mean	N	r	Sig.
Assigning web projects	1.96	1.82	29	.477**	.009
Assistive technologies	1.76	3.13	29	-.027	.891
Audio, video and multimedia	3.24	3.62	29	-.002	.990
Blogs	3.00	1.79	29	.277	.145
Blogs for communication	3.00	2.66	29	.227	.235
Digital tools for research	3.76	2.44	29	-.038	.844
Digital tools to collaborate	3.10	3.17	29	.429*	.020
Effective use of resources- wikis	2.76	3.62	29	.028	.884
E-mail for communication	5.51	2.66	29	.108	.576
Inspiration	3.06	4.10	29	-.017	.931
PowerPoint	4.79	1.79	29	.361	.055
Promote innovative thinking	2.97	3.79	29	.259	.176
Spreadsheets	2.90	4.10	29	.185	.338
Technology used in major field of study	4.28	2.44	29	.131	.497
Technology used to emphasize higher order or innovative thinking	3.00	4.72	29	.195	.310
Using a variety of media for communication	3.10	2.66	29	.288	.129
Using collaborative productivity tools	2.97	2.62	29	.206	.284
Using technology resources for higher order thinking	3.00	3.62	29	.389*	.037
Web page development	3.00	1.79	29	.540**	.003
Wikis for communication	2.76	2.66	29	.378*	.043
Wikis for multimedia projects	2.76	1.79	29	.588**	.001

*p < .05, two-tailed. **p< .01, two-tailed.

An example of this scatter plot graph and frequency table analysis is illustrated in figure 5. An examination of the scatter plot graph and the frequency tables of responses for assigning web projects ($r = .477$, $n = 29$, $p =.009$) provides a visual representation of the relationship between the *SPSSI* and *LoTiP* responses for assigning web projects. The frequency chart data indicates that while there was a significant relationship between the preservice teachers' levels of preparation (as measure by the *SPSSI*) and the preservice teachers' levels of implementation of assigning web projects (as measured by the *LoTiP*), 15 of 29 preservice teachers never assigned web projects in their IBTE. The *SPSSI* data discloses that 15 preservice teachers indicated nonuse or basic awareness of assigning web projects. An examination of the scatter plot graph, in figure 5, reveals that those who were not prepared to assign web projects, largely did not assign web projects in their IBTE.

Conversely, the scatter plot graph reveals a cluster of data in the upper right quadrant indicating that those who were prepared to implement web projects did assign web projects in their IBTE. The scatter plot graph regression line reveals a coefficient of determination of .22 indicating that 22% of the *LoTiP* score can be account for by the corresponding *SPSSI* score and vice-versa.

A similar pattern of responses is seen in the scatter plot graph (see figure 6) for web page development ($r =.540$, $n = 29$, $p = .003$). This example presents a cluster of data points in the lower left quadrant indicating little or no-use in preparation as measured by the *SPSSI* and low use in the IBTE as measured by the *LoTi;* and conversely higher levels of preparation are correlated with higher levels of use.

SPSSI - Assigning Web Projects		
Score	Label	Frequency
0	Nonuse	7
1	Awareness	8
2	Exploration	6
3	Infusion	0
4	Integration	4
5	Expansion	3
6	Refinement	1

Note. Mean = 1.96

LoTiP - Assigning Web Projects		
Score	Label	Frequency
0	Never	15
1	At least once a year	2
2	At least once a semester	4
3	At least once a month	2
4	A few times a month	0
5	At least once a week	2
6	A few times a week	3
7	At least once a day	1

Note. Mean = 1.82

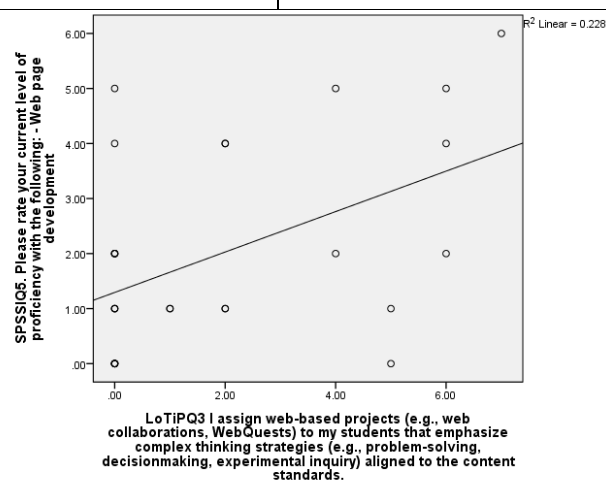


Figure 5. Frequency Chart and Scatter Plot Graph for Assigning Web Projects (r=.477)

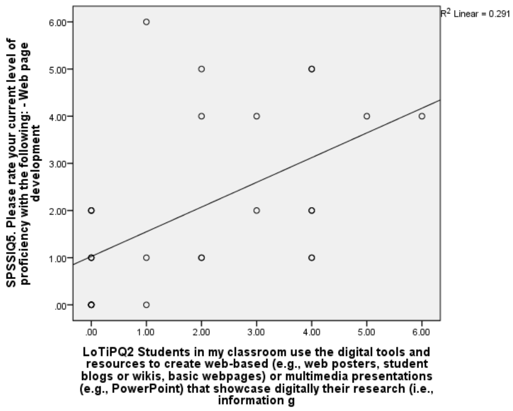
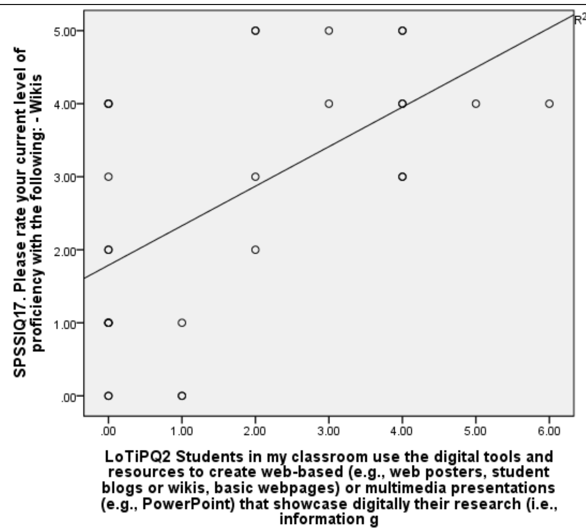


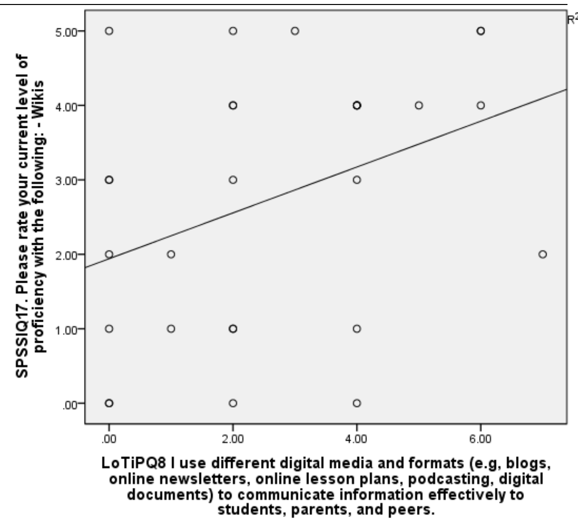
Figure 6. Scatter Plot Graph for Web Page Development (r=.540)

A final example is presented in a comparison of the scatter plot graphs for wikis for multimedia projects (r =.588, n =29, p = .001)(figure 7), and for wikis for communication to parents, peers and students (r = .378, n = 29, p = .043) . Figure 7 reveals clusters of data in both graphs indicating nonuse of wikis in IBTE, consistent with a lack of preparation in the use of wikis. The remaining data points are scattered among a range of scores indicating preservice teacher preparation in the use of wikis correlated with levels of implementation and use of wikis in IBTE.

In the cases of insignificant correlations, outlying data points were noted and the correlation coefficients were recalculated without the outlying data to determine if any significant results could be found. No other significant results were found. The frequency charts and graphs supported that no significant relationship existed among 15 *SPSSI* and *LoTiP* competencies. Detailed frequency charts, correlation and scatter plot graph data for research question 1 are available in Appendix F.



Scatter Plot Graph for Wikis for Multimedia Projects. (r=.588)



Scatter Plot Graph for Wikis - Digital Media for Communication to Parents, Peers, and Students. (r=.378)

Figure 7. Scatter Plot Graph for Wikis for Multimedia Projects. (r=.588) and Scatter Plot Graph for Wikis - Digital Media for Communication to Parents, Peers, and Students. (r=.378)

In summary, there was no significant relationship (r = .190, n = 29, p = .324) between the overall preservice teacher predispositions towards technology integration and the level in which preservice teachers' integrated technology in IBTE. The preservice teachers overall *LoTiP* score was 2.63. At a 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) using the available digital assets (Moersch, 2009, p.4). Significant positive relationships existed between the following *SPSSI* and *LoTiP* technology integration competencies including: web page development (r =.540, n = 29, p = .003); wikis for multimedia projects (r =.588, n =29, p

= .001); wikis for communication to parents, peers and students (r = .378, n = 29, p = .043); assigning web projects (r = .477, n = 29, p =.009); digital tools to collaborate, publish or interact (r=.429, n=29, p = .02); and using technology resources for higher order thinking (r = .389, n = 29, p =.037).

Research Question Two

Is there a relationship between mentor teacher predispositions towards technology integration and the level in which preservice teachers integrate technology in internship-based teaching experiences?

Research question two was also analyzed in two parts. Part one examined the relationship between the mentor teacher predispositions towards technology integration (as measured by the overall mean *LoTiM* score) and the level in which preservice teachers' integrated technology in IBTE (as measured by the overall mean *LoTiP* overall *LoTiM* score) for 18 mentor teachers and their 18 respective preservice teachers who completed the *LoTiM* and the *LoTiP*.

Part two examined the relationship between the mentor teachers' self-assessed competencies for each of 37 *LoTi Digital Age* competencies with preservice teachers' levels of those same competencies in their respective IBTE. Correlation coefficients, frequency tables and scatter plot graphs were calculated for each item using *SPSS*.

Part one: Overall *LoTiM* mean and *LoTiP* mean results

Eighteen mentor teachers completed the *LoTiM.* The mentors' respective preservice teachers completed the *LoTiP*. The *LoTiM* was administered at the beginning of the internship-based teaching experience to assess the mentor teachers' technology skills and predispositions.

The *LoTiP* was administered to the preservice teachers upon conclusion of the IBTE to assess the levels of technology implementation that occurred in the IBTE. A correlation coefficient was calculated between the overall *LoTiM* and the *LoTiP* scores. The correlation coefficient was calculated to determine if there was a relationship between the mentor teachers' overall technology skills and predispositions, as measured by the *LoTiM*, with the preservice teachers' overall levels of technology implementation in the IBTE, as measured by the *LoTiP*.

The overall *LoTiM* mean was 2.58, and the mean *LoTiP* score was 2.78. At a 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) using the available digital assets (Moersch, 2009, p.4).

The overall scores of both survey instruments were not significantly correlated ($r = .087$, $n = 18$, $p = .730$). These results indicate that there was no significant relationship between the overall mentor teacher predispositions towards technology integration and the level in which preservice teachers' integrated technology in IBTE.

Part two: *LoTiM* and *LoTiP* individual competencies data results

Part two, in answering research question two, involved determining if there were significant relationships between the mentor teachers' individual predispositions and technology skills, as measured by the *LoTiM* items, and the preservice teachers implementation of those individual predispositions and technology skills, as measured by the *LoTiP* items.

A correlation analysis was conducted for each of the competencies assessed in the *LoTiM* and *LoTiP* surveys. The analysis revealed two significant relationships between the mentor teachers' responses and the preservice teachers' responses among the 37 competencies assessed in the *LoTiP* and *LoTiM* surveys. The two significant relationships were for modeling students the safe and legal use of digital tools and resources (r = -.628, n = 18, p = .005), and students identify important real world issues or problems then use collaborative tools and human resources beyond the school to solve them (r =.-563, n =18, p = .015). The negative correlations are indicative of higher preservice teacher scores in relation to their respective mentors' scores for the competency. These inverse relationships are represented in figure 8.

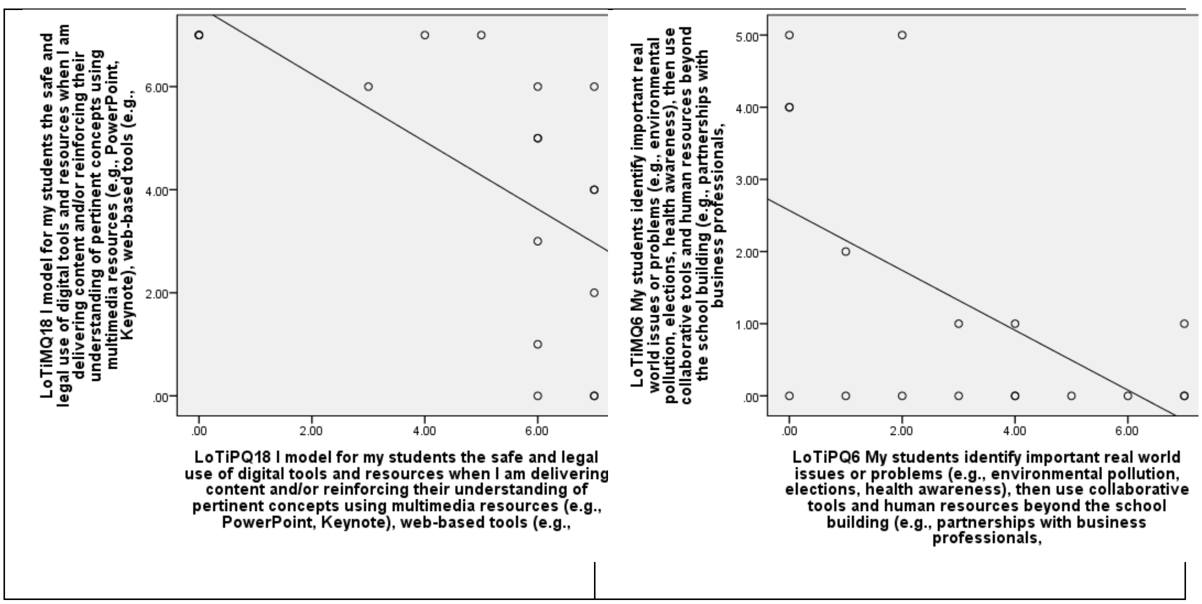


Figure 8. Scatter Plot Graphs for modeling students the safe and legal use of digital tools and resources (r = -.628, n = 18, p = .005), and students identify important real world issues or problems then use collaborative tools and human resources beyond the school to solve them (r =.-563, n =18, p = .015).

No other significant relationships existed between the mentor teachers' responses and the preservice teachers' responses for the remaining competencies assessed in the *LoTiM* and *LoTiP* instruments. Appendix H contains a listing of those *LoTiM* and *LoTiP* competencies not significantly related.

Frequency charts were used in conjunction with the scatter plot graph data to further investigate any potential relationships that might exist among the data, not revealed with the correlation coefficients. In some cases, outlying data points were noted and the correlation coefficients were recalculated without the outlying data to determine if any significant results could be found. No other significant results were found. The frequency charts and graphs supported that no significant relationship existed among corresponding *LoTiM* and *LoTiP* competencies. Detailed frequency charts, correlation and scatter plot graph data for research question 2 are available in Appendix G.

Research Question Three

3. Is there a relationship between technology integration variables/barriers and the level in which preservice teachers integrate technology in internship-based teaching experiences?

Research Question 3a

3a. Is there a relationship between technology resources available and the level in which preservice teachers integrate technology in internship-based teaching experiences?

Research question 3a was analyzed using quantitative data from the *LoTiP* survey and qualitative data from the *Preservice Teacher Technology Journal Entries (PTTJE).* The *PTTJE* survey consisted of three open-end journal prompts to provide a "picture" of the technology resources used in the internship-based experiences. The responses to the journal entries helped explain how access to resources contributed to or inhibited technology use, and, if applicable, provided an explanation of why resources were not used.

The *LoTiP* survey prompted preservice teachers to list obstacles to technology integration in their IBTE. The selection criteria were based on four research-driven variables. Those criteria, as listed in table 19, are access to technology; time to learn, practice, and plan; other priorities (e.g., statewide testing, new textbook adoptions); and lack of staff development opportunities. Twenty-nine (24%) preservice teachers noted access to technology as a primary technology integration barrier, while the remaining 27 preservice teachers selected among the remaining three categories which are addressed in research question 3b.

Table 19

Greatest Obstacles to Technology Integration

Criteria	N
Access to technology	29 (24%)
Time to learn, practice, and plan	32 (27%)
Other priorities (e.g., statewide testing, new textbook adoptions)	30 (26%)
Lack of staff development opportunities	26 (21%)

The *LoTiP* survey also queried the preservice teachers on the number of computers in their internship-based teaching environments. Two (6%) of the internship-based teaching environments contained more than five computers, seventeen (49%) of the internship-based teaching environments contained three to five computers, fourteen (40%) of the internship-based teaching environments had one to two computers, and two (6%) internship-based teaching environments had no computers.

Access to resources was an overriding theme from the *PTTJE*. The journal entries were largely positive reflections regarding access to resources. Twenty-one preservice teachers participated in the journaling process. All responses related to access to resources were categorized in the *MCC* as either contributing resources or general limitations. The contributing resources category was then assigned themes as illustrated in table 20.

Table 20

Sample Master Content Code (MCC) for Contributing Resources

Category	Themes
(C) Contributing Resources	(S) Smartboard/Promethean Board use
	(A) ActiveInspire
	(EL) ELMO (Document Camera)
	(WS) Websites for students

The journal entries from the preservice teachers indicated the effectiveness of using interactive whiteboards in the classroom. Eleven preservice teachers (52%) cited using interactive whiteboards with their students. Other journal entries indicated the positive use of interactive whiteboards in the internship based teaching experiences including: “The interactive whiteboard (specifically the Promethean Board) has been helpful in allowing students to get out of their seats and to be, well, interactive during typically dull parts of lessons. The boards also provide enlarged visuals of the text they have in front of them and they benefit from seeing me highlight/circle important parts of the text" (1Q3AJCS).

Another preservice teacher noted, "The students respond well to SmartBoards or Promethean Boards, computers and document cameras. They love to be able to use flip charts on the Promethean and I love that it provides them with visuals throughout the lesson" (12Q3AJCS).

One (5%) preservice teacher noted attending a training session for whiteboards, but also noted that he/she had no opportunities to use an interactive whiteboard in the classroom. Three (14%) preservice teachers specifically cited using *ActivInspire* software. Use of *ActivInspire* software is an indication of using whiteboards at a higher level of interaction than just displaying computer content via the whiteboard, for example.

Nine (43%) preservice teachers referenced using "the ELMO" which is a document camera. Document cameras are image display devices. One preservice teacher described her use of the document camera noting, "It allows the students to follow along (without me having to make a transparency) and I can even display student work or books" (24Q3AJCE).

Eight preservice (38%) teachers used websites designed for student educational use. *Brainpop* and *Brainpop Jr.* provide educational movies, quizzes, lesson, and other resources for students and teachers. Eight (38%) preservice teachers noted using websites designed for teachers including *TeacherTube*, *Brainpop*, *Edline*, and *Safari Montage* for designing instruction. *Brainpop* was frequently mentioned as an excellent resource. *Safari Montage* is a subscription digital media distribution system aligned with PreK-12 content standards. Four preservice teachers expressed using *Safari Montage* as a resource for planning instruction. Three (14%) preservice teachers cited using *PowerPoint*; one student noted advanced use of *PowerPoint* via the inclusion of animations in the *PowerPoint* presentations. One preservice teacher had the following comment regarding the use of several of these technology integration resources: "I have found that using videos from *Safari Montage* and *Brainpop Jr.*, and creating *PowerPoint* presentations with animations has helped me keep my students engaged" (28Q3AJCWS).

Four (19%) preservice teachers indicated general use of computers during their IBTE. While not systemic, three (14%) of the preservice teachers noted limited access to resources as a barrier to technology integration. Two of the three preservice teachers noted a lack of resources in their classroom, while the other noted problems with the technology not working in their classroom.

Two preservice (6%) teachers noted, via the *LoTiP*, not having any computers in their teaching environments, while the remaining 33 (94%) preservice teachers expressed varying access to computer hardware (from 1 to more 5 computers) in their environments. While computer hardware may have been readily available in a majority of the teaching environments, 29 (24%) of the preservice teachers, via the *LoTiP,* noted access to resources as their primary obstacle to technology integration. This is confounded by only three (14%) of the preservice teachers having cited access limitations in their journal entries. The primary focus of the journal entries related to access to technology in the preservice placements was positively focused on resources available. The discrepancy between 24% of preservice teachers citing access to resources as a primary obstacle to technology integration (via the *LoTiP*) and the 3% of preservice teachers having cited access limitations in their journal entries requires further investigation and study.

Research Question 3b

3b. Is there a relationship between other variables (e.g. time, emphasis on traditional teaching methods etc.) and the level in which preservice teachers integrate technology in internship-based teaching experiences?

As noted in research question 3a, the *LoTiP* survey asked preservice teachers to list their greatest obstacles to technology integration in their IBTE. The response options were based on four research-driven variables. Twenty-nine (24%) preservice teachers noted access to technology as the primary obstacle, 32 (27%) noted time to learn and practice as the primary obstacle, 30 (26%) noted other priorities (e.g., statewide testing, new textbook adoptions) as the primary obstacle, and 26 (21%) preservice teachers noted lack of staff development opportunities as the primary obstacle. Table 14 lists the obstacles to technology integration identified by the preservice teachers.

The *PTTJE* survey data was also used to analyze question 3b. One of the open-ended *PTTJE* prompts was directly related to research question 3b. This journal prompt provided an opportunity for the preservice teachers to reflect on how access to technology resources might have contributed to, or inhibited student learning.

Table 21 outlines the categorization and assignment of themes in the *MCC* for responses related to question 3b. The full *Master Content Code (MCC*) can be found in Appendix D.

Table 21

Sample MCC for Other Variables Affecting Technology Integration

Categories	Themes
(L) Limitations	(GL) General Limitations
(E) Effect on Integration	(H) Help / increase / expand student learning
	(E) Engaging
	(M) Motivating
	(I) Inhibiting
	(D) Distracting
	(U) Used properly / correctly
	(O) Overwhelming- too much information

Preservice teachers responses to this journal prompt were largely focused on descriptors related to the effect on technology integration. Non-thematic or general concerns by individual preservice teachers included: “students needed a computer class as they lacked the basic computer skills which got in the way of learning”; “technology can be restricting if used incorrectly; students can be inhibited if tech is overused”; “technology can’t be exclusive of processes”; “technology provides opportunities for cheating; hardware is unreliable, and sources on the Internet are not permanent”.

Eleven (52%) of the preservice teachers cited ways in which technology was used to help and/or expand student learning. This included comments like, “the internet resources help students think beyond themselves” (17Q3BJEH); “technology helps students with different learning styles” (22Q3BJEE); and “resources help me develop more challenging lessons” (26Q3BJEE).

Eight (38%) of the preservice teachers cited ways in which the technology was engaging; seven (33%) cited ways in which the technology was motivating. Responses included, “the students want to pay attention because the technology is more fun than direct instruction” (29Q3BJEM), “technology engages and motivates students - they want to be the one who gets to press the buttons for Brain Pop or come up and write on the ELMO” (32Q3BJEM), and “technology motivates students to participate in the lesson, this usually contributes to their learning” (33Q3BJEM).

Four preservice teachers (19%) noted instances, in which technology was inhibiting, particularly when the use of technology is not well-planned, over-used or not used properly, and when resources are not working or are temporarily unavailable (e.g. Internet connection is lost). Three (14%) preservice teachers cited instances where the technology provides too much information, and gets in the way of learning.

The preservice teachers *PTTJE* responses were predominantly focused on themes related to how technology impacts student learning. Journal responses addressing research question 3b criteria (i.e. other variables in preservice teaching placements that affect the level in which preservice teachers integrate technology in IBTE) were focused on: expanding ways in which technology integration can make learning engaging, motivating, inhibiting and distracting. There was no mention, in the *LoTiP* survey or the *PTTJE*, of the mentor teachers as an obstacle to technology integration, a research proven variable affecting technology integration.

Summary

Forty-six mentor teachers and 35 preservice teachers from Maryland public schools participated in this study. Four measuring instruments the *SPSSI*, the *LoTiM*, the *LoTiP*, and the *PTTJE* were used to collect data for this research study. Research question one examined potential relationships between preservice teacher predispositions towards technology integration and the level in which preservice teachers' integrated technology in IBTE. The study results revealed that there was no significant relationship between the overall preservice teacher predispositions towards technology integration and the overall level in which preservice teachers' integrated technology in IBTE. Significant positive relationships were found among the following competencies: web page development; wikis for publishing; assigning web projects; using digital tools to collaborate, publish, or interact

Research question two examined a potential relationship between mentor teacher predispositions towards technology integration and the level in which preservice teachers' integrated technology in IBTE. The analysis revealed that the mentors' overall predispositions towards technology integration were not related to the overall level in which preservice teachers' integrated technology in IBTE. An examination of correlation coefficients for the 37 individual *LoTiM* and *LoTiP* items revealed one significant relationship related to modeling safe and legal use of digital tools and resources when delivering content.

Research question 3a examined the relationship between technology resources available and the level in which preservice teachers' integrated technology in IBTE. Data indicated access to a variety of resources in the IBTE. While 29 (24%) of the preservice teachers indicated, via the *LoTi*, access to resources as an obstacle to technology integration in their IBTE, 3 (14%) of these same preservice teachers cited access limitations in their journal entries. Hardware and software resources used in internship-based placements for instructional preparation/planning and instruction included Smartboards, *ActivInspire*, ELMO document cameras, *Safari Montage*, and *Brainpop*.

Research question 3b examined potential relationships among other variables in preservice teaching placements affecting the level in which preservice teachers integrate technology in IBTE. While 29 (24%) preservice teacher's responses noted access to technology as the primary obstacle, 32 (27%) noted time to learn and practice as the primary obstacle, 30 (26%) noted other priorities (e.g., statewide testing, new textbook adoptions) as the primary obstacle, and 26 (21%) preservice teacher noted lack of staff development opportunities as the primary obstacle. The preservice teachers *PTTJE* responses related to question four were predominantly focused on themes related to how technology impacts student learning including expansion, engagement, motivation, and inhibition of learning.

Chapter V. Discussion

Improving PreK-12 student performance has taken on a renewed sense of urgency over the past decade. Driven by education reform initiatives, such as the *No Child Left Behind* legislation and the *American Recovery and Reinvestment Act*, increased pressure has been placed on teachers, administrators, and subsequently students to increase student performance (Dearth, 2010). These same education reform efforts emphasized standardized testing which indirectly led to a movement of curriculum standardization, and direct instruction (Amrein & Berliner, 2002; Birkmire, 1993; Darling-Hammond, 1994; Franklin & Snow-Gerono, 2007; Gordon & Reese, 1997; Moon, Brighton, Jarvis & Hall, 2007; Pedulla, 2003). Concurrently, college teacher preparation programs were using research-based data, led by Apple Computer (1991) to become more focused on technology-integrated, constructivist teaching practices in their preparation of preservice teachers (Gordon, 2009).

When these preservice teachers begin their (internship-based teaching experiences) IBTE, they often encounter barriers while attempting to integrate technology in a constructivist manner (NCES, 2007). Barriers contributing to the inability of preservice teachers to integrate technology, in a constructivist manner, in IBTE include: competing priorities in the classroom (74 %), available technology infrastructure in the schools (73 %), lack of training or skill (64 %), time (62 %), and willingness (53 %) on the part of supervising teachers/mentors teacher to integrate technology in their classrooms (NCES, 2007). The preservice and mentor teachers, participating in this research study, scored at level 2 on the *LoTi* scale. Scores at Level 2 (Exploration) are indicative instruction emphasizing mastery learning and direct instruction (LoTi Connection, 2012).

The purpose of this chapter is to discuss the results of this research study about preservice teacher technology integration in IBTE. In addition, recommendations for improving the levels of technology integration in IBTE are presented in this chapter. This chapter consists of five sections: research summary, discussion of results, recommendations, areas for future research and conclusion.

Research Summary

The purpose of this research study was to examine preservice teacher technology integration in IBTE. The target population for this study was preservice teachers and their respective mentor teachers. All the participants, in this study, were engaged in IBTE in grades PreK-12. The internships occurred in local Professional Development Schools (PDS) affiliated with a University. A PDS is a collaboratively planned partnership between a local school system and a University. PDS partnerships are designed for the academic and clinical preparation of interns under the guidance of a mentor classroom teacher and a University faculty member (Towson University, 2012).

Of the 35 preservice teachers who fully participated in the study, 31 (89%) were completing their internships in elementary school settings, one (3%) in a middle school, and three (8%) in high school settings. Thirty-one (88%) of the preservice elementary school teachers were classroom generalists, certified to teach across the curriculum. All four (11%) secondary preservice teachers' specialty areas were in mathematics. Thirty-four (97%) of the preservice teachers had no previous teaching experience, and one (3%) preservice teacher had five or more years of teaching experience. Thirty-one (88%) of the preservice teachers indicated having taken technology integration University coursework.

The preservice teachers, via the *SPSSI*, self-scored several categories of technology integration skills and competencies. The highest mean integration scores were for the following skills and competencies: e-mail for communication (mean = 5.51), word processing (5.31), *PowerPoint* (4.79), Blackboard (4.55), online social networking (4.41), awareness of technology used in their respective major field of study (4.28), and using technology to locate, evaluate, and collect information (4.24). The lowest integration scores were noted for spreadsheets (2.89), wikis (2.76) editing digital media (2.34), web page development (1.97) and assistive technologies (1.75). While the preservice teachers felt extremely confident in their use and adaptation of online social networking, e-mail, word processing, and *PowerPoint*, they expressed lesser confidence in the use and development of spreadsheets, web pages, and wikis and assistive technology.

Of the 46 mentor teachers who participated in the study, 34 (89%) held positions in elementary school settings, three (7%) in middle school settings, six (14%) in high school settings, and one (2%) at all grade levels. Twenty (43%) of the mentor teachers were classroom generalists (multiple subjects), certified to teach across the curriculum. Twelve (11%) mentor teachers' specialty areas were in mathematics, one (2%) in the sciences, and 13 (28%) identified themselves as other (elementary or special area teachers).

Five (11%) of the mentor teachers had one to five years of previous teaching experience, and 21 (3%) mentor teachers had five to nine years of teaching experience, 12 mentors (26%) had 10 to 20 years of teaching experience, and eight (17%) mentors had more than 20 years of experience.

Discussion of Results

This study examined levels of technology integration in IBTE. The preparation of the preservice teachers through a stand-alone technology integration course and through their major program of study were factors in the preservice teachers' attitudes, beliefs and competencies towards integrating technology in the classroom. The mentor teachers beliefs and attitudes towards technology integration were not a significant factor affecting the preservice teachers' ability to integrate technology in the classroom. The mentor and preservice teachers *LoTi* scores were indicative of direct instruction and mastery learning.

The context of this research acknowledges the limitations and assumptions regarding the multiple variables in classroom environments affecting the integration of technology, and other personnel (beyond the mentor teacher) in the school who may contribute to the preservice teachers' levels of technology integration. Qualitative results from this study are not generalizable; the convenience sampling techniques used in this study limits the generalizability of quantitative results. Those preservice and mentor teachers who participated in the study, may have been more inclined to participate in the study because of their intrinsic interest in technology integration. The results are discussed by research question focus including preservice teacher dispositions and preparation; mentor teacher dispositions; resources available; and other variables (e.g. time, mandated testing, emphasis on traditional teaching methods etc.) affecting the level of technology integration in IBTE.

Preservice teacher dispositions and preparation

Research question 1. Is there a relationship between preservice teacher predispositions towards technology integration and the level in which preservice teachers integrate technology in internship-based teaching experiences?

The results of this study indicate no significant relationship between the overall preservice teacher predispositions, integration skills, strategies and competencies towards technology integration and the level in which preservice teachers' integrated technology in IBTE ($r = .190$, $n = 29$, $p = .324$). The overall *LoTiP* mean was 2.63. At level 2 on the *LoTi* scale, instruction emphasizes content understanding and supports mastery learning and direct instruction. Significant relationships were determined to exist between a portion of the pre-internship individual integration skills, strategies and competencies and the levels in which preservice teachers' integrated those respective integration skills, strategies and competencies in their IBTE.

The *SPSSI* was used to assess the preservice teacher's dispositions and competency levels acquired in the teacher preparation programs, including their stand-alone technology integration coursework. The preservice teachers entered their IBTE with relatively high *SPSSI* integration scores for the following individual technology integration skills, strategies and competencies: e-mail for communication (mean = 5.51), word processing (5.31), *PowerPoint* (4.79), Blackboard (4.55), online social networking (4.41), awareness of technology used in their respective major field of study (4.28), and using technology to locate, evaluate, and collect information (4.24).

The grand mean (3.43) for the all the *SPSSI* data was at the Infusion level. This is indicative of the preservice teachers expressing overall comfort and frequent use of the

SPSSI competencies. These findings support Lambert and Gong (2010) who determined that preservice teachers' enrolled in technology integration courses demonstrated improved self-efficacy towards integrating technology, in the classroom, in addition to developing more advanced knowledge and skills in classroom technology integration. The *SPSSI* scale can be found in table 22.

Table 22

SPSSI Levels of Use, Description and Range

Integration Rating	Description	Mean Range
Nonuse	I am not familiar and do not use	0-.99
Awareness	I have a basic awareness, but am not comfortable using	1.00-1.99
Exploration	I occasionally use or am somewhat comfortable and can do basic tasks	2.00-2.99
Infusion	I am comfortable and use often	3.00-3.99
Integration	I am proficient and use as a regular part of my work	4.00-4.99
Expansion	I am very confident and am able to occasionally adapt the technology to fit my needs	5.00-5.99
Refinement	I am completely confident and frequently adapt the technology to fit my needs	6.00-6.99

Further examination of the individual *SPSSI* and *LoTiP* technology integration skills, strategies and competencies revealed significant positive relationships existed among the following technology integration skills and competencies including: web page development ($r = .540$, $n = 29$, $p = .003$); wikis for multimedia projects ($r = .588$, $n = 29$, p

= .001); wikis for communication to parents, peers and students (r = .378, n = 29, p = .043); assigning web projects (r = .477, n = 29, p =.009); digital tools to collaborate, publish or interact (r=.429, n=29, p = .02); and using technology resources for higher order thinking (r = .389, n = 29, p =.037). These analyses indicate a relationship existed between the preservice teacher competency levels (and preservice teacher competency preparation) with preservice teacher rates of implementation in the IBTE. The significant relationships among these individual competencies support Milman and Molebash (2008) who concluded, in a longitudinal study of practicing K-12 teachers, that that the post personal confidence and instructional scores in relation to technology integration were higher in teachers who had taken an educational technology course.

It should be noted that the data results regarding preservice teacher dispositions and preparation, in relation to levels of technology, should not be interpreted as indicators of high levels of use or preparation among technology integration skills, strategies and competencies. Significant correlations for several of the items are attributable to low levels of preparation prior to the IBTE, and subsequent low levels of use in the IBTE. These competencies include: web page development (r =.540, n = 29, p = .003); wikis for multimedia projects (r =.588, n =29, p = .001); wikis for communication to parents, peers and students (r = .378, n = 29, p = .043); assigning web projects (r = .477, n = 29, p =.009). The results of this study indicate significant relationships among individual technology integration skills, strategies and competencies and the preservice teacher's levels of integration of those respective integration skills, strategies and competencies. These individual relationships can be used to further expand the PDS relationship by taking measures to align the integration skills, strategies and competencies taught in the college based technology integration course with the resources available and required curriculum in the IBTE. Further study of the relationship between preservice teacher dispositions and preparation, and technology use in preservice teaching experiences is needed to optimize technology integration in IBTE.

Mentor teacher dispositions

Research question 2. Is there a relationship between mentor teacher predispositions towards technology integration and the level in which preservice teachers integrate technology in internship-based teaching experiences?

Twenty-nine (63%) of the mentor teachers, who participated in this study, had taken technology integration coursework, and 31 (67%) of the mentor teachers rated technology integration as very important. This figure (67%) compares favorably to the NCES (2007) figure of 53% of mentor teachers who nationally did not demonstrate a willingness to integrate technology into their classrooms. This may indicate a willingness for this 67% of the mentor teachers to integrate technology in their classrooms. The mentor teachers, in this research study, viewed technology integration as very important, but this did not correlate to meaningful levels of technology integration by preservice teachers in their respective mentors' teaching environments.

While the mentor teacher's technology integration predispositions are a crucial factor in supporting preservice teacher technology integration efforts (Bai & Ertmer, 2008; Brush, Galeski. & Hew, 2008; Grove, Strudler, & Odell, 2004), the *LoTiM, LoTiP and PTTJE* present inconclusive data in determining a relationship between the mentor teachers' technology dispositions and the levels of technology integration among the preservice teachers studied. The *LoTiM* and *LoTiP* results indicate no relationship between the overall mentor teachers' predispositions and the preservice teachers' levels of technology integration. Examination of the *LoTiM* data reveals that 26 (57%) of the mentor teachers were clustered in *LoTi* levels 0 through 2. These levels represent the lower portion of the *LoTi Framework*. The instructional focus, at *LoTi* level 2, emphasizes content understanding and supports mastery learning and direct instruction. Competing priorities in the classroom, driven by educational reforms and standardized testing, can place pressure on mentor teachers to utilize direct instruction methods like drill and practice (Moon, Brighton, Jarvis & Hall, 2007; Sacks, 2000). This is supported by Frederick, Schweizer, and Lowe (2006) who noted that preservice teachers found the traditional styles of mentor teachers complicated constructivist use of computer technology. Higher levels of technology integration than those indicated in this study are found in student centered or TICLE (Jonassen, 1991; Jonassen & Carr, 2000; Jonassen, Carr & Yueh, 1998; Papert, 1993; Prensky, 2009; Ringstaff et al., 1996).

The *PTTJE* entries were revealing in that none of the preservice teachers listed their mentor teacher as either a positive or negative influence towards integrating technology in the IBTE. This is supported with an insignificant correlation ($r = .087$, $n = 18$, $p = .730$) between the *LoTiM* overall mean score in relation to the overall *LoTiP* mean. Based on the analysis of the *LoTiM and PTTJE* data, the influence of the mentor teachers, in this study, on technology integration in the IBTE is not clearly defined. The mentor teachers were neither a contributing nor inhibiting factors in the preservice teacher technology integration in the IBTE. Further study of the relationship between the mentor teachers technology dispositions and levels of technology use among preservice teachers is warranted by these results. Providing dialogue among the PDS partners, conducting a needs assessment, and subsequent professional development opportunities for the mentor teachers is recommended for developing a comprehensive plan to improve technology integration in the IBTE, including raising the mentor and preservice teachers' levels of technology integration.

Resources available

3a. Is there a relationship between technology resources available and the level in which preservice teachers integrate technology in internship-based teaching experiences?

The literature indicated that, in addition to a supportive mentor teacher, access to technology is needed for preservice teachers to practice and implement "student-centered" technology lessons (Grove, Strudler, & Odell, 2004; Brush, Galeski, & Hew, 2008). Limited access to resources was noted in 29 (24%) of the *LoTiP* responses. Three (14%) of the preservice teachers noted limited access to resources as a barrier to technology integration (via the *PTTJE*). Two of the three preservice teachers noted a lack of resources in their classroom, while the other preservice teacher noted problems with the technology not working in his/her classroom. Two preservice teachers noted (via the *LoTiP*) not having any computers in their teaching environments, while the remaining 33 (94%) preservice teachers expressed varying access to computer hardware (from one to more than five computers) in their environments. These findings support the NCES (2007) study of teacher education programs which noted access to resources as a barrier to technology integration, at least to some extent, in 92% of internship experiences, and as a primary barrier to technology integration. While access to resources was not identified as barrier in 71% of the IBTE, access to resources was noted as a barrier in 29% of this study's IBTE *LoTiP* responses, and 3 (14%) of the *PTTJE* results.

The journal entries, related to technology access in the preservice placements, were positively focused on resources available and how those technology resources impacted student learning. Journal entries supported access to and the use of a variety of hardware, software and web-based technology integration tools in the IBTE. Eleven preservice teachers (52%) cited using interactive whiteboards, three (14%) preservice teachers specifically cited using *ActivInspire* software, nine (43%) students referenced using ELMO document cameras, eight preservice (38%) teachers used websites designed for student educational use, eight (38%) preservice teachers noted using websites designed for teachers including *TeacherTube*, *Brainpop*, *Edline*, and *Safari Montage* for designing instruction. Three (14%) preservice teachers cited using *PowerPoint*. Access to subscription web-based digital media was provided for student classroom use and as resources for preservice teachers' lesson planning. The journal entries provide anecdotal data of access to and use of a variety of technology resources in the IBTE. Despite the positive access to technology cited in the *PTTJE*, 29 (24%) of *LoTiP* responses indicated access to resources as a barrier to technology integration in the IBTE. This discrepancy between the *PTTJE* and *LoTiP* data may be attributable to the preservice teachers being more willing to share their positive efforts toward technology integration, and being less willing to focus on specific barriers to technology integration. This variance requires further study of access to technology resources in the IBTE. This process can begin by assessing the technology resources available in the PDS-based, teaching environments and those available in the college-based teacher preparation coursework.

Other variables (e.g. time, emphasis on traditional teaching methods etc.)

3b. Is there a relationship between other variables (e.g. time, emphasis on traditional teaching methods etc.) and the level in which preservice teachers integrate technology in internship-based teaching experiences?

A knowledgeable mentor teacher and adequate access to technology is needed for a preservice teacher to practice and implement "student-centered" technology lessons (Grove, Strudler, & Odell, 2004; Brush, Galeski, & Hew, 2008). In a NCES (2007) survey of 1439 colleges with teacher education programs, only 49% of the schools indicated that their preservice teachers were able to practice the technology related skills and knowledge they acquired in their coursework during their field experiences. Barriers to technology integration encountered in preservice teaching experiences include: the technology integration dispositions of the mentor and preservice teachers, access to technology resources, time to learn (including training) and practice new technology resources, and competing priorities in the classroom (NCES, 2007).

The research proven variables of time to learn, practice, and plan; other priorities; and lack of staff development opportunities were identified as obstacles to technology integration by the 35 preservice teachers who completed the *LoTiP* survey. Thirty-two (27%) noted time to learn and practice as a obstacle, 30 (26%) noted other priorities (e.g., statewide testing, new textbook adoptions) as an obstacle, and 26 (21%) preservice teachers noted lack of staff development opportunities as an obstacle. These findings again support the barriers to technology integration in internship based teaching experiences identified by Bartlett (2002), Brush et al. (2003), NCES (2007), and Russell et al. (2003). There was no mention, in the *PTTJE,* of several of these research documented factors affecting technology integration, most notably, time (to learning practice, and plan), other priorities (e.g. statewide testing), and lack of staff development opportunities.

As with the other themes related to the research questions guiding this study, the research findings, regarding other barriers to technology integration presented a variety of perspectives. While the *LoTiP* suggests these other barriers were an inhibiting factor on the preservice teachers levels of technology integration, the *PTTJE* responses in relation to these barriers, were focused on descriptors that had both a positive and negative effect on the preservice teachers' levels of technology integration. Eleven (52%) of the preservice teachers cited ways in which technology was used to help and/or expand student learning. Eight (38%) of the preservice teachers cited ways in which the technology was engaging; seven (33%) cited ways in which the technology was motivating. Four preservice teachers (19%) noted instances, in which technology was inhibiting, particularly when the use of technology is not well-planned, over-used or not used properly, and when resources are not working or are temporarily unavailable (e.g. Internet connection is lost). Three (14%) preservice teachers cited instances where the technology provides too much information, and gets in the way of learning.

The data findings, in relation to research question 3b, were inconsistent, scant, and inconclusive. Further research is needed to identify the specific other barriers to technology integration in the IBTE. Once these barriers are clearly identified, these data can be shared among the PDS partners. This data will provide the basis for developing a comprehensive plan, to be developed by all parties involved in the PDS partnership, for improving technology integration in the IBTE.

Recommendations

The data analysis supports that preservice teachers, including those who participated in this study, while prepared to integrate technology in the curriculum, encounter barriers to technology integration in internship-based teaching environments. Access to technology, time to learn practice and plan, opportunities for staff development, and other priorities were identified by the preservice teacher participants as barriers to integrating technology in internship-based teaching environments.

This research found that the mentor teachers' technology integration dispositions were not related to the levels of preservice teacher technology integration; however, the data indicated that the mentor and preservice teachers' overall levels of technology integration in their classrooms were consistent with direct instruction, student use of tutorial programs, and "project-based" learning opportunities at the knowledge/comprehension level on the *LoTi* scale (LoTi Connection, 2012).

The results of this study were intended for teacher preparation programs and aimed to provide descriptive data to inform decision making on preservice teacher, technology integration preparation and implementation in IBTE. Based on the results of this study, recommendations for preservice teacher programs, specifically, technology integration preparation and recommendations to advance research in the field are presented. Trachtman (2007) noted that in an era of accountability, reconstruction and renewal are made possible by the elements of PDS inquiry and accountability. Recommendations for preservice teacher programs include using the NCATE (2001) PDS standards and framework as a guiding documents to specifically address resource availability; promote data collection and staff development; and promote technology-integrated, constructivist teaching practices. Additional recommendations provided to advance the field include: advocating for effective teaching practices, refining the measuring instruments, requiring technology assessment in internships, and integrating action research into internships.

Recommendations for preservice teacher programs

Continue comprehensive relationships with PDS.

Continued evolution of the relationship, between the University and the PDS, should include: conducting a needs assessment of issues related to technology integration, collectively sharing resources, partnering in technology integration staff development programs and the sharing of best instructional practices. This would provide the University with PDS-based data to better prepare preservice teachers to integrate technology in internship-based teaching environments. The University should coordinate ongoing technology integration, professional development opportunities for the preservice teachers, mentor teachers and other school personnel. The PDS would benefit from this professional development by having the mentor and preservice teachers utilizing the instructional practices in which students learn best.

The PDS model is ideal for this level of collaboration as it is a proven method for increasing collaboration between teacher preparation programs, PreK-12 schools, and the greater educational community (Doolittle, Sudek, & Rattigan, 2008). The National Council for Accreditation of Teacher Education (NCATE) (2001) outlined five standards for professional development schools. These standards include (a) Learning Community, (b) Accountability and Quality Assurance, (c) Collaboration, (d) Diversity and Equity, and (e) Structures, Resources and Roles. The learning community, collaborative, and structural components of the PDS standards provide a nurturing clinical framework for preservice teachers and mentor teachers to raise their levels of technology integration. It is recommended that the PDS partners conduct on-going needs assessment surveys. This process should begin by addressing resource availability in the PDS.

Address resource availability. Improved communication, regarding available technology resources in the IBTE, must be pursued between teacher preparation programs and the PDS. If this is done, then the teacher preparation programs can better prepare preservice teachers to utilize the technology resources in the internship-based teaching environments. In preparing preservice teachers, teacher preparation programs must consider the technology resources currently available in the actual internship-based teaching environments, as well as resources that will be available in the future. The NCATE Standards for Professional Development Schools, standard V (structures, resources, roles) provides a structural framework for the PDS partners to address access to resources in PDS. The elements of the standard emphasize the garnishment and allocation of resources to support PDS work (NCATE, 2001). The learning community and collaborative elements of the PDS relationship identified by NCATE (2001), serve as the framework to develop the PDS relationship, and provide the school systems and teacher preparation programs with a shared knowledge base that can only be advantageous in the technology resource procurement process for both partners.

Access to resources has been identified, in the literature, as one of the barriers to technology integration in internship based teaching experiences (Bartlett, 2002; Brush et al 2003; NCES, 2007; and Russell et al., 2003). The preservice teachers in this study identified access to resources as a barrier in 29% of the *LoTiP* responses, and 3 (14%) of the *PTTJE* results. The process of tackling this issue should begin by assessing what resources are available in the internship based teaching environments and by providing the integration skills and strategies (via University preparation) to assure the preservice teachers are prepared to use the resources at hand.

Promote data collection and staff development. Teacher preparation programs should continue to collect data regarding preservice teachers' technology integration predispositions and skills. Further data collection would help ensure that preservice teachers are equipped with the skills and competencies consistent with the higher levels of technology implementation on the *LoTi* scale. For example, the data analysis indicates that the preservice teacher participants in this study need further exposure to and practice with assistive technology tools, and web 2.0 tools (e.g. wikis). Lack of staff development opportunities were also cited as a barrier to integration by the preservice teachers involved in this study; this is consistent with the technology integration barriers identified by Bartlett (2002), Brush et al. (2003), NCES (2007); and Russell et al. (2003).

The mentor and preservice teachers involved in this study were assessed at *LoTi* level 2 which is consistent with direct instruction and mastery learning. Twenty-six (56%) of the mentor teachers and 21 (60%) of the preservice teachers *LoTi* scores were at *LoTi* levels 1 and 2. These data indicate a need for staff development for preservice and mentor teachers. For the preservice and mentor teachers who scored at *LoTi* level 2 in this study, the *LoTi Connection* recommended staff development that models specific strategies and techniques for integrating higher-order thinking skills and engaged learning with the available digital tools and resources. This recommendation is targeted at moving preservice and mentor teachers to *LoTi* level 3 (LoTi Connection, 2012).

The *LoTi Connection (2012)* recommendation for those mentor and preservice teachers who scored at *LoTi* levels 3 or higher is to provide staff development that increases participants' confidence and competence with designing LoTi Level 4+ learning experiences using a constructivist, learner-based approach to curriculum planning.

It is recommended that IBTE include University sponsored sessions for the preservice and mentor teachers to receive staff development opportunities in the effective integration of technology, and opportunities to practice and to practically integrate technology in the experiences. Using the recommendations provided by the *LoTi Connection* and data gathered by ongoing needs assessment, the PDS partners should provide opportunities for professional development in the integration of technology in instructional environments.

As teachers are required to take coursework to maintain certification, the PDS relationship should be cultivated by providing University sponsored opportunities for PDS teachers to take technology integration coursework that will maintain their certification. The staff development opportunities should be systemic. It is also recommended that the PDS staff be provided opportunities to share their best practices with University faculty.

Promote constructivist teaching practices. PDS partnerships involve a shared vision of teaching and learning grounded in research (NCATE, 2001). The PDS dialogue regarding teaching practices should be cultivated between the PDS partners. The dialogue must emphasize the *ACOT* research and the contemporary research of Jonassen, Papert, and Prensky, citing the effectiveness of TICLE. Developing a shared vision of teaching and learning is facilitated in the PDS environment (NCATE, 2001).

Ninety-four percent of the preservice teachers and 78 % in this study identified their teachings styles as some combination of direct instruction and constructivist teaching. The *LoTi* results indicate preservice and mentor teacher at levels of instruction (at *LoTi* level 2) consistent with direct instruction. Given that the mentor teachers and preservice teachers, involved in this study, *LoTi* scores were at levels consistent with direct instruction practices, it is incumbent on teacher preparation programs to share research, at the local school system level and within the PDS that TICLE, not direct instruction, leads to optimal student learning. The aforementioned recommendations, for staff development opportunities in the PDS, provide a venue for University faculty to share research regarding the effectiveness of TICLE. The staff development sessions also provide a venue for modeling technology-integrated, constructivist learning practices.

Prepare the mentors through cognitive apprenticeship strategies. In further efforts to raise the *LoTi* levels in the mentor teachers' classrooms, the University faculty can promote technology integration by modeling technology integration strategies in the PDS, PreK-12 teaching environments. Consistent with the cognitive apprenticeship framework, this places the mentor teacher in the role of apprentice, and the University supervisor in the role of mentor. As Collins et al. (1991) noted, this model of cognitive apprenticeship would allow the mentor teachers, under the guidance of the University faculty, to gradually encounter similar learning situations through guided authentic experiences. The mentor teachers would be able to observe experts (i.e. the University supervisors) addressing technology integration in the authentic context of the PreK-12 teaching environments. Once the mentor teachers, under the guidance of the University supervisors, have completed Collin's (1989) six major steps in the cognitive apprenticeship process, they will have a greater degree of confidence in TICLE. These six steps, in the cognitive apprenticeship process, include: (a) modeling, (b) coaching, (c) scaffolding, (d) articulation, (e) reflection, and (f) exploration (Collins, 1989).

The process can then recycle itself with the mentor teachers assuming the role of technology mentor for their novice preservice teachers. This course of action can lead to higher levels of technology integration by the mentor teachers, and subsequently, their preservice teachers.

Recommendations to advance the field

Advocating for effective teaching practices. The case for constructivist teaching practices must be carried beyond the local levels to state and national levels. As public school reform efforts emphasizing standardized testing have resulted in curriculum standardization, direct instruction, and driving teachers to "teach to the test", teacher preparation programs have not been successful in advocating for technology-integrated, constructivist learning practices at the state and national level (Amrein & Berliner, 2002; Franklin & Snow-Gerono, 2007; Moon, Brighton, Jarvis & Hall, 2007; Pedulla, 2003). Teacher preparation programs must educate and lobby those who drive policy at the state and national levels to the effectiveness of TICLE. Resolving pedagogical differences at the local, state and national levels must occur for preservice teachers to implement the technology integration practices most beneficial for PreK-12 students.

Over the course of the 20th century, Dewey, Kilpatrick and Brameld advocated for learning environments based on experimentation and in mediums associated with real life. Teacher preparation programs must package the research of these early learning theorists with the contemporary research of Jonassen, Papert and Prensky which support that students learn better in TICLE. Teacher preparation programs must assume a leadership role to “right the ship” and change the direction of 21st century education.

Refine measuring instruments. The *LoTi Digital Age Survey* (Moersch, 2009) served as an effective and validated instrument for measuring the preservice teachers’ levels of technology integration in this study. The *SPSSI* also served as an effective and validated measuring instrument for assessing the preservice teachers’ technology integration skills and dispositions prior to their IBTE. It is recommended for future research to have one validated instrument, specific to IBTE, that measures the same competencies both pre-internship and post internship.

Requiring technology assessment in internships. Mishra and Kolher (2006) noted that Colleges of Education are moving towards modeling technology integration strategies in all teacher preparation coursework, not just a standalone technology integration course. These same integration strategies must be incorporated into, and accounted for, in the IBTE. One option is to administer the technology integration coursework concurrent with the internships. This would permit the preservice teachers to apply the concepts from their coursework in a coexisting clinical environment. Another option, as suggested by Parker et al. (2008), is to require an internship-based technology assignment and corresponding rubrics to improve connections between college faculty, mentor teachers and the preservice teachers. This requirement reinforces the importance of technology integration to both the preservice and mentor teachers.

Integrating action research or capstone projects into internships.

The levels of technology integration can be increased by requiring internship-based action research or capstone projects focused on technology integration. Dawson and Dana (2007), and Wentworth et al. (2008) found these types of internship-based research projects to be effective in creating opportunities for technology integration. Dawson and Dana (2007), advocated for using teacher inquiry, a strategy in which educators study their own practice. Teacher inquiry, when directed towards technology integration, can provide important benefits for preservice teachers in IBTE (Dawson & Dana 2007). Wentworth et al., (2008) provided specific indicators within a technology related internship-based capstone project to better connect the goals of mentors, preservice teacher and University faculty. The focus of each of these approaches should be integrated into the internship-based teacher experiences; each approach provides preservice teachers with a methodology or tool to reflectively assess their technology integration practices in IBTE.

Areas for Future Research

Given recent and ongoing changes in national curriculum and teacher assessment, additional research is needed to determine the impact of these changes on technology integration in internship-based teaching environments. This study should be replicated with a larger population of mentor and preservice teachers. A multiple regression analysis should be conducted with this larger population to determine variable changes among the barriers to technology integration. Multiple regression analysis would permit prediction of the levels of technology integration from the known value of two or more of the identified barriers to technology integration.

A case study or studies following daily activities of preservice teachers in their internship based experiences can provide complex views of the preservice teacher in the IBTE (Creswell, 2003). A case study would provide further insight and in the case of this research study clarity into the complexity of the barriers affecting technology integration in IBTE

Conducting a study in this natural setting can provide further insight into the technology integration practices in IBTE. Restructuring programs to have the technology integration coursework be concurrent with the IBTE, provides opportunities for action research studies as supported by Dawson and Dana (2007), and Wentworth et al. (2008).

Conclusion

This study examined the preservice teaching environment in relation to variables that impact the ability of the preservice teacher to integrate technology in a constructivist manner. The results of this study, along with existing research, support that preservice teachers encounter barriers to integrating technology in IBTE (NCES, 2007). Reform efforts emphasizing standardized testing have indirectly led to a movement of curriculum standardization, direct instruction, and ultimately driving teachers to “teach to the test”. Teacher preparation programs have made efforts to prepare preservice teachers to integrate technology in a constructivist manner in internship-based teaching experiences. Despite these efforts, the preservice teachers, who participated in this study, had levels of technology integration consistent with direct instruction.

Efforts are needed to change the teaching paradigm in public schools from direct instruction to technology-integrated, constructivist learning. Elevating the levels of technology integration among mentor teachers from direct instruction to more technology integrated constructivist learning will have the residual effect preservice teachers entering environments where higher level technology integration is already taking place.

Consistency must be attained in the instructional methodologies promoted by Colleges of Education and local public school systems. The instructional strategies selected should be based on research citing optimal student learning. Research presented in this study supports that PreK-12 students learn best in technology-integrated constructivist learning environments (Jonassen, 1991; Jonassen & Carr 2000; Jonassen, Carr & Yueh, 1998; Papert, 1993; Prensky, 2009, and Ringstaff, et al., 1996) . It is imperative that teacher preparation programs and public school systems work together to provide preservice teachers with the technology-integrated constructivist learning environments in which they can teach to their highest capabilities. Failure to do so will result in preservice teachers not implementing the technology-integrated constructivist skills and strategies proven to optimize learning.

Appendix A
IRB Approval

BALTIMORE COUNTY PUBLIC SCHOOLS

Joe A. Hairston, Superintendent 6901 Charles Street Towson, MD • 21204-3/11

December 6, 2010

David Robinson
Graduate Program Director, School Library Media Program
Towson University
8000 York Road '
Towson, MD 21252

We have received your request to conduct a research study in the Baltimore County Public Schools (BCPS). The proposal, *Technology' Integration and Preservice Teachers* (BCPS Research Project #2223) is approved as submitted. In order to gain access to your desired population, certain conditions must be met.

Please contact William Burke, Executive Director of Professional Development, at (410) 887-6400 to arrange anything through that office. While we have informed the personnel of your study, it is your responsibility to contact the appropriate staff and make arrangements to gain access to your subjects. **Participation in this study is strictly voluntary and informed consent must be signed by each participant.**

Upon completion of the study, you agree to share any written results, videos or dissertation summaries with the Baltimore County Public Schools through the Department of Research, Accountability, and Assessment, 9611 Pulaski Park Drive, Suite 305, Baltimore, Maryland 21220.

Sincerely,

Dr. Tamela H. Hawley
Director of Research
Department of Research, Accountability, and Assessment

cc: Joe A. Hairston, Superintendent
Michele Prumo, Chief of Staff
John Quinn, Acting Associate Superintendent, Curriculum and Instruction William Burke, Executive Director of Professional Development Thomas Rhoades, Executive Director of Research, Accountability, and Assessment Thea Jones, Supervisor, Instructional Technology Renard Adams, Coordinator of Research Gary Brager, Supervisor of Research
File

Focused on Quality; Committed to Excellence

TOWSON
UNIVERSITY

EXEMPTION NUMBER: 11-0X08

To: David E. Robinson
From: Institutional Review Board for the Protection of Human Subjects, Patricia Alt, Member

Date: Wednesday, August 11, 2010
RE: Application for Approval of Research Involving the Use of Human Participants

Office
of
University
Research
Services

Thank you for submitting an application for approval of the research titled, Technology Integration and Preservice Teachers to the Institutional Review Board for the Protection of Human Participants

t. 410 704-223
f. 410 704-4494

(IRB) at Towson University.

Your research is exempt from general Human Participants requirements according to 45 CFR 46.101(b)(2). No further review of this project is required from year to year provided it does not deviate from the submitted research design.

If you substantially change your research project or your survey instrument please notify the Board immediately.

We wish you every success in your research project.

CC: Wm. SaderaSadera

Informed Letter of Consent

Embedded in Student Voice

Preparing preservice teachers to utilize technology in teaching and learning is a primary theme in the Towson University College of Education Conceptual Framework. It is important for preservice teachers and their respective mentor teachers to provide technology integrated teaching environments for the optimization of student learning. The purpose of this study is to examine factors that affect preservice teachers' ability to integrate technology in their preservice teaching experiences.

Data for this research study will be collected through a survey instrument, and written journal entries. The data analysis for this study is designed to account for factors affecting preservice teachers' ability to integrate technology in their preservice teaching experiences.

Your participation in this research study is voluntary, but critical to this study. Data collected will benefit future preservice teachers by promoting the effective use of technology integration in preservice teaching environments. Your involvement in this study will consist of approximately 40 minutes to complete an online pre-survey (20 minutes) and an online post survey instrument (20 minutes). You will be also asked to complete three online journal entries (approximately 5 for each) throughout the semester.

All data in this study will be handled with strict confidence. No individuals will be identified in any reports. **Your participation and contributions in this research study will in no way affect your class grade or status within the College of Education.**

Thank you for your time and willingness to participate in this research study. Additional information and the results of this study will be available to those who are interested.

If you have any questions regarding this study please feel free to contact me (David Robinson, Principal Investigator – 410-704-6301) or the Institutional Review Board Chairperson, Dr. Debi Gartland, Office of University Research Services, 8000 York Road, Towson University, Towson, Maryland 21252; phone (410) 704-2236.

This survey is intended as a tool to aid in the research of student technical skills and to measure growth over time. All responses will remain confidential, and information gathered is intended for aggregate collection and analysis only.

By participating in this survey, you are giving your consent for this information to be gathered for professional research.

Please provide your Towson University (TU) username:

Appendix B
Select Project Skills Survey Items (SPSSI)

***SPSSI* Spring 2011**

Rating Scale

0= Nonuse - I am not familiar and do not use
1 = Awareness - I have a basic awareness, but am not comfortable using
2= Exploration - I occasionally use or am somewhat comfortable and can do basic tasks
3= Infusion - I am comfortable and use often
4= Integration - I am proficient and use as a regular part of my work
5 = Expansion - I am very confident and am able to occasionally adapt the technology to fit my needs
6 = Refinement - I am completely confident and frequently adapt the technology to fit my needs

Please rate your current level of proficiency with the following:

E-mail	1	2	3	4	5	6
	○	○	○	○	○	○
Spreadsheets	1	2	3	4	5	6
	○	○	○	○	○	○
Online databases for research	1	2	3	4	5	6
	○	○	○	○	○	○
Web page development	1	2	3	4	5	6
	○	○	○	○	○	○
Word processing	1	2	3	4	5	6
	○	○	○	○	○	○

0= Nonuse - I am not familiar and do not use
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4= Integration - I am proficient and use as a regular part of my work
5 = Expansion - I am very confident and am able to occasionally adapt the technology to fit my needs
6 = Refinement - I am completely confident and frequently adapt the technology to fit my needs

Please rate your current level of proficiency with the following:

Computer graphics, editing (i.e., Photoshop)	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○
Presentation (*PowerPoint*)	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○
Presentation (*Inspiration*)	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○
Online digital media resources (video, audio, multimedia)	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○
Using help files to learn a new computer application	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○
Assistive technologies (for vision, hearing, or developmentally impaired users)	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○
Posting to an online discussion forum	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○
Blackboard	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○
Evaluating digital media resources	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○
Peripherals, such as digital cameras,	1	2	3	4	5	6

scanners, microphones	○	○	○	○	○	○

0= Nonuse - I am not familiar and do not use

1 = Awareness - I have a basic awareness, but am not comfortable using

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3= Infusion - I am comfortable and use often

4= Integration - I am proficient and use as a regular part of my work

5 = Expansion - I am very confident and am able to occasionally adapt the technology to fit my needs

6 = Refinement - I am completely confident and frequently adapt the technology to fit my needs

Please rate your current level of proficiency with the following:

	1	2	3	4	5	6
Wikis	○	○	○	○	○	○
Blogs	○	○	○	○	○	○
Online social networking sites (e.g., Facebook)	○	○	○	○	○	○
Current level of proficiency creating or editing digital media, such as audio or graphics files	○	○	○	○	○	○
Current ability to use technology resources to facilitate higher order and complex thinking skills, knowledge construction, and creativity	○	○	○	○	○	○
Current ability to collaborate in constructing technology-enhanced models or producing other creative works using productivity tools	○	○	○	○	○	○
Current level of proficiency in using technology to locate, evaluate, and collect information from a variety of sources	○	○	○	○	○	○
Current level of proficiency to process data (i.e. spreadsheets) and report results (word processing)	○	○	○	○	○	○

Awareness of how technology is used in your major field of study	1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○

0= Nonuse - I am not familiar and do not use
1 = Awareness - I have a basic awareness, but am not comfortable using
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3= Infusion - I am comfortable and use often
4= Integration - I am proficient and use as a regular part of my work
5 = Expansion - I am very confident and am able to occasionally adapt the technology to fit my needs
6 = Refinement - I am completely confident and frequently adapt the technology to fit my needs

Please rate your current level of proficiency with the following:

Current level of proficiency in evaluating technology enhanced learning	1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○
Current level of proficiency to evaluate and select new information resources and technological innovations based on their appropriateness to specific tasks	1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○
Current level of proficiency to use a variety of media and formats, including telecommunications, to collaborate, publish, or interact with peers, experts, or other audiences	1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○
How would you rate your current level of knowledge in discussing diversity issues related to accessing and using technology?	1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ Lowest Highest

Appendix C
LoTi Digital Age Survey

Part I. 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.

Teacher Computer Use (TCU):

How often are you (the teacher) using digital tools and resources during the instructional day?

o *Never*
o *At least once a year*
o *At least once a month*
o *At least once a week*
o *At least once a day*
o *Multiple times each day*

Student Computer Use (SCU):

How often are your students using digital tools and resources during the instructional day?

o *Never*
o *At least once a year*
o *At least once a month*
o *At least once a week*
o *At least once a day*
o *Multiple times each day*

Part II. Participants completed survey questions 1-37, by selecting one of these responses:

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*

1: 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.

2: 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.

3: 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.

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

5: 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).

6: 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.

7: 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).

8: 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.

9: My students discover 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 pursue their individual curiosities and make a difference in their lives and in their community.

10: 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.

11: I use my school's digital tools and resources primarily to access the Internet, communicate with colleagues or parents, grade student work and/or plan instructional activities for my students.

12: I alone use the digital tools and resources in my classroom for tasks such as planning, preparing, presenting, and/or grading instructional activities.

13: 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.

14: 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.

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

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

17: 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.

18: I model for my students the safe and legal use of digital tools and resources when 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.

19: 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.

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

21: I continue to offer students learning activities that emphasize the use of digital tools and resources to solve "real-world" problems or issues, even though I sometimes experience issues during project implementation (e.g., student discipline problems, network errors, lack of time to plan the lessons, technical glitches).

22: 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.

23: 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.

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

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

26: 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).

27: 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).

28: 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.

29: 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.

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

31: 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.

32: 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.

33: 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.

34: 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.

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

36: 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.

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

Part III. Additional Questions Added by the Researcher

1 Are you a mentor teacher or a preservice teacher?
A Mentor Teacher
B Preservice Teacher

2 What do you perceive as your second greatest obstacle to further using technology in your instructional setting? (Research Question 2 – Barriers)

A Access to Technology
B Time to Learn, Practice, and Plan
C Other Priorities (e.g., Statewide Testing, New Textbook Adoptions)
D Lack of Staff Development Opportunities

3 What do you perceive as your third greatest obstacle to further using technology in your instructional setting? (Research Question 2 – Barriers)
A Access to Technology
B Time to Learn, Practice, and Plan
C Other Priorities (e.g., Statewide Testing, New Textbook Adoptions)
D Lack of Staff Development Opportunities

4 Have you completed University based coursework in Integrating Technology in the classroom such as ISTC 301?

A Yes
B No

5 Do you utilize technology integration skills acquired in the university coursework (i.e. students produced media projects like *PowerPoint*, websites, or student use of online collaborative research tools like Wiki's, Blogs, Databases) ?

A Not applicable (have not taken any technology integration coursework).
B Yes
C No

6 What importance do you place on the value of technology integration in the classroom?
A Very Important
B Important
C Marginally Important
D Not Important

7 Do you believe your instructional style more behaviorist based (teacher directed) or constructivist based (student centered)?
A Behaviorist
B Constructivist

8 Have you utilized technology integration skills acquired in the university coursework in your instructional setting (i.e. students produced media projects like *PowerPoint*, websites, or student use of online collaborative research tools like Wiki's, Blogs, Databases) ?
A Not applicable (have not taken any technology integration coursework).
B Yes
C

Appendix D

Master Content Code

Research Question	Research Instrument	Categories	Themes	Content Code
(Q3a) The relationship between technology resources available and the level in which preservice teachers integrate technology in internship-based teaching experiences?	(J) Journal Entries	(C) Contributing Resources	(S) Smartboard/Promethean Board Use	Q3AJCS
			(A)ActivInspire	Q3AJCA
			(EL) ELMO (Document Camera)	Q3AJCE
			(WS) Websites for Students	Q3AJCWS
			(WT) Websites for Teachers	Q3AJCWT
			(WI) Wiki	Q3AJCW
			(P) *PowerPoint*	Q3AJCP
			(S) *Safari Montage* (Multimedia Database)	Q3AJCS
			(C) Computers /Laptops/IPods(General)	Q3AJCC
			(V) Video, Audio, and Images File	Q3AJCV
			(G) General Contributions	Q3AJCG
		(L) Limitations	(GL) General Limitations	Q3AJLGL

Research Question	Research Instrument	Categories	Themes	Content Code
(Q3B) What other variables in preservice teaching placements affect the level in which preservice teachers integrate technology in	(J) Journal Entries	(L) Limitations	(GL) General Limitations	Q3BJLGL
		(E) Effect on Integration	(H) Help / increase / expand student learning	Q3BJEH
			(E) Engaging	Q3BJEE
			(M) Motivating	Q3BJEM
			(I) Inhibiting	Q3BJEI
			(D) Distracting	Q3BJED
			(U) Used properly / correctly	Q3BJEU

internship-based teaching experiences?			(O) Overwhelming- too much information	Q3BJEO

Appendix E

Research Questions Responses Database (RQR)

Research question 3a. Is there a relationship between technology resources available and the level in which preservice teachers integrate technology in internship-based teaching experiences?

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
1	Q3AJCS	1	ActivInspire on the Smartboard, ELMO, Brain Pop Jr!, *Safari Montage*, Time For Kids (Internet source)	(C) Contributing Resources	(S) Smartboard/Promethean Board Use
2	Q3AJCS	7	I have found that using the promethean board is very helpful.	(C) Contributing Resources	(S) Smartboard/Promethean Board Use
3	Q3AJCS	8	I also have used an interactive whiteboard one time and the students were very interested in the lesson.	(C) Contributing Resources	(S) Smartboard/Promethean Board Use
4	Q3AJCS	9	Individual student laptops, Promethean Board, ELMO, ActivInspire - Primary, Wiki program, Activotes, Ipod/speakers.	(C) Contributing Resources	(S) Smartboard/Promethean Board Use
5	Q3AJCS	10	Promethean board	(C) Contributing Resources	(S) Smartboard/Promethean Board Use
6	Q3AJCS	11	Promethean Board and ELMO	(C) Contributing Resources	(S) Smartboard/Promethean Board Use
7	Q3AJCS	12	Promethean board engages all types of learners in both the interactive sense and for the purpose of engaging students.	(C) Contributing Resources	(S) Smartboard/Promethean Board Use
8	Q3AJCS	13	Promethean board,	(C)	(S)

GQR I	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			ELMO	Contributing Resources	Smartboard/Promethean Board Use
9	Q3AJCS	17	The interactive whiteboards (specifically the Promethean Board) has been helpful in allowing students to get out of their seats and to be, well, interactive during typically dull parts of lessons. The boards also provide enlarged visuals of the text they have in front of them and they benefit from seeing me highlight/circle important parts of the text.	(C) Contributing Resources	(S) Smartboard/Promethean Board Use
10	Q3AJCS	18	Also *PowerPoint* and smart boards have been helpful in diversifying how information is presented in order to help students learn.	(C) Contributing Resources	(S) Smartboard/Promethean Board Use
11	Q3AJCS	20	The only resource I have had access to is the ELMO document camera. I find the ELMO very helpful. I attended an Interactive White Board training session through my internship seminar, but I have not had the opportunity to apply what I learned.	(C) Contributing Resources	(S) Smartboard/Promethean Board Use

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
12	Q3AJCS	21	They respond well to Smartboards or Promethean Boards, computers and Document Cameras. They love to be able to use flip charts on the promethean and I love that it provides them with visuals throughout the lesson.	(C) Contributing Resources	(S) Smartboard/Promethean Board Use
13	Q3AJCA	1	ActivInspire on the Smartboard, ELMO, Brain Pop Jr!, *Safari Montage*, Time For Kids (Internet source)	(C) Contributing Resources	(A) ActivInspire
14	Q3AJCA	9	Individual student laptops, Promethean Board, ELMO, ActivInspire - Primary, Wiki program, Activotes, iPod/speakers.	(C) Contributing Resources	(A) ActivInspire
15	Q3AJCA	21	…They love to be able to use flip charts on the promethean and I love that it provides them with visuals throughout the lesson.	(C) Contributing Resources	(A) ActivInspire
16	Q3AJCE	1	ActivInspire on the Smartboard, ELMO, Brain Pop Jr!, *Safari Montage*, Time For Kids (Internet source)	(C) Contributing Resources	(EL) ELMO (Document Camera)
17	Q3AJCE	1	Brain Pop, Jr., *Safari Montage*, ELMO projector	(C) Contributing Resources	(EL) ELMO (Document Camera)

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
18	Q3AJCE	3	Curriculum CD, ANY and ALL internet sources, Cells Alive, Learn Genetics.com, ELMO, Projector	(C) Contributing Resources	(EL) ELMO (Document Camera)
19	Q3AJCE	4	ELMO, *PowerPoint*, overhead, brain pop, teacher tube,	(C) Contributing Resources	(EL) ELMO (Document Camera)
20	Q3AJCE	9	Individual student laptops, Promethean Board, ELMO, Activinspire - Primary, Wiki program, Activotes, iPod/speakers.	(C) Contributing Resources	(EL) ELMO (Document Camera)
21	Q3AJCE	11	Promethean Board and ELMO	(C) Contributing Resources	(EL) ELMO (Document Camera)
22	Q3AJCE	13	Promethean board, ELMO	(C) Contributing Resources	(EL) ELMO (Document Camera)
23	Q3AJCE	20	The only resources I have had access to is the ELMO document camera. I find the ELMO very helpful. I attended an Interactive White Board training session through my internship seminar, but I have not had the opportunity to apply what I learned.	(C) Contributing Resources	(EL) ELMO (Document Camera)
24	Q3AJCE	21	They respond well to SmartBoards or Promethean Boards, computers and Document Cameras. They love to be able to use flip charts on	(C) Contributing Resources	(EL) ELMO (Document Camera)

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			the promethean and I love that it provides them with visuals throughout the lesson. Also, with the Document Camera, it allows them to follow along (without me having to make a transparency) and I can even display student work or books. The students also like the computer, we play spelling games in the computer lab. This resource also allows us to use different media, like movies in lessons (from sites like *Brainpop*Jr. and *Safari Montage*).		
25	Q3AJCWS	1	ActivInspire on the Smartboard, ELMO, Brain Pop Jr!, *Safari Montage*, Time For Kids (Internet source)	(C) Contributing Resources	(WS) Websites for Students
26	Q3AJCWS	2	Brain Pop, Jr., *Safari Montage*, ELMO projector	(C) Contributing Resources	(WS) Websites for Students
27	Q3AJCWS	3	Curriculum CD, ANY and ALL internet sources, Cells Alive, Learn Genetics.com, ELMO, Projector	(C) Contributing Resources	(WS) Websites for Students
28	Q3AJCWS	8	I have found that using videos from *Safari Montage* and	(C) Contributing Resources	(WS) Websites for Students

GQR I	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			Brainpop Jr., and creating *PowerPoint* with animations have helped me keep my students engaged. I also have used an interactive whiteboard one time and the students were very interested in the lesson. I think that using visual images and audio enhances the lessons for most of my learners.		
29	Q3AJC WS	9	Individual student laptops, Promethean Board, ELMO, ActivInspire - Primary, Wiki program, Activotes, iPod/speakers.	(C) Contributing Resources	(WS) Websites for Students
30	Q3AJC WS	18	The Internet and all it has to offer has been incredibility helpful for meeting the needs of students. There are many resources for teachers to give lesson starters and activities that can be used. Other people can have great ideas on how to teach certain content. Technology allows for teachers to share ideas and resources. Also *PowerPoint* and smart boards	(C) Contributing Resources	(WS) Websites for Students

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			have been helpful in diversifying how information is presented in order to help students learn.		
	Q3AJC WS	19	The internet and *PowerPoint*	(C) Contributing Resources	(WS) Websites for Students
31	Q3AJC WS	21	… The students also like the computer, we play spelling games in the computer lab. This resource also allows us to use different media, like movies in lessons (from sites like *Brainpop*Jr. and *Safari Montage*).	(C) Contributing Resources	(WS) Websites for Students
32	Q3AJC WT	3	Curriculum CD, ANY and ALL internet sources, Cells Alive, Learn Genetics.com, ELMO, Projector	(C) Contributing Resources	(WT) Websites for Teachers
33	Q3AJC WT	4	ELMO, *PowerPoint*, overhead, brain pop, teacher tube,	(C) Contributing Resources	(WT) Websites for Teachers
34	Q3AJC WT	5	I frequently search online to help develop lessons, manipulative, bulletin boards, etc., and have found much success. I use many kindergarten teacher websites for assistance and ideas.	(C) Contributing Resources	(WT) Websites for Teachers
35	Q3AJC WT	6	I have found *PowerPoint* Presentations very useful. I also really	(C) Contributing Resources	(WT) Websites for Teachers

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			enjoy using *Edline*. I have yet to use laptops, but would love to find a way to incorporate them into my classroom.		
36	Q3AJCWT	9	Individual student laptops, Promethean Board, ELMO, *ActivInspire* - Primary, Wiki program, Activotes, iPods/speakers.	(C) Contributing Resources	(WT) Websites for Teachers
37	Q3AJCWT	14	Scott Foresman online and other various teaching websites	(C) Contributing Resources	(WT) Websites for Teachers
38	Q3AJCWT	15	*TeacherTube*, *PowerPoint*, Online resources	(C) Contributing Resources	(WT) Websites for Teachers
39	Q3AJCWT	18	The Internet and all it has to offer has been incredible helpful for meeting the needs of students. There are many resources for teachers to give lesson starters and activities that can be used. Other people can have great ideas on how to teach certain content…	(C) Contributing Resources	(WT) Websites for Teachers
40	Q3AJCW	9	Individual student laptops, Promethean Board, ELMO, ActivInspire - Primary, Wiki program, Activotes, iPod/speakers.	C) Contributing Resources	(WI) Wikis
41	Q3AJCP	4	ELMO, *PowerPoint*,	(C)	(P) *PowerPoint*

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			overhead, brain pop, *TeacherTube*,	Contributing Resources	
42	Q3AJCP	6	I have found *PowerPoint* Presentations very useful. I also really enjoy using *Edline*. I have yet to use laptops, but would love to find a way to incorporate them into my classroom.	(C) Contributing Resources	(P) *PowerPoint*
43	Q3AJCP	8	I have found that using videos from *Safari Montage* and *Brainpop Jr.*, and creating *PowerPoint* with animations have helped me keep my students engaged. I also have used an interactive whiteboard one time and the students were very interested in the lesson. I think that using visual images and audio enhances the lessons for most of my learners.	(C) Contributing Resources	(P) *PowerPoint*
44	Q3AJCP	15	*TeacherTube*, *PowerPoint*, Online resources	(C) Contributing Resources	(P) *PowerPoint*
45	Q3AJCP	18	…. Also *PowerPoint* and smart boards have been helpful in diversifying how information is presented in order to help students learn.	(C) Contributing Resources	(P) *PowerPoint*
46	Q3AJCP	19	The internet and	(C)	(P) *PowerPoint*

GQR I	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			PowerPoint	Contributing Resources	
47	Q3AJCS	1	ActivInspire on the Smartboard, ELMO, Brain Pop Jr!, *Safari Montage*, Time For Kids (Internet source)	(C) Contributing Resources	(S) *Safari Montage* (Multimedia Database)
48	Q3AJCS	2	Brain Pop, Jr., *Safari Montage*, ELMO projector	(C) Contributing Resources	(S) *Safari Montage* (Multimedia Database)
49	Q3AJCS	8	I have found that using videos from *Safari Montage* and *Brainpop Jr.*, and creating *PowerPoint* with animations have helped me keep my students engaged. I also have used an interactive whiteboard one time and the students were very interested in the lesson. I think that using visual images and audio enhances the lessons for most of my learners.	(C) Contributing Resources	(S) *Safari Montage* (Multimedia Database)
50	Q3AJCS	21	The students also like the computer, we play spelling games in the computer lab. This resource also allows us to use different media, like movies in lessons (from sites like *Brainpop*Jr. and *Safari Montage*).	(C) Contributing Resources	(S) *Safari Montage* (Multimedia Database)
51	Q3AJC	9	Individual student	(C)	(C) Computers

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
	C		laptops, Promethean Board, ELMO, Activinspire - Primary, Wiki program, Activotes, iPod/speakers.	Contributing Resources	/Laptops/IPods(General)
52	Q3AJCC	21	They respond well to SmartBoards or Promethean Boards, computers and .Document Cameras….	(C) Contributing Resources	(C) Computers /Laptops/IPods(General)
53	Q3AJCC		Computers	(C) Contributing Resources	(C) Computers /Laptops/IPods(General)
54	Q3AJCV	8	I have found that using videos from *Safari Montage* and *Brainpop Jr.*, and creating *PowerPoint* with animations have helped me keep my students engaged. I also have used an interactive whiteboard one time and the students were very interested in the lesson. I think that using visual images and audio enhances the lessons for most of my learners.	(C) Contributing Resources	(V) Video, Audio, and Images File
55	Q3AJAG	9	I have a ton of technology resources in my internship.	(C) Contributing Resources	(G) General Contributions
	Q3AJLGL	3	I used the ELMO in my A placement which was August-October. At my B placement the only	(L) Limitations	(GL) General Limitations

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			technology accessible were *Safari Montage* videos.		
	Q3AJLGL	4	I would like to utilize technology more, specifically the SMART board. I think this would be very motivating for my students	(L) Limitations	(GL) General Limitations
	Q3AJLGL	5	In my placement this semester, the only technology I have is an overhead projector and a computer which is connected to the TV. Last semester my mentor got an ELMO half way through the semester and it was amazing.	(L) Limitations	(GL) General Limitations
	Q3AJLGL	6	Calculators may have inhibited student learning because they have not been used as resources, but as crutches. Students rely too heavily on the calculator because teachers want to break away from forcing students to memorize facts. Unfortunately, many instructors fail to realize that neither option is beneficial. We should be	(L) Limitations	(GL) General Limitations

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			helping students understand concepts and processes.		
	Q3AJLGL	8	I feel technology, when used correctly in the classroom, always contributes to learning. I have also found, however, that students can't be inhibited if technology is overused or if used inappropriately.	(L) Limitations	(GL) General Limitations
	Q3AJLGL	11	It helps students learn in different ways. The students definitely need a computer class, however, because too many basic needs stand in the way of true learning.	(L) Limitations	(GL) General Limitations
	Q3AJLGL	18	Technology engages and motivates students. They want to be the one who gets to press the buttons for Brain Pop or come up and write on the ELMO. It's something that they don't have at home and enjoy using. Sometimes though, when technology is inappropriate for a lesson and you try to make it fit into the lesson, technology can take away from	(L) Limitations	(GL) General Limitations

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			the focus of the lesson.		
	Q3AJL GL	19	Technology is not always perfect and does have limitations in the classroom. Technology has allowed more ways for students to cheat on testing and assignments. It is also sometimes not reliable. Resources may be taken off the internet and technology can break or break down.	(L) Limitations	(GL) General Limitations

3b. What other variables in preservice teaching placements affect the level in which preservice teachers integrate technology in internship-based teaching experiences (e.g. emphasis on traditional teaching methods etc.)?

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
1	Q3BJL GL	3	I used the ELMO in my A placement which was August-October. At my B placement the only technology accessible were *Safari Montage* videos.	(L) Limitations	(GL) General Limitations
2	Q3BJL GL	4	I would like to utilize technology more, specifically the SMART	(L) Limitations	(GL) General Limitations

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			board. I think this would be very motivating for my students		
3	Q3BJLGL	5	In my placement this semester, the only technology I have is an overhead projector and a computer which is connected to the TV. Last semester my mentor got an ELMO half way through the semester and it was amazing.	(L) Limitations	(GL) General Limitations
4	Q3BJLGL	6	Calculators may have inhibited student learning because they have not been used as resources, but as crutches. Students rely too heavily on the calculator because teachers want to break away from forcing students to memorize facts. Unfortunately, many instructors fail to realize that neither option is beneficial. We should be helping students understand concepts and processes.	(L) Limitations	(GL) General Limitations
5	Q3BJLGL	8	I feel technology, when used correctly in the classroom, always contributes to learning. I have also found, however, that students can't be inhibited if technology is overused or if used inappropriately.	(L) Limitations	(GL) General Limitations
6	Q3BJLGL	11	It helps students learn in different ways. The students definitely need a computer class, however, because too many basic needs stand in	(L) Limitations	(GL) General Limitations

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			the way of true learning.		
7	Q3BJLGL	18	Technology engages and motivates students. They want to be the one who gets to press the buttons for Brain Pop or come up and write on the ELMO. It's something that they don't have at home and enjoy using. Sometimes though, when technology is inappropriate for a lesson and you try to make it fit into the lesson, technology can take away from the focus of the lesson.	(L) Limitations	(GL) General Limitations
8	Q3BJLGL	19	Technology is not always perfect and does have limitations in the classroom. Technology has allowed more ways for students to cheat on testing and assignments. It is also sometimes not reliable. Resources may be taken off the internet and technology can break or break down.	(L) Limitations	(GL) General Limitations
9	Q3BJEH	1	Ability to access and display videos, music, and images is extremely beneficial for student learning, as are online learning resources. I believe technology only inhibits learning when it is not well prepared or planned.	(E) Effect on Integration	(H) Help / increase / expand student learning
10	Q3BJEH	2	Access to technology helps to expand students' learning.	(E) Effect on Integration	(H) Help / increase / expand student learning

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
11	Q3BJEH	3	Access to technology resources has definitely increased student learning! The students are drawn to technology in the classroom so it is very motivating for them when I use it! The more the students are motivated, the more they learn (because they want to).	(E) Effect on Integration	(H) Help / increase / expand student learning
12	Q3BJEH	8	I feel technology, when used correctly in the classroom, always contributes to learning. I have also found, however, that students can't be inhibited if technology is overused or if used inappropriately.	(E) Effect on Integration	(H) Help / increase / expand student learning
13	Q3BJEH	10	It contributes to student learning because the students find it more motivating and engaging in the classroom. The students want to pay attention because the technology is more fun than direct instruction.	(E) Effect on Integration	(H) Help / increase / expand student learning
14	Q3BJEH	11	It helps students learn in different ways. The students definitely need a computer class, however, because too many basic needs stand in the way of true learning.	(E) Effect on Integration	(H) Help / increase / expand student learning
15	Q3BJEH	14	Online activities seem to take longer because of the plethora of information on the internet, but I believe they get more from doing the research then me lecturing.	(E) Effect on Integration	(H) Help / increase / expand student learning

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
16	Q3BJEH	16	Students are motivated by technology so any opportunity to integrate it into the curriculum is definitely helpful.	(E) Effect on Integration	(H) Help / increase / expand student learning
17	Q3BJEH	19	Technology is a very vital resource that can help students learning but also inhibit their learning. Technology helps students access a broader range of information at a faster pace. The internet and the resources that are available are helpful resources in planning lessons and helping students think beyond themselves. Technology helps students with different learning style by providing ways to help students who are visual, auditory, and kinesthetic learners. Technology is not always perfect and does have limitations in the classroom. Technology has allowed more ways for students to cheat on testing and assignments. It is also sometimes not reliable. Resources may be taken off the internet and technology can break or break down.	(E) Effect on Integration	(H) Help / increase / expand student learning
18	Q3BJEH	22	The resources I use help me to develop more intriguing and challenging lessons for students.	(E) Effect on Integration	(H) Help / increase / expand student learning
19	Q3BJEE	4	All above technology resources were extremely	(E) Effect on Integration	(E) Engaging

GQR I	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			motivating for students; therefore, when used properly, lessons were engaging and effective. At times, devices (activotes/laptops) were distracting. Promethean Board also malfunctioned/need re calibration frequently		
20	Q3BJEE	7	Easy to see, engaging, interactive	(E) Effect on Integration	(E) Engaging
21	Q3BJEE	10	It contributes to student learning because the students find it more motivating and engaging in the classroom. The students want to pay attention because the technology is more fun than direct instruction.	(E) Effect on Integration	(E) Engaging
22	Q3BJEE	12	Keep students engaged, its interactive. Helps differentiate lessons for different learning styles	(E) Effect on Integration	(E) Engaging
23	Q3BJEE	15	Sometimes they are just too much. I think it is important to limit the amount of technology in a lesson. It can often take a lot of time to go from one piece of technology to another. Sometimes it also does work. In one lesson, I was using the Promethean board we lost power. That board is so big there is really no other space to write, so I just had to wing it by using my words. Technical issues are definitely a big issue with technology. Also,	(E) Effect on Integration	(E) Engaging

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			while interesting technology can be a motivator and engager, it can also be a distraction. Sometimes students don't pay attention because they are so focused on getting a turn on the Promethean or ELMO. Or, they get up to the Promethean and just want to play instead of doing what you have asked.		
24	Q3BJEE	18	Technology engages and motivates students. They want to be the one who gets to press the buttons for Brain Pop or come up and write on the ELMO. It's something that they don't have at home and enjoy using. Sometimes though, when technology is inappropriate for a lesson and you try to make it fit into the lesson, technology can take away from the focus of the lesson.	(E) Effect on Integration	(E) Engaging
25	Q3BJEE	20	Technology is engaging to students and motivates them to participate in the lesson, this usually contributes to their learning	(E) Effect on Integration	(E) Engaging
26	Q3BJEE	22	The resources I use help me to develop more intriguing and challenging lessons for students.	(E) Effect on Integration	(E) Engaging
27	Q3BJEM	3	Access to technology resources has definitely increased student learning! The students are drawn to technology in the classroom so it is very motivating for	(E) Effect on Integration	(M) Motivating

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			them when I use it! The more the students are motivated, the more they learn (because they want to).		
28	Q3BJEM	4	All above technology resources were extremely motivating for students; therefore, when used properly, lessons were engaging and effective. At times, devices (Activotes/laptops) were distracting. Promethean Board also malfunctioned/need re calibration frequently.	(E) Effect on Integration	(M) Motivating
29	Q3BJEM	10	It contributes to student learning because the students find it more motivating and engaging in the classroom. The students want to pay attention because the technology is more fun than direct instruction.	(E) Effect on Integration	(M) Motivating
30	Q3BJEM	15	Sometimes they are just too much. I think it is important to limit the amount of technology in a lesson. It can often take a lot of time to go from one piece of technology to another. Sometimes it also does work. In one lesson, I was using the Promethean board we lost power. That board is so big there is really no other space to write, so I just had to wing it by using my words. Technical issues are definitely a big issue	(E) Effect on Integration	(M) Motivating

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			with technology. Also, while interesting technology can be a motivator and engager, it can also be a distraction. Sometimes students don't pay attention because they are so focused on getting a turn on the Promethean or ELMO. Or, they get up to the Promethean and just want to play instead of doing what you have asked.		
31	Q3BJEM	16	Students are motivated by technology so any opportunity to integrate it into the curriculum is definitely helpful.	(E) Effect on Integration	(M) Motivating
32	Q3BJEM	18	Technology engages and motivates students. They want to be the one who gets to press the buttons for Brain Pop or come up and write on the ELMO. It's something that they don't have at home and enjoy using. Sometimes though, when technology is inappropriate for a lesson and you try to make it fit into the lesson, technology can take away from the focus of the lesson.	(E) Effect on Integration	(M) Motivating
33	Q3BJEM	20	Technology is engaging to students and motivated them to participate in the lesson, this usually contributes to their learning	(E) Effect on Integration	(M) Motivating
34	Q3BJEI	1	Ability to access and display videos, music, and images is extremely beneficial for student	(E) Effect on Integration	(I) Inhibiting

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			learning, as are online learning resources. I believe technology only inhibits learning when it is not well prepared or planned.		
35	Q3BJEI	6	Calculators may have inhibited student learning because they have not been used as resources, but as crutches. Students rely too heavily on the calculator because teachers want to break away from forcing students to memorize facts. Unfortunately, many instructors fail to realize that neither option is beneficial. We should be helping students understand concepts and processes.	(E) Effect on Integration	(I) Inhibiting
36	Q3BJEI	8	I feel technology, when used correctly in the classroom, always contributes to learning. I have also found, however, that students can't be inhibited if technology is overused or if used inappropriately.	(E) Effect on Integration	(I) Inhibiting
37	Q3BJEI	19	Technology is a very vital resource that can help students learning but also inhibit their learning. Technology helps students access a broader range of information at a faster pace. The internet and the resources that are available are helpful resources in planning lessons and helping students think	(E) Effect on Integration	(I) Inhibiting

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			beyond themselves. Technology helps students with different learning style by providing ways to help students who are visual, auditory, and kinesthetic learners. Technology is not always perfect and does have limitations in the classroom. Technology has allowed more ways for students to cheat on testing and assignments. It is also sometimes not reliable. Resources may be taken off the internet and technology can break or break down.		
38	Q3BJED	4	All above technology resources were extremely motivating for students; therefore, when used properly, lessons were engaging and effective. At times, devices (Activotes/laptops) were distracting. Promethean Board also malfunctioned/need re calibration frequently.	(E) Effect on Integration	(D) Distracting
39	Q3BJED	15	Sometimes they are just too much. I think it is important to limit the amount of technology in a lesson. It can often take a lot of time to go from one piece of technology to another. Sometimes it also does work. In one lesson, I was using the Promethean board we lost power. That board is so big there is really no other space to write, so I	(E) Effect on Integration	(D) Distracting

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			just had to wing it by using my words. Technical issues are definitely a big issue with technology. Also, while interesting technology can be a motivator and engager, it can also be a distraction. Sometimes students don't pay attention because they are so focused on getting a turn on the Promethean or ELMO. Or, they get up to the Promethean and just want to play instead of doing what you have asked.		
40	Q3BJED	17	Students benefit from technology by getting to participate actively in lessons. It allows teachers to use different tools to provide a better classroom environment. Can sometimes be a distraction for students but usually is not a problem.	(E) Effect on Integration	(D) Distracting
41	Q3BJED	18	Technology engages and motivates students. They want to be the one who gets to press the buttons for Brain Pop or come up and write on the ELMO. It's something that they don't have at home and enjoy using. Sometimes though, when technology is inappropriate for a lesson and you try to make it fit into the lesson, technology can take away from the focus of the lesson.	(E) Effect on Integration	(D) Distracting
42	Q3BJE	4	All above technology	(E) Effect on	(U) Used

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
	U		resources were extremely motivating for students; therefore, when used properly, lessons were engaging and effective. At times, devices (activotes/laptops) were distracting. Promethean Board also malfunctioned/need re calibration frequently.	Integration	properly / correctly
43	Q3BAU	8	I feel technology, when used correctly in the classroom, always contributes to learning. I have also found, however, that students can't be inhibited if technology is overused or if used inappropriately.	(E) Effect on Integration	(U) Used properly / correctly
44	Q3BJEO	14	Online activities seem to take longer because of the plethora of information on the internet, but I believe they get more from doing the research then me lecturing.	(E) Effect on Integration	(O) Overwhelming- too much information
45	Q3BJEO	15	Sometimes they are just too much. I think it is important to limit the amount of technology in a lesson. It can often take a lot of time to go from one piece of technology to another. Sometimes it also does work. In one lesson, I was using the Promethean board we lost power. That board is so big there is really no other space to write, so I just had to wing it by using my words. Technical issues	(E) Effect on Integration	(O) Overwhelming- too much information

GQRI	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			are definitely a big issue with technology. Also, while interesting technology can be a motivator and engager, it can also be a distraction. Sometimes students don't pay attention because they are so focused on getting a turn on the Promethean or ELMO. Or, they get up to the Promethean and just want to play instead of doing what you have asked.		
46	Q3BJEO	19	Technology is a very vital resource that can help students learning but also inhibit their learning. Technology helps students access a broader range of information at a faster pace. The internet and the resources that are available are helpful resources in planning lessons and helping students think beyond themselves. Technology helps students with different learning style by providing ways to help students who are visual, auditory, and kinesthetic learners. Technology is not always perfect and does have limitations in the classroom. Technology has allowed more ways for students to cheat on testing and assignments. It is also sometimes not reliable. Resources may be taken off the internet and technology	(E) Effect on Integration	(O) Overwhelming- too much information

GQR I	Master Content Code (MCC)	Participant (P)	Student (SR)Responses	Categories	Themes
			can break or break down.		

Note:

Appendices F, G, and H can be found on the enclosed CD.

Appendix F
Research Question 1 Data Charts

Research Question 1 - *Is there a relationship between preservice teacher predispositions towards technology integration and the level in which preservice teachers integrate technology in internship-based teaching placements?*
Table F1

Quantitative Data Sources – SPSSI Q3 and LoTiPQ1 (Spreadsheet Data)

SPSSI Q3- Spreadsheets

Score	Label	Frequency
0	Nonuse	4
1	Awareness	2
2	Exploration	4
3	Infusion	8
4	Integration	5
5	Expansion	6
6	Refinement	0

Note. Mean = 2.90

Table F2
LoTiPQ1- Spreadsheets

Score	Label	Frequency
0	Never	3
1	At least once a year	2
2	At least once a semester	1
3	At least once a month	5
4	A few times a month	5
5	At least once a week	3
6	A few times a week	5
7	At least once a day	5

Note. Mean =4.10

Table F3

Spreadsheets Correlation Table

Parameter		SPSSIQ3 Score	LoTiPQ1 Score
SPSSI Score	Pearson Correlation	1	.185
	Sig. (2-tailed)		.338
	N	29	29
LoTi Score	Pearson Correlation	.185	1
	Sig. (2-tailed)	.338	
	N	29	29

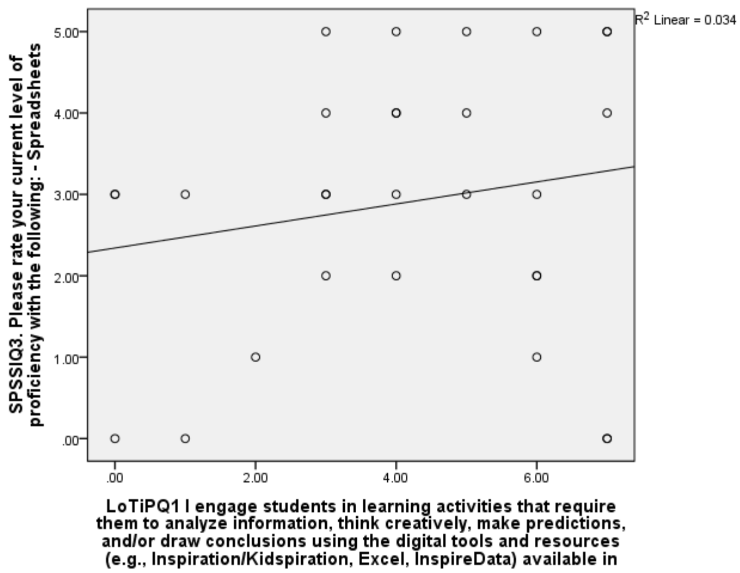

Figure F1. Scatter plot Graph for spreadsheets.

Table F4

Quantitative Data Sources – SPSSI Q9 and LoTiPQ1 (Inspiration Data)

SPSSI Q9- Inspiration

Score	Label	Frequency
0	Nonuse	5
1	Awareness	3
2	Exploration	4
3	Infusion	3
4	Integration	5
5	Expansion	5
6	Refinement	4

Note. Mean = 3.06

Table F5

LoTiPQ1- Inspiration

Score	Label	Frequency
0	Never	3
1	At least once a year	2
2	At least once a semester	1
3	At least once a month	5
4	A few times a month	5
5	At least once a week	3
6	A few times a week	5
7	At least once a day	5

Note. Mean = 4.10

Table F6

Inspiration Correlation Table

Parameter		SPSSIQ9 Score	LoTiPQ1 Score
SPSSIQ9 Score	Pearson Correlation	1	-.017
	Sig. (2-tailed)		.931
	N	29	29
LoTiPQ1 Score	Pearson Correlation	-.017	1
	Sig. (2-tailed)	.931	
	N	29	29

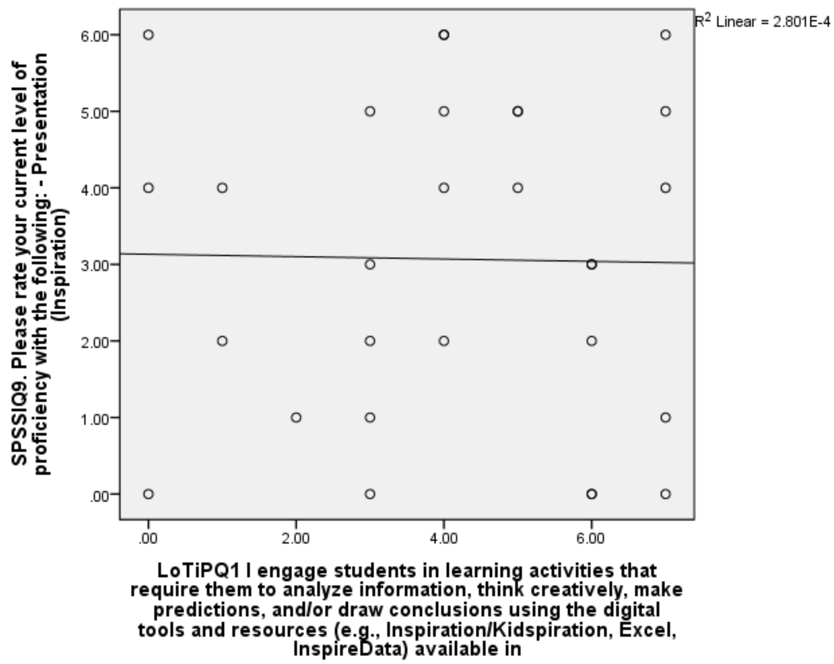

Figure F2. Scatter plot Graph for Inspiration.

Table F7

Quantitative Data Sources – SPSSIQ5 and LoTiPQ2 (Web Page Development_)

SPSSI Q5 – Web Page Development

Score	Label	Frequency
0	Nonuse	7
1	Awareness	8
2	Exploration	6
3	Infusion	
4	Integration	4
5	Expansion	3
6	Refinement	1

Note. Mean = 1.96

Table F8

LoTiPQ2- Web Page Development

Score	Label	Frequency
0	Never	12
1	At least once a year	3
2	At least once a semester	4
3	At least once a month	2
4	A few times a month	6
5	At least once a week	1
6	A few times a week	1
7	At least once a day	0

Note. Mean = 1.79

Table F9

Web Page Development Correlation Table

Parameter		SPSSIQ5 Score	LoTiPQ2 Score
SPSSIQ5 Score	Pearson Correlation	1	.540**
	Sig. (2-tailed)		.003
	N	29	29
LoTiPQ2 Score	Pearson Correlation	.540**	1
	Sig. (2-tailed)	.002	
	N	29	29

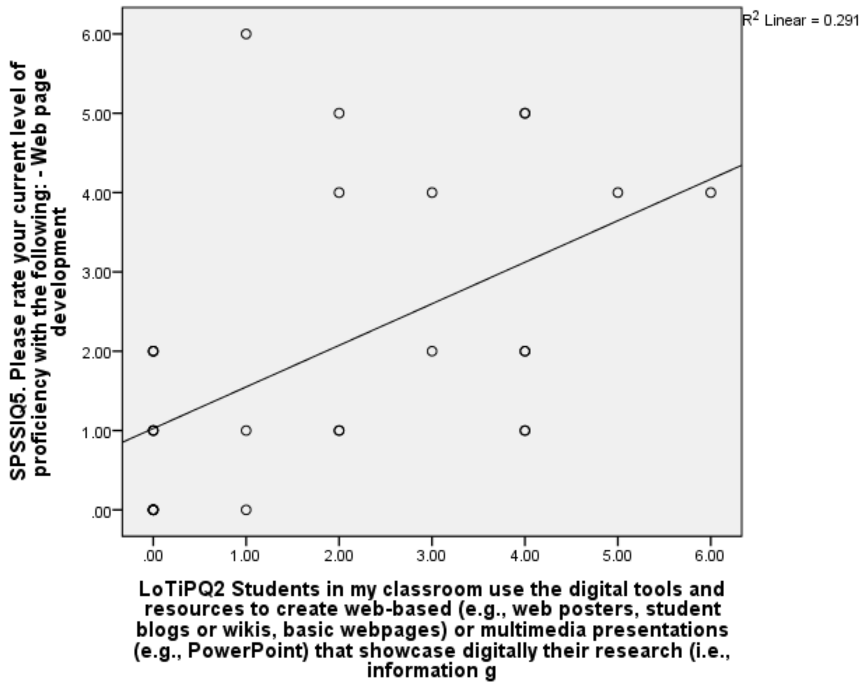

Figure F3. Scatter plot Graph for Web Page Development

Table F10

Quantitative Data Sources – SPSSI Q8 and LoTiPQ2 (PowerPoint)

SPSSI Q8 - PowerPoint

Score	Label	Frequency
0	Nonuse	1
1	Awareness	1
2	Exploration	2
3	Infusion	2
4	Integration	6
5	Expansion	7
6	Refinement	12

Note. Mean = 4.79

Table F11

LoTiPQ2- PowerPoint

Score	Label	Frequency
0	Never	12
1	At least once a year	3
2	At least once a semester	4
3	At least once a month	2
4	A few times a month	6
5	At least once a week	1
6	A few times a week	1
7	At least once a day	0

Note. Mean = 1.79

Table F12

PowerPoint Correlation Table

Parameter		SPSSIQ8 Score	LoTiPQ2 Score
SPSSIQ8 Score	Pearson Correlation	1	.361
	Sig. (2-tailed)		.055
	N	29	29
LoTiPQ2 Score	Pearson Correlation	.361	1
	Sig. (2-tailed)	.055	
	N	29	29

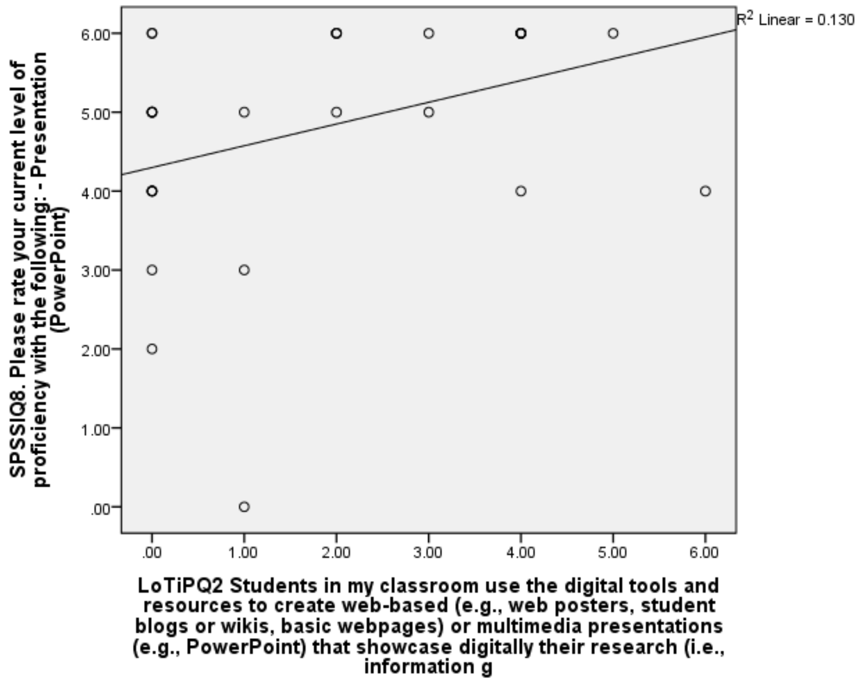

Figure F4. Scatter plot Graph for PowerPoint.

Table F13

Quantitative Data Sources – SPSSI Q17 and LoTiPQ2 (Wikis)

SPSSI Q17- Wikis

Score	Label	Frequency
0	Nonuse	4
1	Awareness	5
2	Exploration	3
3	Infusion	4
4	Integration	8
5	Expansion	5
6	Refinement	0

Note. Mean = 2.76

Table F14

LoTiPQ 2- Wikis

Score	Label	Frequency
0	Never	12
1	At least once a year	3
2	At least once a semester	4
3	At least once a month	2
4	A few times a month	6
5	At least once a week	1
6	A few times a week	1
7	At least once a day	0

Note. Mean = 1.79

Table F15

Wikis Correlation Table

Parameter		SPSSIQ17 Score	LoTiPQ2 Score
SPSSIQ17 Score	Pearson Correlation	1	.588**
	Sig. (2-tailed)		.001
	N	29	29
LoTiPQ 2 Score	Pearson Correlation	.588**	1
	Sig. (2-tailed)	.001	
	N	29	29

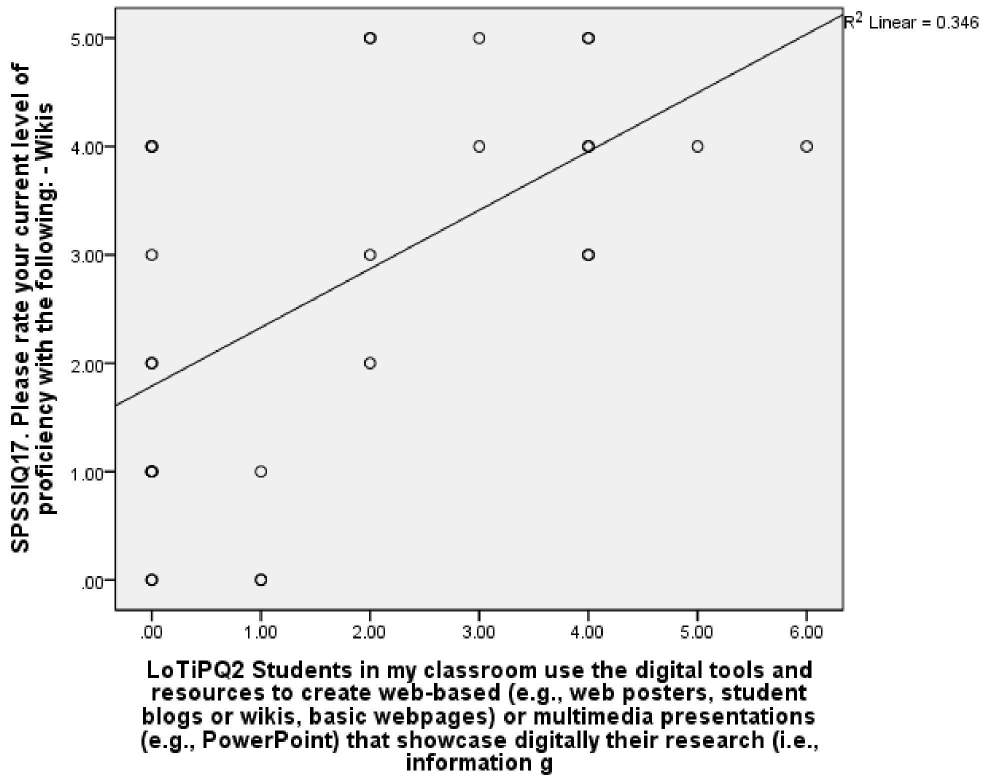

Figure F5. Scatter plot Graph for Wikis.

Table F16

Quantitative Data Sources – SPSSI Q18 and LoTiPQ2 (Blogs)

SPSSI Q18 - Blogs

Score	Label	Frequency
0	Nonuse	3
1	Awareness	4
2	Exploration	4
3	Infusion	6
4	Integration	6
5	Expansion	4
6	Refinement	1

Note. Mean = 3.00

Table F17

LoTiPQ2 - Blogs

Score	Label	Frequency
0	Never	12
1	At least once a year	3
2	At least once a semester	4
3	At least once a month	2
4	A few times a month	6
5	At least once a week	1
6	A few times a week	1
7	At least once a day	0

Note. Mean = 1.79

Table F18

Blogs Correlation Table

Parameter		SPSSIQ18 Score	LoTiPQ2 Score
SPSSIQ18 Score	Pearson Correlation	1	.277
	Sig. (2-tailed)		.145
	N	29	29
LoTiPQ2 Score	Pearson Correlation	.277	1
	Sig. (2-tailed)	.145	
	N	29	29

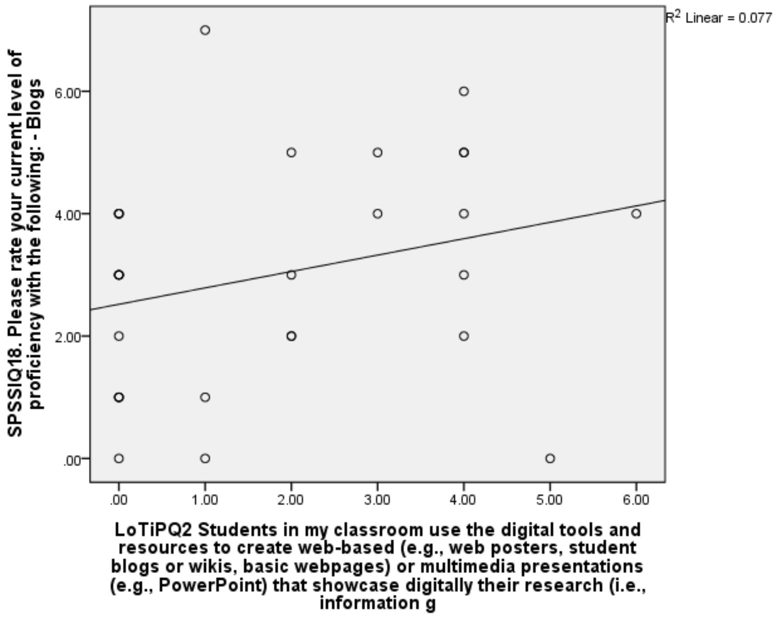

Figure F6. Scatter plot Graph for Blogs

Table F19

Quantitative Data Sources – SPSSIQ5 and LoTiPQ3 (Web Development/Assigning Web Projects)

SPSSI Q5 - Web Development/Assigning Web Projects

Score	Label	Frequency
0	Nonuse	7
1	Awareness	8
2	Exploration	6
3	Infusion	0
4	Integration	4
5	Expansion	3
6	Refinement	1

Note. Mean = 1.96

Table F20

LoTiPQ3 - Web Development/Assigning Web Projects

Score	Label	Frequency
0	Never	15
1	At least once a year	2
2	At least once a semester	4
3	At least once a month	2
4	A few times a month	0
5	At least once a week	2
6	A few times a week	3
7	At least once a day	1

Note. Mean = 1.82

Table F21

Web Development/Assigning Web Projects Correlation Table

Parameter		SPSSIQ5 Score	LoTiPQ3 Score
SPSSIQ5 Score	Pearson Correlation	1	.477**
	Sig. (2-tailed)		.009
	N	29	29
LoTiPQ3 Score	Pearson Correlation	.477**	1
	Sig. (2-tailed)	.009	
	N	29	29

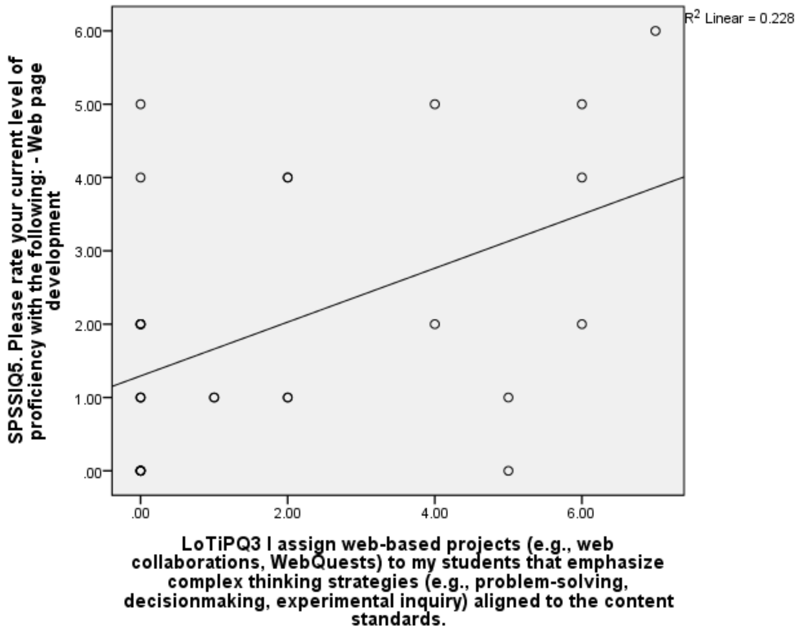

Figure F7. Scatter plot Graph for Web Development/Assigning Web Projects.

Table F22

Quantitative Data Sources – SPSSIQ22 and LoTiPQ5 (Promote Innovative Thinking)

SPSSI Q22- Promote Innovative Thinking

Score	Label	Frequency
0	Nonuse	4
1	Awareness	1
2	Exploration	7
3	Infusion	5
4	Integration	7
5	Expansion	2
6	Refinement	3

Note. Mean = 2.97

Table F23

LoTiPQ5 - Promote Innovative Thinking

Score	Label	Frequency
0	Never	5
1	At least once a year	2
2	At least once a semester	3
3	At least once a month	2
4	A few times a month	5
5	At least once a week	1
6	A few times a week	6
7	At least once a day	5

Note. Mean = 3.79

Table F24

Promote Innovative Thinking Correlation Table

Parameter		SPSSIQ22 Score	LoTiPQ5 Score
SPSSIQ22 Score	Pearson Correlation	1	.259
	Sig. (2-tailed)		.176
	N	29	29
LoTiPQ5 Score	Pearson Correlation	.259	1
	Sig. (2-tailed)	176	
	N	29	29

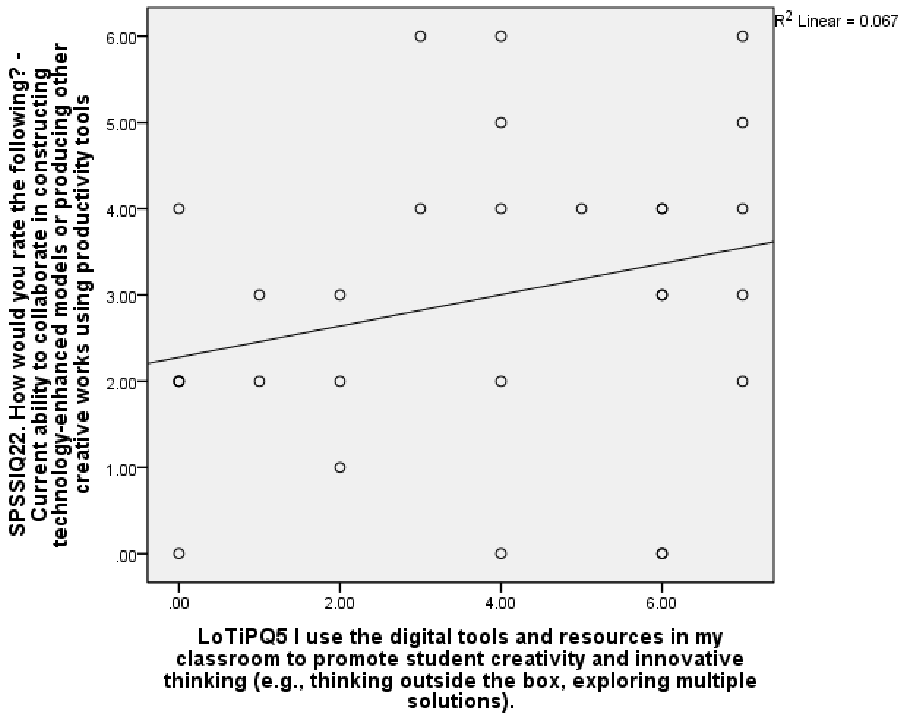

Figure F8. Scatter plot Graph for Promote Innovative Thinking.

Table F25

Quantitative Data Sources – SPSSIQ22 and LoTiPQ6 (Using Collaborative Productivity Tools)

SPSSI Q22 - Using Collaborative Productivity Tools

Score	Label	Frequency
0	Nonuse	4
1	Awareness	1
2	Exploration	7
3	Infusion	5
4	Integration	7
5	Expansion	2
6	Refinement	3

Note. Mean = 2.97

Table F26

LoTiPQ6 - Using Collaborative Productivity Tools

Score	Label	Frequency
0	Never	7
1	At least once a year	5
2	At least once a semester	5
3	At least once a month	2
4	A few times a month	3
5	At least once a week	2
6	A few times a week	2
7	At least once a day	3

Note. Mean = 2.62

Table F27

Using Collaborative Productivity Tools Correlation Table

Parameter		SPSSIQ22 Score	LoTiPQ6 Score
SPSSIQ22 Score	Pearson Correlation	1	.206
	Sig. (2-tailed)		.284
	N	29	29
LoTiPQ6 Score	Pearson Correlation	.206	1
	Sig. (2-tailed)	.284	
	N	29	29

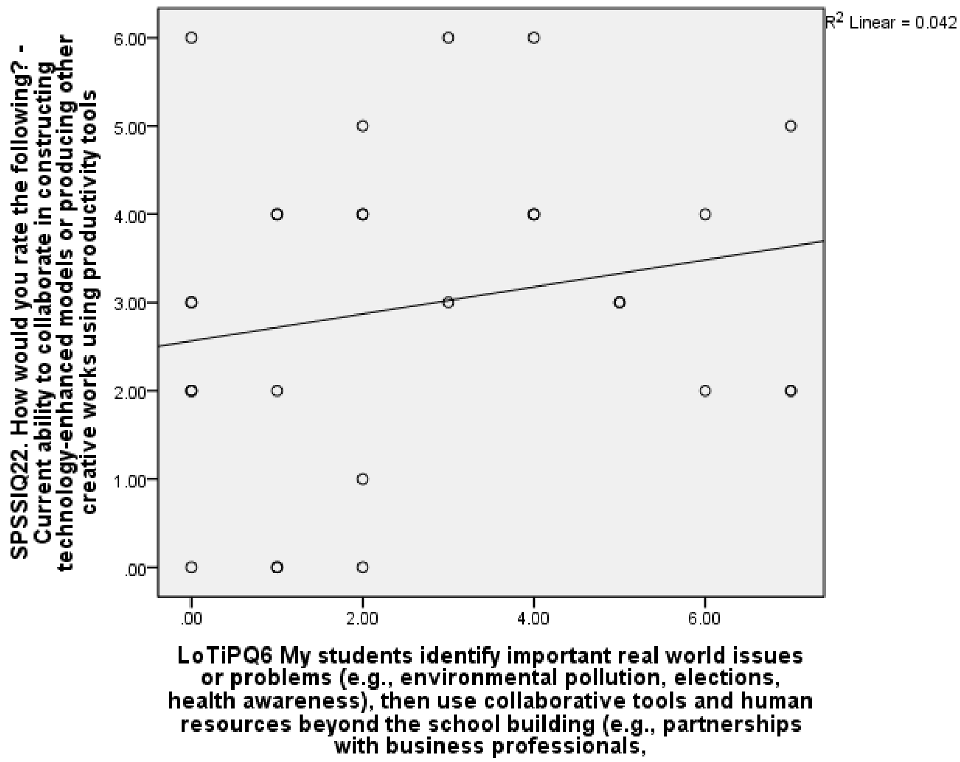

Figure F9. Scatter plot Graph for Using Collaborative Productivity Tools.

Table 28

Quantitative Data Sources – SPSSIQ17 and LoTiPQ8 (Wikis - Digital Media for Communication to Parents, Peers, and Students)

SPSSI Q17 - Wikis - Digital Media for Communication to Parents, Peers, and Students

Score	**Label**	**Frequency**
0	Nonuse	4
1	Awareness	5
2	Exploration	3
3	Infusion	4
4	Integration	8
5	Expansion	5
6	Refinement	0

Note. Mean = 2.76

Table F29

LoTiPQ8 - Wikis - Digital Media for Communication to Parents, Peers, and Students

Score	Label	Frequency
0	Never	7
1	At least once a year	2
2	At least once a semester	7
3	At least once a month	1
4	A few times a month	7
5	At least once a week	1
6	A few times a week	3
7	At least once a day	1

Note. Mean = 2.66

Table F30

Wikis - Digital Media for Communication to Parents, Peers, and Students Correlation Table

Parameter		SPSSIQ17 Score	LoTiPQ8 Score
SPSSIQ17 Score	Pearson Correlation	1	.378*
	Sig. (2-tailed)		.043
	N	29	29
LoTiPQ 8 Score	Pearson Correlation	.378*	1
	Sig. (2-tailed)		
	N	.043	

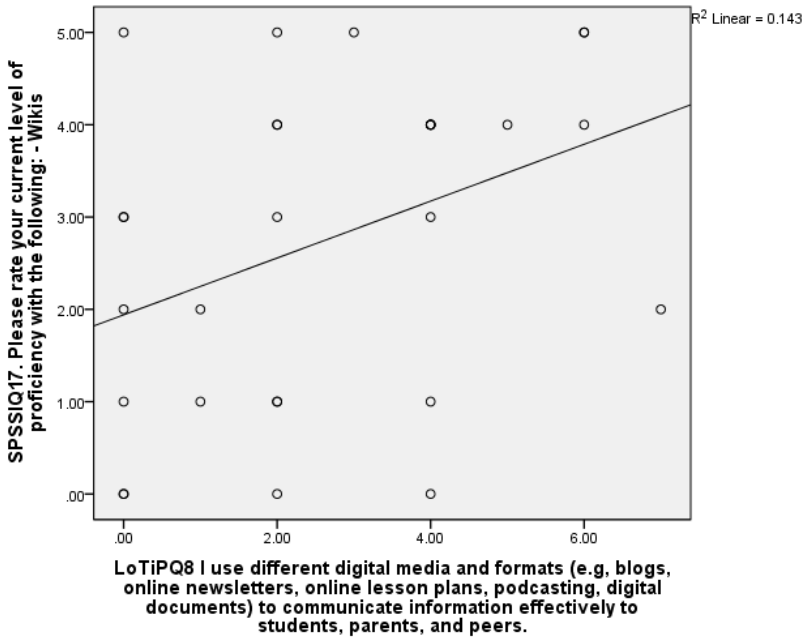

Figure F10. Scatter plot Graph for Wikis - Digital Media for Communication to Parents, Peers, and Students.

Table F31

Quantitative Data Sources – SPSSI Q18and LoTiPQ8 (Blogs - Digital Media for Communication to Parents, Peers, and Students)

SPSSIQ18 - Blogs - Digital Media for Communication to Parents, Peers, and Students

Score	Label	Frequency
0	Nonuse	3
1	Awareness	4
2	Exploration	4
3	Infusion	6
4	Integration	6
5	Expansion	4
6	Refinement	1

Note. Mean = 3.00

Table F32

LoTiPQ8 - Blogs - Digital Media for Communication to Parents, Peers, and Students

Score	Label	Frequency
0	Never	7
1	At least once a year	2
2	At least once a semester	7
3	At least once a month	1
4	A few times a month	7
5	At least once a week	1
6	A few times a week	3
7	At least once a day	1

Note. Mean = 2.66

Table F33

Blogs - Digital Media for Communication to Parents, Peers, and Students Correlation Table

Parameter		SPSSIQ18 Score	LoTiPQ8 Score
SPSSIQ18 Score	Pearson Correlation	1	.277
	Sig. (2-tailed)		.235
	N	29	29
LoTiPQ8 Score	Pearson Correlation	.227	1
	Sig. (2-tailed)	.235	
		29	
	N		29

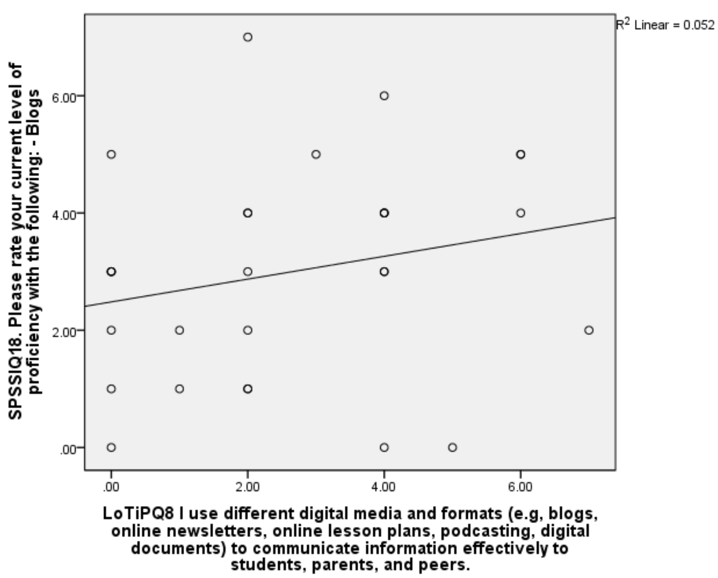

Figure F11. Scatter plot Graph for Blogs - Digital Media for Communication to Parents, Peers, and Students

Table F34

Quantitative Data Sources – SPSSI Q2 and LoTiQ8 (E-mail - Digital Media for Communication to Parents, Peers, and Students)

SPSSI Q12 - E-mail - Digital Media for Communication to Parents, Peers, and Students

Score	Label	Frequency
0	Nonuse	0
1	Awareness	0
2	Exploration	1
3	Infusion	0
4	Integration	2
5	Expansion	7
6	Refinement	19

Note. Mean = 5.51

Table F35

LoTiPQ8 - E-mail - Digital Media for Communication to Parents, Peers, and Students

Score	Label	Frequency
0	Never	7
1	At least once a year	2
2	At least once a semester	7
3	At least once a month	1
4	A few times a month	7
5	At least once a week	1
6	A few times a week	3
7	At least once a day	1

Note. Mean = 2.66

Table F36

E-mail - Digital Media for Communication to Parents, Peers, and Students Correlation Table

Parameter		SPSSIQ12 Score	LoTiPQ8 Score
SPSSIQ12 Score	Pearson Correlation	1	.108
	Sig. (2-tailed)		.576
	N	29	29
LoTiPQ8 Score	Pearson Correlation	.108	1
	Sig. (2-tailed)	.576	
	N	29	29

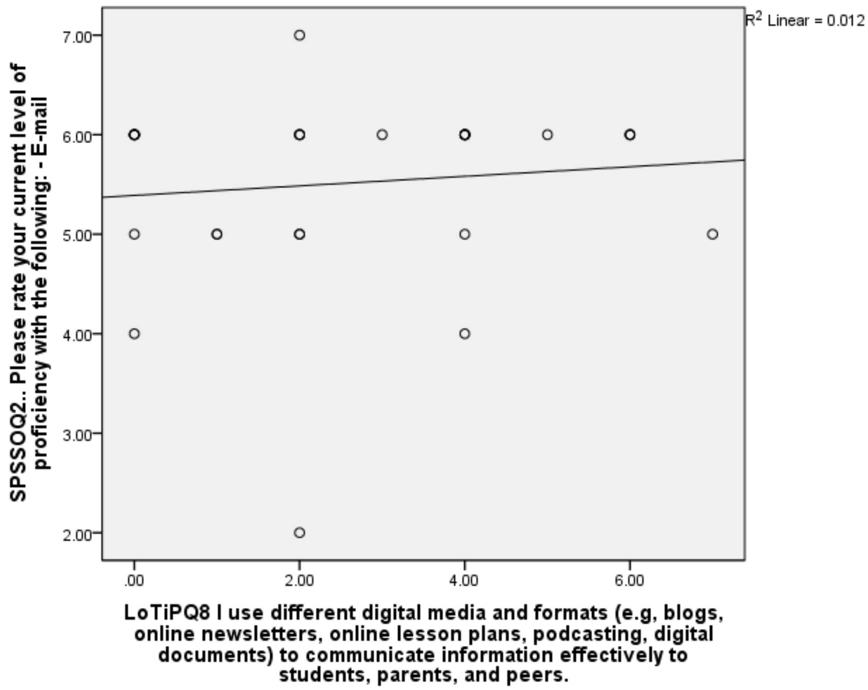

Figure F12. Scatter plot Graph for E-mail - Digital Media for Communication to Parents, Peers, and Students.

Table F37

Quantitative Data Sources – SPSSIQ28 and LoTiPQ8 (Use a Variety of Media to Collaborate – Digital Media for Communication to Parents, Peers, and Students)

SPSSIQ28 - *Use a Variety of Media to Collaborate – Digital Media for Communication to Parents, Peers, and Students*

Score	Label	Frequency
0	Nonuse	0
1	Awareness	3
2	Exploration	9
3	Infusion	8
4	Integration	1
5	Expansion	7
6	Refinement	1

Note. Mean = 3.10

Table F38

LoTiPQ8 - Use a Variety of Media to Collaborate – Digital Media for Communication to Parents, Peers, and Students

Score	Label	Frequency
0	Never	7
1	At least once a year	2
2	At least once a semester	7
3	At least once a month	1
4	A few times a month	7
5	At least once a week	1
6	A few times a week	3
7	At least once a day	1

Note. Mean = 2.66

Table F39

Use a Variety of Media to Collaborate – Digital Media for Communication to Parents, Peers, and Students Correlation Table

Parameter		SPSSIQ28 Score	LoTiPQ8 Score
SPSSIQ28 Score	Pearson Correlation	1	.288
	Sig. (2-tailed)		.129
	N	29	29
LoTiPQ8 Score	Pearson Correlation	.288	1
	Sig. (2-tailed)	.129	
	N	29	29

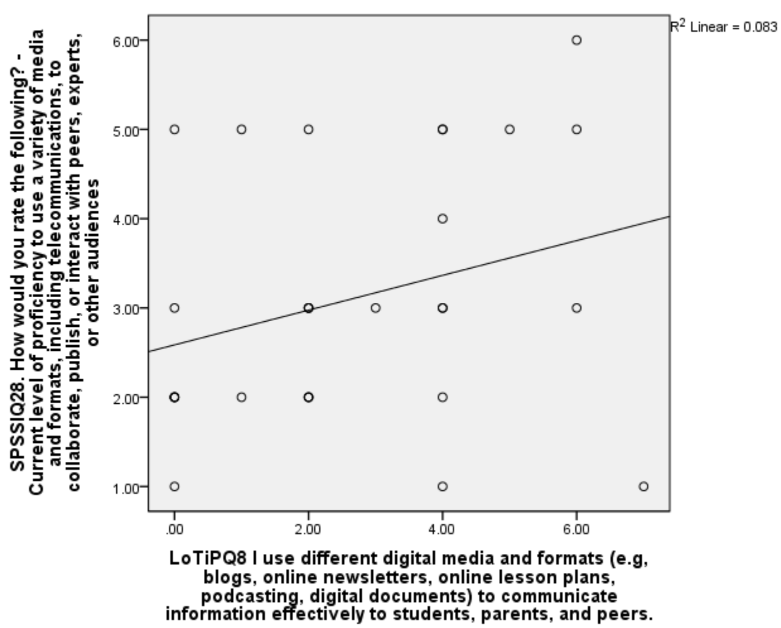

Figure F13. Scatter plot Graph for Use a Variety of Media to Collaborate – Digital Media for Communication to Parents, Peers, and Students.

Table F40

Quantitative Data Sources – SPSSIQ17 and LoTiP10 (Wikis - 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)
SPSSI Q17 - Wikis - 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)

Score	Label	Frequency
0	Nonuse	4
1	Awareness	5
2	Exploration	3
3	Infusion	4
4	Integration	8
5	Expansion	5
6	Refinement	0

Note. Mean = 2.76

Table F41

LoTiPQ10- Wikis - 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)

Score	Label	Frequency
0	Never	5
1	At least once a year	1
2	At least once a semester	3
3	At least once a month	6
4	A few times a month	4
5	At least once a week	0
6	A few times a week	6
7	At least once a day	4

Note. Mean = 3.62

Table F42

Wikis - 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) Correlation Table

Parameter		SPSSIQ17 Score	LoTiPQ10 Score
SPSSIQ17 Score	Pearson Correlation	1	.208
	Sig. (2-tailed)		.884
	N	29	29
LoTiPQ10 Score	Pearson Correlation	.028	1
	Sig. (2-tailed)	.884	
	N	29	29

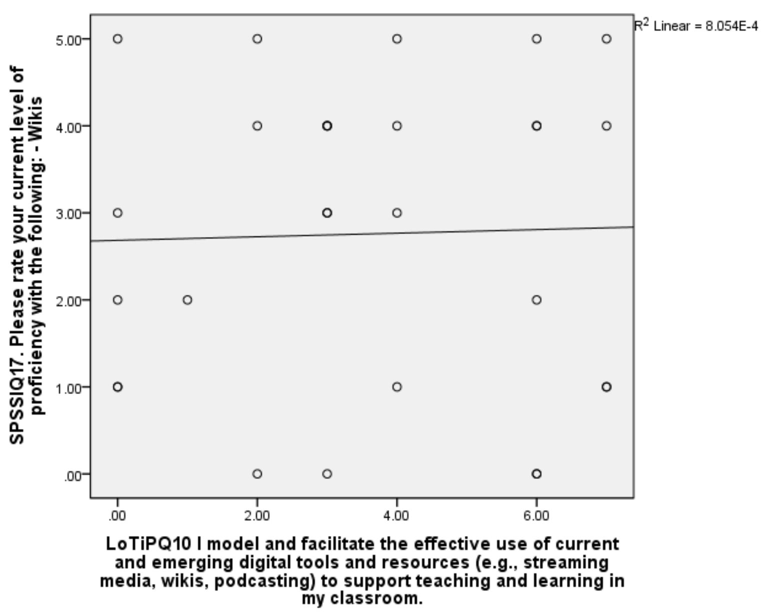

Figure F14. Scatter plot Graph for Model and Facilitate the Effective Use of Current and Emerging Digital Tools and Resources

Table F43

Quantitative Data Sources – SPSSIQ10 and LoTiPQ10 (Online Digital Media – Audio, Video Multimedia - 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)

SPSSI Q10 - Online Digital Media – Audio, Video Multimedia - 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)

Score	**Label**	**Frequency**
0	Nonuse	3
1	Awareness	3
2	Exploration	7
3	Infusion	3
4	Integration	4
5	Expansion	2
6	Refinement	7

Note. Mean = 3.24

Table F44

LoTiPQ10 - Online Digital Media – Audio, Video Multimedia - 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)

Score	Label	Frequency
0	Never	5
1	At least once a year	1
2	At least once a semester	3
3	At least once a month	6
4	A few times a month	4
5	At least once a week	0
6	A few times a week	6
7	At least once a day	4

Note. Mean = 3.62

Table F45

Online Digital Media – Audio, Video Multimedia - 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) Correlation Table

Parameter		SPSSIQ10 Score	LoTiPQ10 Score
SPSSIQ10 Score	Pearson Correlation	1	-.002
	Sig. (2-tailed)		.990
	N	29	29
LoTiPQ10 Score	Pearson Correlation	-.002	1
	Sig. (2-tailed)	.990	
	N	29	29

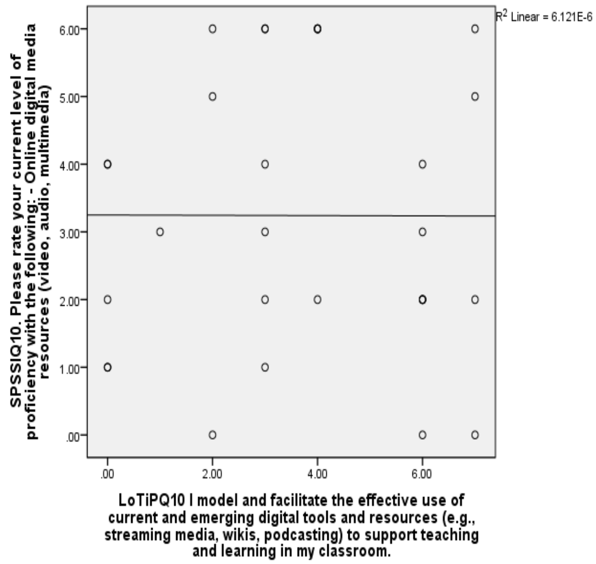

Figure F15. Scatter plot Graph for Online Digital Media – Audio, Video Multimedia - Model and Facilitate the Effective Use of Current and Emerging Digital Tools and Resources (e.g., streaming media, wikis, podcasting) to support teaching and learning in my classroom.

Table F46

Quantitative Data Sources – SPSSIQ25 and LoTiPQ13 – (Technology Used in Major Field of Study)

SPSSI Q25 - Technology Used in Major Field of Study

Score	Label	Frequency
0	Nonuse	0
1	Awareness	2
2	Exploration	2
3	Infusion	3
4	Integration	7
5	Expansion	10
6	Refinement	5

Note. Mean = 4.28

Table F47

LoTiPQ13 - Technology Used in Major Field of Study

Score	Label	Frequency
0	Never	13
1	At least once a year	2
2	At least once a semester	1
3	At least once a month	1
4	A few times a month	4
5	At least once a week	1
6	A few times a week	6
7	At least once a day	1

Note. Mean = 2.44

Table F48

Technology Used in Major Field of Study Correlation Table

Parameter		SPSSIQ25 Score	LoTiPQ13 Score
SPSSIQ25 Score	Pearson Correlation	1	.131
	Sig. (2-tailed)		.497
	N	29	29
LoTiPQ13 Score	Pearson Correlation	.131	1
	Sig. (2-tailed)	.497	
	N	29	29

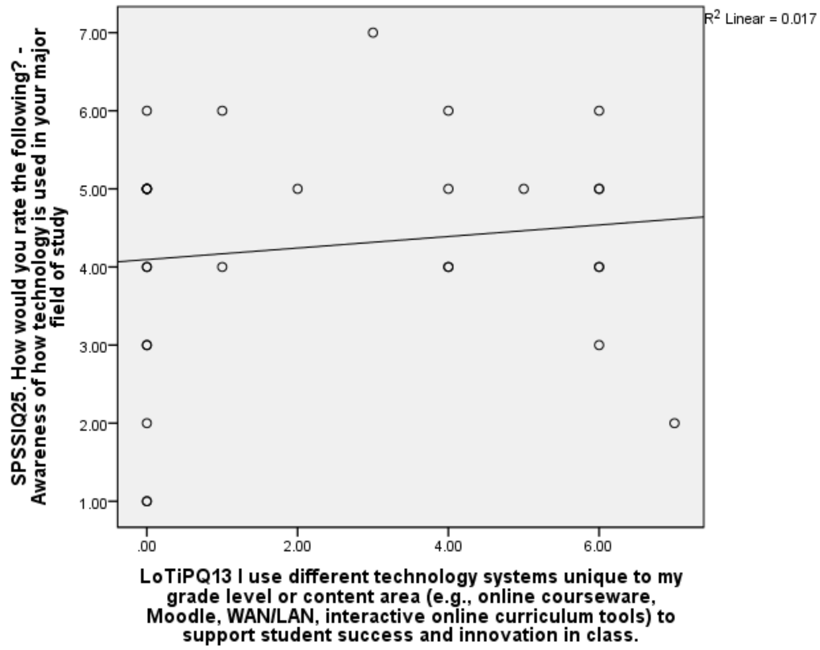

Figure F16. Scatter plot Graph for Technology Used in Major Field of Study.

Table F49

Quantitative Data Sources -SPSSIQ28 and LoTiPQ17 (Use Digital Tools to Collaborate, Publish, or Interact)

SPSSI Q28 - Use Digital Tools to Collaborate, Publish, or Interact

Score	Label	Frequency
0	Nonuse	0
1	Awareness	2
2	Exploration	3
3	Infusion	8
4	Integration	1
5	Expansion	7
6	Refinement	1

Note. Mean = 3.10

Table F50

LoTiPQ17 - Use Digital Tools to Collaborate, Publish, or Interact

Score	Label	Frequency
0	Never	6
1	At least once a year	2
2	At least once a semester	3
3	At least once a month	4
4	A few times a month	5
5	At least once a week	4
6	A few times a week	3
7	At least once a day	2

Note. Mean = 3.17

Table F51

Use Digital Tools to Collaborate, Publish, or Interact Correlation Table

Parameter		SPSSIQ28 Score	LoTiPQ17 Score
SPSSIQ28 Score	Pearson Correlation	1	.429*
	Sig. (2-tailed)		.020
	N	29	29
LoTiPQ17 Score	Pearson Correlation	.429*	1
	Sig. (2-tailed)	.020	
	N	29	29

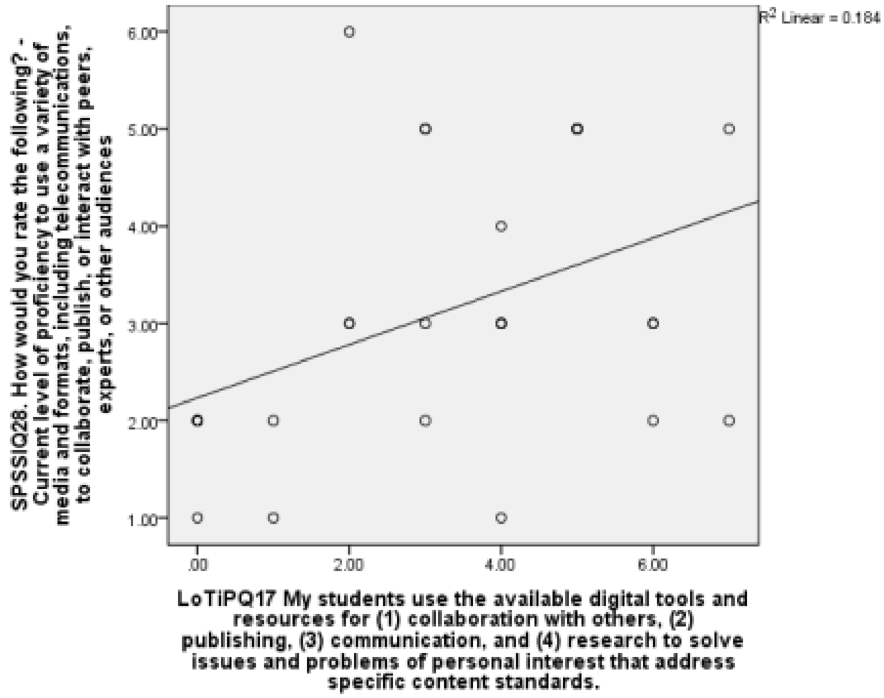

Figure F17. Scatter plot Graph for Use Digital Tools to Collaborate, Publish, or Interact.

Table F52

Quantitative Data Sources – SPSSI Q21 and LoTiPQ22 (Technology Used to Emphasize Higher Order or Innovative Thinking)

SPSSI Q21- Technology Used to Emphasize Higher Order or Innovative Thinking

Score	Label	Frequency
0	Nonuse	4
1	Awareness	1
2	Exploration	6
3	Infusion	5
4	Integration	9
5	Expansion	2
6	Refinement	2

Note. Mean = 3.00

Table F53

LoTiPQ22 - Technology Used to Emphasize Higher Order or Innovative Thinking

Score	Label	Frequency
0	Never	2
1	At least once a year	1
2	At least once a semester	0
3	At least once a month	1
4	A few times a month	8
5	At least once a week	6
6	A few times a week	6
7	At least once a day	5

Note. Mean = 4.72

Table F54

Technology Used to Emphasize Higher Order or Innovative Thinking Correlation Table

Parameter		SPSSIQ21 Score	LoTiPQ22 Score
SPSSIQ21 Score	Pearson Correlation	1	.195
	Sig. (2-tailed)		.310
	N	29	29
LoTiPQ 22 Score	Pearson Correlation	.195	1
	Sig. (2-tailed)	.310	
	N	29	29

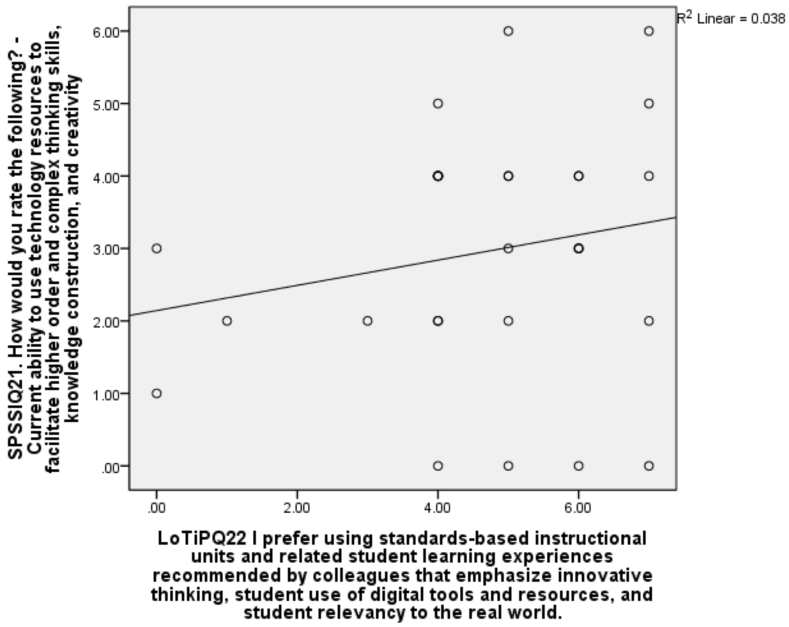

Figure F18. Scatter plot Graph for Technology Used to Emphasize Higher Order or Innovative Thinking

Table F55

Quantitative Data Sources – SPSSIQ4 and LoTiPQ28 (Digital Tools for Research)

SPSSI Q4 - Digital Tools for Research

Score	Label	Frequency
0	Nonuse	1
1	Awareness	2
2	Exploration	6
3	Infusion	2
4	Integration	5
5	Expansion	9
6	Refinement	4

Note. Mean = 3.76

Table F56

LoTiPQ28 - Digital Tools for Research

Score	Label	Frequency
0	Never	9
1	At least once a year	2
2	At least once a semester	3
3	At least once a month	4
4	A few times a month	7
5	At least once a week	2
6	A few times a week	1
7	At least once a day	1

Note. Mean = 2.44

Table F57

Digital Tools for Research Correlation Table

Parameter		SPSSIQ4 Score	LoTiPQ28 Score
SPSSIQ4 Score	Pearson Correlation	1	-.038
	Sig. (2-tailed)		.844
	N	29	29
LoTiPQ28 Score	Pearson Correlation	-.038	1
	Sig. (2-tailed)	.844	
	N	29	29

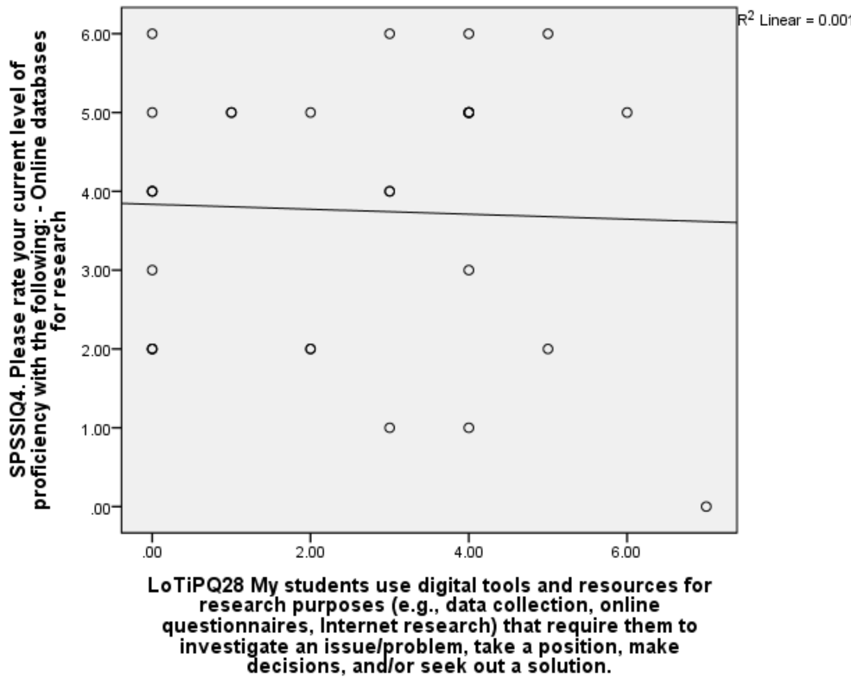

Figure F19. Scatter plot Graph for Digital Tools for Research.

Table F58

Quantitative Data Sources – SPSSIQ21 and LoTiQ33 (Use Technology Resources for Higher Order Thinking)

SPSSI Q21 - Use Technology Resources for Higher Order Thinking

Score	Label	Frequency
0	Nonuse	4
1	Awareness	1
2	Exploration	6
3	Infusion	5
4	Integration	9
5	Expansion	2
6	Refinement	2

Note. Mean = 3.00

Table F59

LoTiPQ33- Use Technology Resources for Higher Order Thinking

Score	Label	Frequency
0	Never	6
1	At least once a year	1
2	At least once a semester	2
3	At least once a month	4
4	A few times a month	3
5	At least once a week	4
6	A few times a week	7
7	At least once a day	2

Note. Mean = 3.62

Table F60

Use Technology Resources for Higher Order Thinking *Correlation Table*

Parameter		SPSSIQ21 Score	LoTiPQ33 Score
SPSSIQ21 Score	Pearson Correlation	1	.389*
	Sig. (2-tailed)		.037
	N	29	29
LoTiPQ33 Score	Pearson Correlation	.389*	1
	Sig. (2-tailed)	.037	
	N	29	29

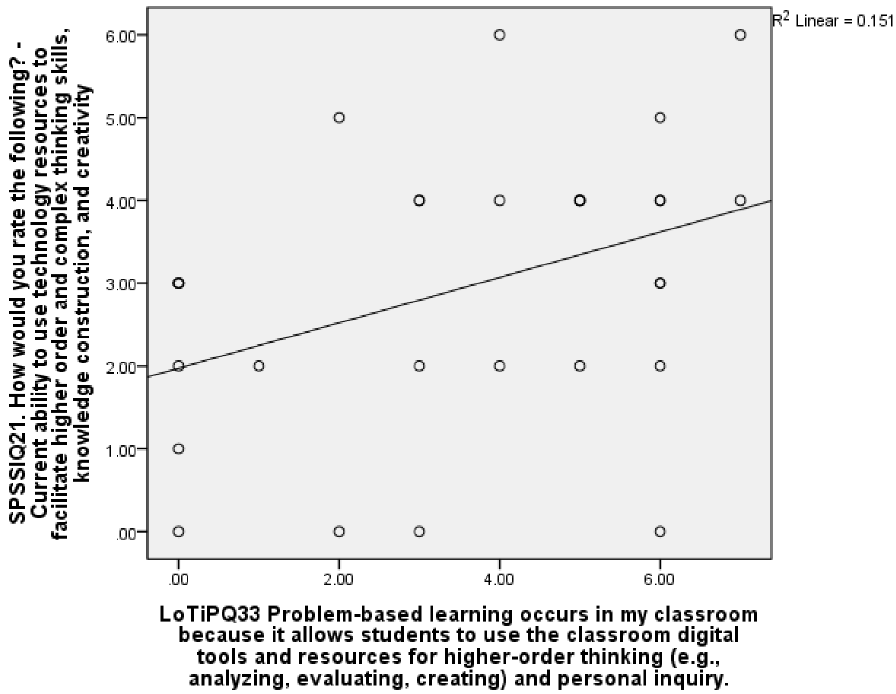

Figure F20. Scatter plot Graph for Use Technology Resources for Higher Order Thinking.

Table F61

Quantitative Data Sources – SPSSIQ12 and LoTiQ35 (Assistive Technologies)

SPSSI Q12 - Assistive Technologies

Score	**Label**	**Frequency**
0	Nonuse	7
1	Awareness	8
2	Exploration	5
3	Infusion	7
4	Integration	0
5	Expansion	1
6	Refinement	1

Note. Mean = 1.76

Table F62

LoTiPQ35 Assistive Technologies

Score	Label	Frequency
0	Never	7
1	At least once a year	2
2	At least once a semester	5
3	At least once a month	0
4	A few times a month	6
5	At least once a week	2
6	A few times a week	4
7	At least once a day	3

Note. Mean = 3.13

Table F63

Assistive Technologies Correlation Table

Parameter		SPSSIQ12 Score	LoTiPQ35 Score
SPSSIQ12 Score	Pearson Correlation	1	-.027
	Sig. (2-tailed)		.891
	N	29	.29
LoTiPQ35 Score	Pearson Correlation	-.027	1
	Sig. (2-tailed)	.891	
	N	29	29

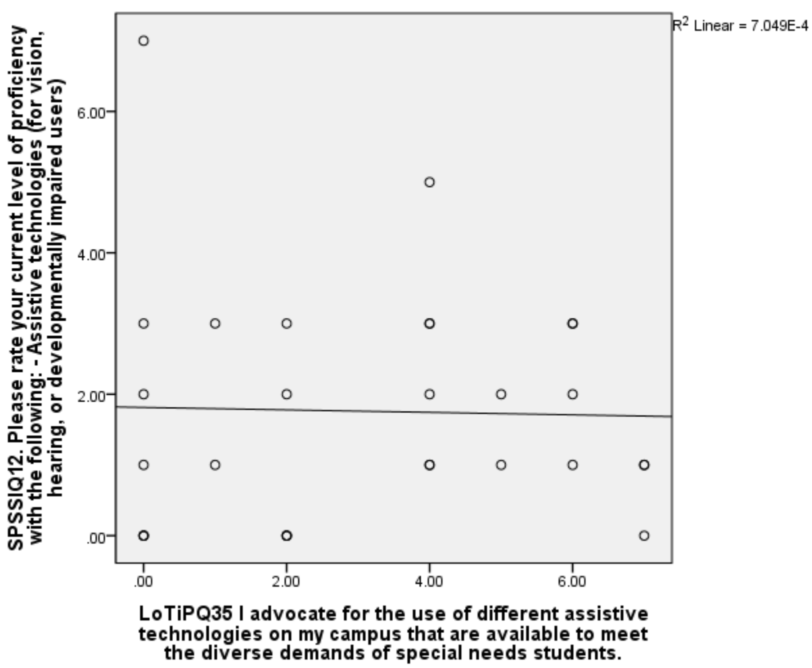

Figure F21. Scatter plot Graph for Assistive Technologies

Appendix G

Research Question 2 Data Charts

Research Question 2 - *Is there a relationship between mentor teacher predispositions towards technology integration and the level in which preservice teachers integrate technology in internship-based teaching placements?*

Table G1

Quantitative Data Sources – LoTiMQ1 and LoTiPQ1

LoTiMQ1

Score	Label	Frequency
0	Never	2
1	At least once a year	0
2	At least once a semester	0
3	At least once a month	1
4	A few times a month	3
5	At least once a week	2
6	A few times a week	4
7	At least once a day	6

Note. Mean = 5.05

Table G2

LoTiPQ1

Score	Label	Frequency
0	Never	3
1	At least once a year	1
2	At least once a semester	0
3	At least once a month	4
4	A few times a month	2
5	At least once a week	2
6	A few times a week	2
7	At least once a day	4

Note. Mean = 3.94

Table G3

Correlation Table- LoTiMQ1 and LoTiPQ1

Parameter		LoTiMQ1 Score	LoTiPQ1 Score
LoTiMQ1 Score	Pearson Correlation	1	-.104
	Sig. (2-tailed)		.680
	N	18	18
LoTiPQ1 Score	Pearson Correlation	-.104	1
	Sig. (2-tailed)	.680	
	N	18	18

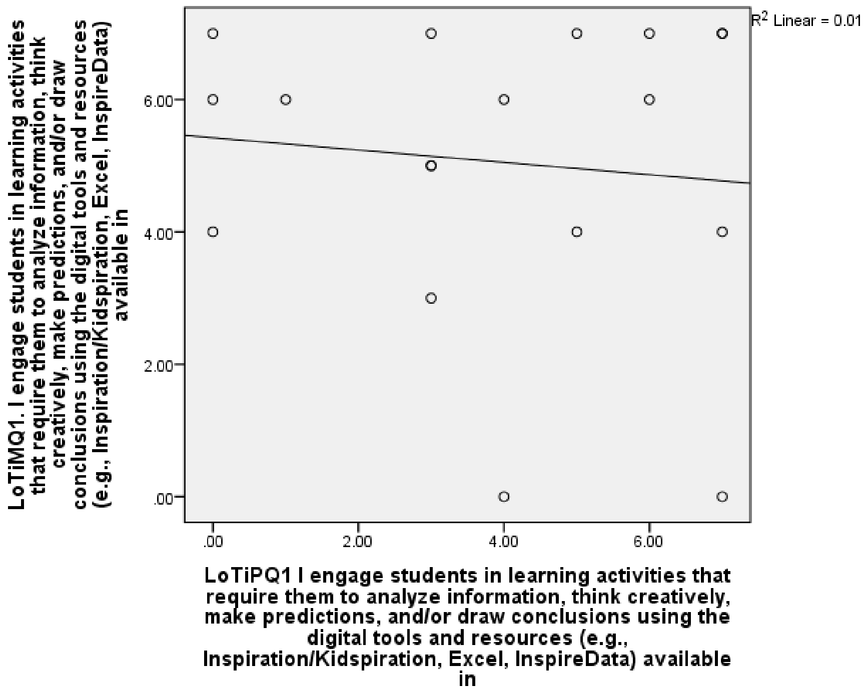

Figure G1. Scatter plot graph for LoTiMQ1 and LoTiPQ1.

Table G4

Quantitative Data Sources – LoTiMQ2 and LoTiPQ2

Q2 Students in my classroom use the digital tools and resources to create web-based (e.g., web posters, student blogs or wikis, basic web pages) 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.

LoTiMQ2

Score	Label	Frequency
0	Never	5
1	At least once a year	4
2	At least once a semester	3
3	At least once a month	1
4	A few times a month	2
5	At least once a week	2
6	A few times a week	1
7	At least once a day	0

Note. Mean = 2.05

Table G5

LoTiPQ2

Score	Label	Frequency
0	Never	6
1	At least once a year	3
2	At least once a semester	3
3	At least once a month	2
4	A few times a month	3
5	At least once a week	1
6	A few times a week	0
7	At least once a day	0

Note. Mean = 1.78

Table G6

Correlation Table- LoTiMQ2 and LoTiPQ2

Parameter		LoTiMQ2 Score	LoTiPQ2 Score
LoTiMQ2 Score	Pearson Correlation	1	.021
	Sig. (2-tailed)		.933
	N	18	18
LoTiPQ2 Score	Pearson Correlation	.021	1
	Sig. (2-tailed)	.933	
	N	18	18

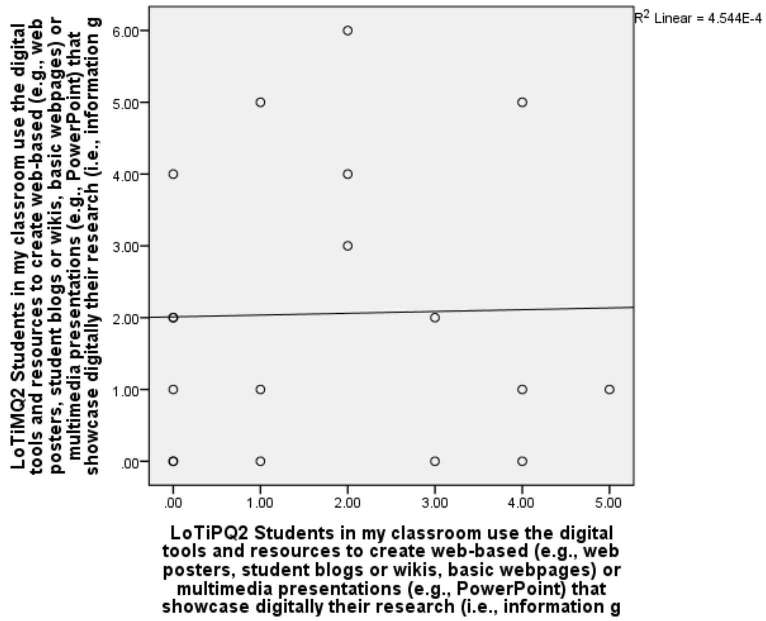

Figure G2. Scatter plot graph for LoTiMQ2 and LoTiPQ2.

Table G7

Quantitative Data Sources – LoTiMQ3 and LoTiPQ3

Q3 - 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.

LoTiMQ3

Score	Label	Frequency
0	Never	10
1	At least once a year	5
2	At least once a semester	0
3	At least once a month	0
4	A few times a month	1
5	At least once a week	0
6	A few times a week	2
7	At least once a day	0

Note. Mean = 1.16

Table G8

LoTiPQ3

Score	Label	Frequency
0	Never	10
1	At least once a year	0
2	At least once a semester	3
3	At least once a month	2
4	A few times a month	0
5	At least once a week	1
6	A few times a week	1
7	At least once a day	1

Note. Mean = 1.78

Table G9

Correlation Table- LoTiMQ3 and LoTiPQ3

Parameter		LoTiMQ3 Score	LoTiPQ3 Score
LoTiMQ3 Score	Pearson Correlation	1	-.016
	Sig. (2-tailed)		.949
	N	18	18
LoTiPQ3 Score	Pearson Correlation	-.016	1
	Sig. (2-tailed)	.949	
	N	18	18

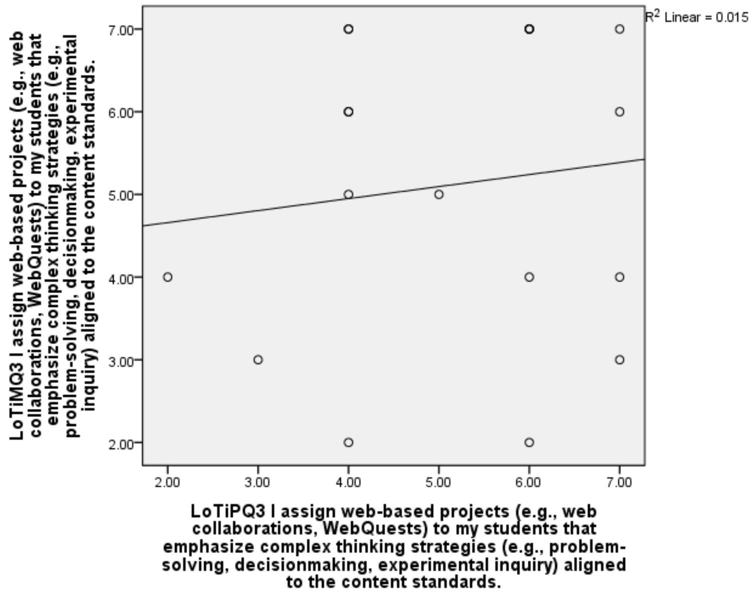

Figure G3. Scatter plot graph for LoTiMQ3 and LoTiPQ3.

Table G10

Quantitative Data Sources – LoTiMQ4 and LoTiPQ4

Q4 I provide multiple and varied formative and summative assessment opportunities that encourage students to "showcase" their content understanding in nontraditional ways.

LoTiMQ4

Score	Label	Frequency
0	Never	0
1	At least once a year	0
2	At least once a semester	2
3	At least once a month	2
4	A few times a month	3
5	At least once a week	2
6	A few times a week	3
7	At least once a day	6

Note. Mean = 5.11

Table G11

LoTiPQ4

Score	Label	Frequency
0	Never	0
1	At least once a year	0
2	At least once a semester	1
3	At least once a month	1
4	A few times a month	6
5	At least once a week	1
6	A few times a week	5
7	At least once a day	4

Note. Mean = 5.11

Table G12

Correlation Table- LoTiMQ4 and LoTiPQ4

Parameter		LoTiMQ4 Score	LoTiPQ4 Score
LoTiMQ4 Score	Pearson Correlation	1	.123
	Sig. (2-tailed)		.628
	N	18	18
LoTiPQ4 Score	Pearson Correlation	.123	1
	Sig. (2-tailed)	.628	
	N	18	18

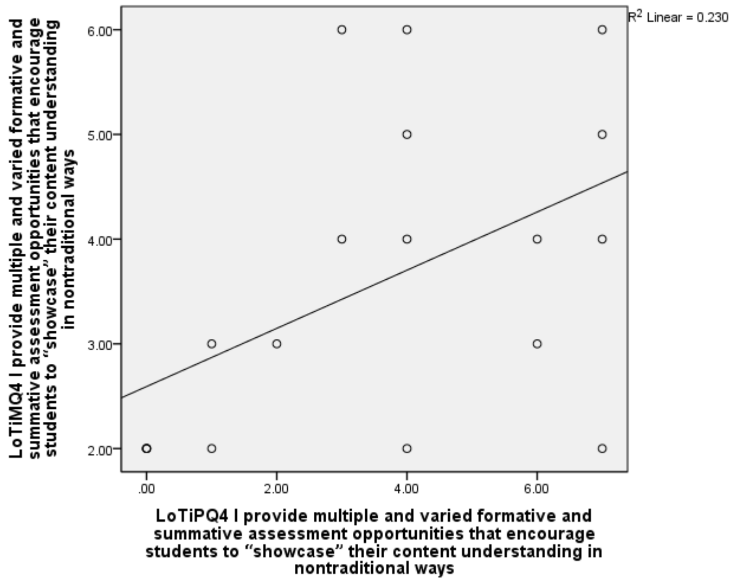

Figure G4. Scatter plot graph for LoTiMQ4 and LoTiPQ4.

Table G13

Quantitative Data Sources – LoTiMQ5 and LoTiPQ5

Q5 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).

LoTiMQ5

Score	Label	Frequency
0	Never	0
1	At least once a year	0
2	At least once a semester	2
3	At least once a month	1
4	A few times a month	1
5	At least once a week	4
6	A few times a week	2
7	At least once a day	8

Note. Mean = 5.50

Table G14

LoTiPQ5

Score	Label	Frequency
0	Never	3
1	At least once a year	2
2	At least once a semester	1
3	At least once a month	2
4	A few times a month	4
5	At least once a week	0
6	A few times a week	2
7	At least once a day	4

Note. Mean = 2.58

Table G15

Correlation Table- LoTiMQ5 and LoTiPQ5

Parameter		LoTiMQ5 Score	LoTiPQ5 Score
LoTiMQ5 Score	Pearson Correlation	1	-.246
	Sig. (2-tailed)		.326
	N	18	18
LoTiPQ5 Score	Pearson Correlation	-.246	1
	Sig. (2-tailed)	.326	
	N	18	18

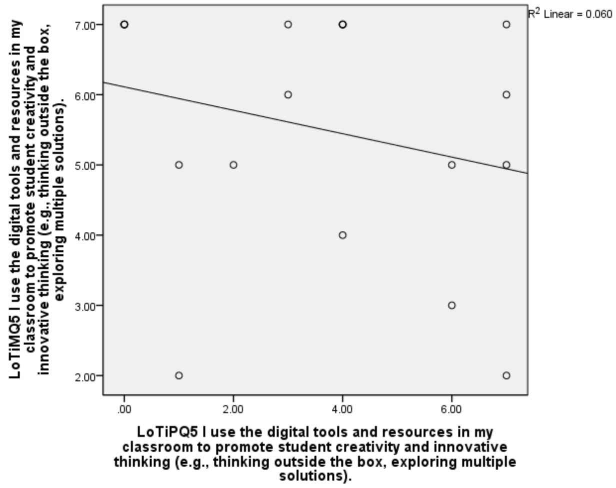

Figure G5. Scatter plot graph for LoTiMQ5 and LoTiPQ5.

Table G16

Quantitative Data Sources – LoTiMQ6 and LoTiPQ6

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.

LoTiMQ6

Score	Label	Frequency
0	Never	10
1	At least once a year	3
2	At least once a semester	1
3	At least once a month	0
4	A few times a month	2
5	At least once a week	2
6	A few times a week	0
7	At least once a day	0

Note. Mean = 1.28

Table G17

LoTiPQ6

Score	Label	Frequency
0	Never	4
1	At least once a year	2
2	At least once a semester	2
3	At least once a month	1
4	A few times a month	3
5	At least once a week	1
6	A few times a week	1
7	At least once a day	3

Note. Mean = 3.11

Table G18

Correlation Table - LoTiMQ6 and LoTiPQ6

Parameter		LoTiMQ6 Score	LoTiPQ6 Score
LoTiMQ6 Score	Pearson Correlation	1	-.563*
	Sig. (2-tailed)		.015
	N	18	18
LoTiPQ6 Score	Pearson Correlation	-.563*	1
	Sig. (2-tailed)	.015	
	N	18	18

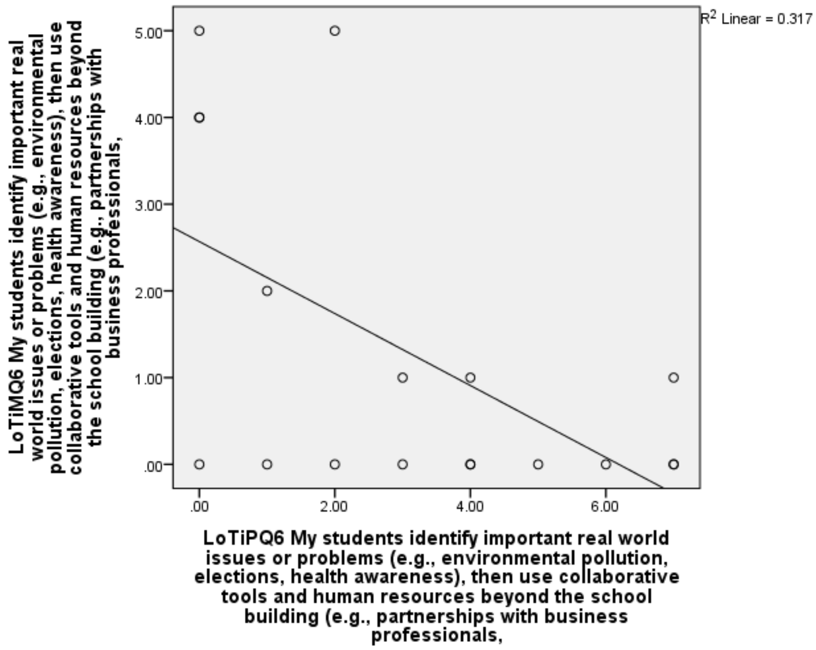

Figure G6. Scatter plot graph for LoTiMQ6 and LoTiPQ6.

Table G19

Quantitative Data Sources – LoTiMQ7 and LoTiPQ7

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).

LoTiMQ7

Score	Label	Frequency
0	Never	4
1	At least once a year	3
2	At least once a semester	0
3	At least once a month	0
4	A few times a month	1
5	At least once a week	0
6	A few times a week	2
7	At least once a day	8

Note. Mean = 4.17

Table G20

LoTiPQ7

Score	Label	Frequency
0	Never	5
1	At least once a year	1
2	At least once a semester	3
3	At least once a month	0
4	A few times a month	2
5	At least once a week	1
6	A few times a week	3
7	At least once a day	3

Note. Mean = 3.28

Table G21

Correlation Table- LoTiMQ7 and LoTiPQ7

Parameter		LoTiMQ7 Score	LoTiPQ7 Score
LoTiMQ7 Score	Pearson Correlation	1	-.139
	Sig. (2-tailed)		.582
	N	18	18
LoTiPQ7 Score	Pearson Correlation	-.139	1
	Sig. (2-tailed)	.582	18
	N	18	

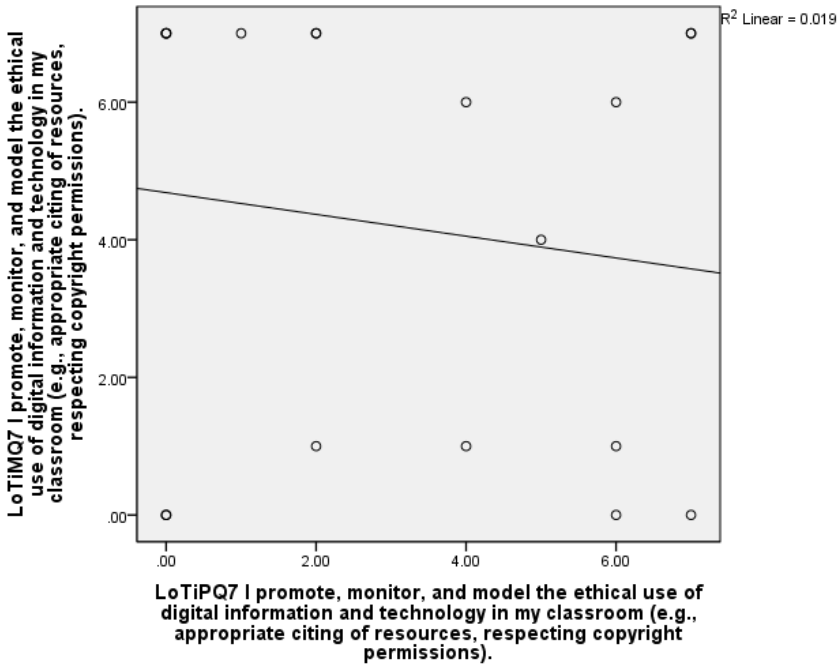

Figure G7. Scatter plot graph for LoTiMQ7 and LoTiPQ7.

Table G22

Quantitative Data Sources – LoTiMQ8 and LoTiPQ8

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.

LoTiMQ8

Score	Label	Frequency
0	Never	6
1	At least once a year	0
2	At least once a semester	1
3	At least once a month	0
4	A few times a month	1
5	At least once a week	2
6	A few times a week	1
7	At least once a day	7

Note. Mean = 3.94

Table G23

LoTiPQ8

Score	Label	Frequency
0	Never	3
1	At least once a year	2
2	At least once a semester	6
3	At least once a month	1
4	A few times a month	4
5	At least once a week	1
6	A few times a week	1
7	At least once a day	0

Note. Mean = 2.40

Table G24

Correlation Table - LoTiMQ8 and LoTiPQ8

Parameter		LoTiMQ8 Score	LoTiPQ8 Score
LoTiMQ8 Score	Pearson Correlation	1	-.229
	Sig. (2-tailed)		.361
	N	18	18
LoTiPQ8 Score	Pearson Correlation	-.229	1
	Sig. (2-tailed)	.361	
	N	18	18

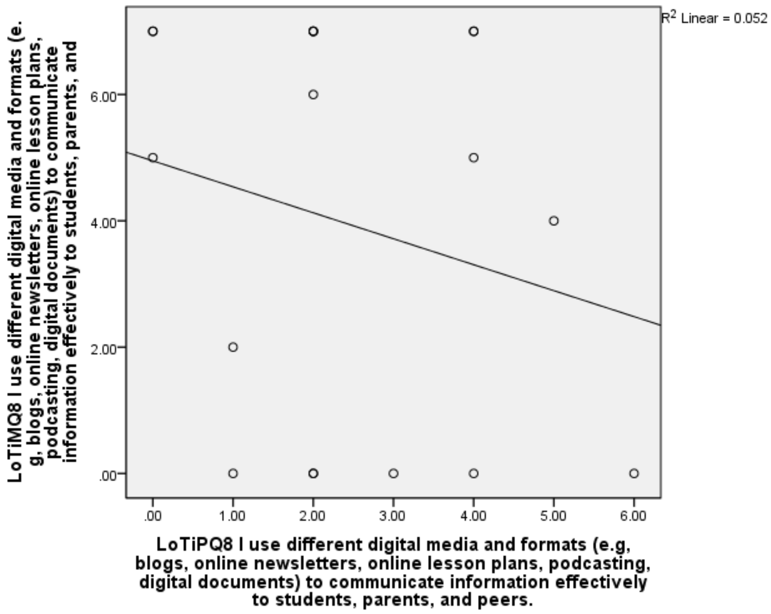

Figure G8. Scatter plot graph for LoTiMQ8 and LoTiPQ8.

Table G25

Quantitative Data Sources – LoTiMQ9 and LoTiPQ9

My students discover 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 pursue their individual curiosities and make a difference in their lives and in their community.

LoTiMQ9

Score	Label	Frequency
0	Never	11
1	At least once a year	0
2	At least once a semester	2
3	At least once a month	3
4	A few times a month	0
5	At least once a week	0
6	A few times a week	1
7	At least once a day	1

Note. Mean = 1.44

Table G26

LoTiPQ9

Score	Label	Frequency
0	Never	10
1	At least once a year	2
2	At least once a semester	0
3	At least once a month	3
4	A few times a month	1
5	At least once a week	1
6	A few times a week	0
7	At least once a day	1

Note. Mean = 1.50

Table G27

Correlation Table – LoTiMQ9 and LoTiPQ9

Parameter		LoTiMQ9 Score	LoTiPQ9 Score
LoTiMQ9 Score	Pearson Correlation	1	-.149
	Sig. (2-tailed)		.555
	N	18	18
LoTiPQ9 Score	Pearson Correlation	-.149	1
	Sig. (2-tailed)	.555	
	N	18	18

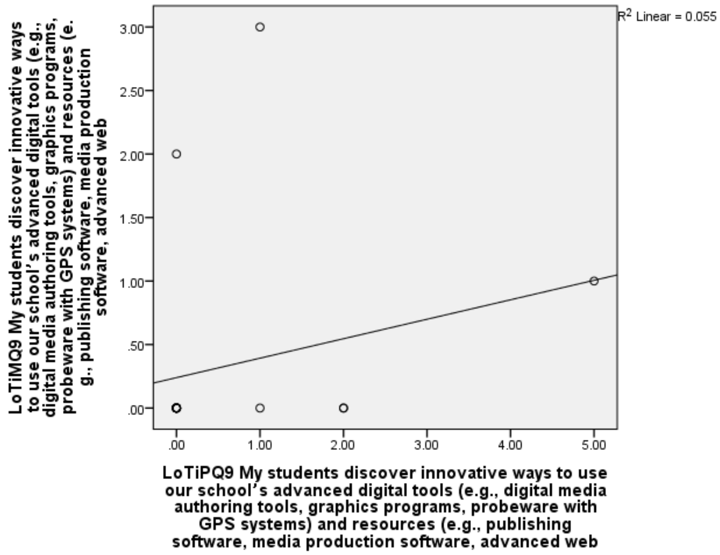

Figure G9. Scatter plot graph for LoTiMQ9 and LoTiPQ9.

Table G28

Quantitative Data Sources – LoTiMQ10 and LoTiPQ10

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.

LoTiMQ10

Score	Label	Frequency
0	Never	7
1	At least once a year	0
2	At least once a semester	1
3	At least once a month	2
4	A few times a month	3
5	At least once a week	1
6	A few times a week	1
7	At least once a day	3

Note. Mean = 2.89

Table G29

LoTiPQ10

Score	Label	Frequency
0	Never	4
1	At least once a year	0
2	At least once a semester	3
3	At least once a month	2
4	A few times a month	2
5	At least once a week	0
6	A few times a week	3
7	At least once a day	4

Note. Mean = 3.68

Table G30

Correlation Table- LoTiMQ10 and LoTiPQ10

Parameter		LoTiMQ10 Score	LoTiPQ10 Score
LoTiMQ10 Score	Pearson Correlation	1	-.347
	Sig. (2-tailed)		.158
	N	18	18
LoTiPQ10 Score	Pearson Correlation	-.347	1
	Sig. (2-tailed)	.158	
	N	18	18

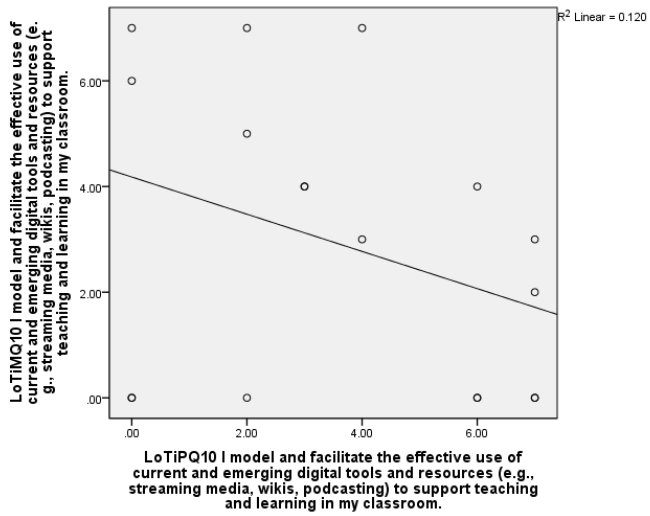

Figure G10. Scatter plot graph for LoTiMQ10 and LoTiPQ10.

Table G31

Quantitative Data Sources – LoTiMQ11 and LoTiPQ11

Q 11 I use my school's digital tools and resources primarily to access the Internet, communicate with colleagues or parents, grade student work and/or plan instructional activities for my students.

LoTiMQ11

Score	Label	Frequency
0	Never	7
1	At least once a year	0
2	At least once a semester	0
3	At least once a month	1
4	A few times a month	0
5	At least once a week	0
6	A few times a week	3
7	At least once a day	7

Note. Mean = 3.90

Table G32

LoTiPQ11

Score	Label	Frequency
0	Never	4
1	At least once a year	0
2	At least once a semester	1
3	At least once a month	0
4	A few times a month	1
5	At least once a week	1
6	A few times a week	4
7	At least once a day	7

Note. Mean = 4.68

Table G33

Correlation Table- LoTiMQ11 and LoTiPQ11

Parameter		LoTiMQ11 Score	LoTiPQ11 Score
LoTiMQ11 Score	Pearson Correlation	1	.206
	Sig. (2-tailed)		.413
	N	18	18
LoTiPQ11 Score	Pearson Correlation	.206	1
	Sig. (2-tailed)	.413	
	N	18	18

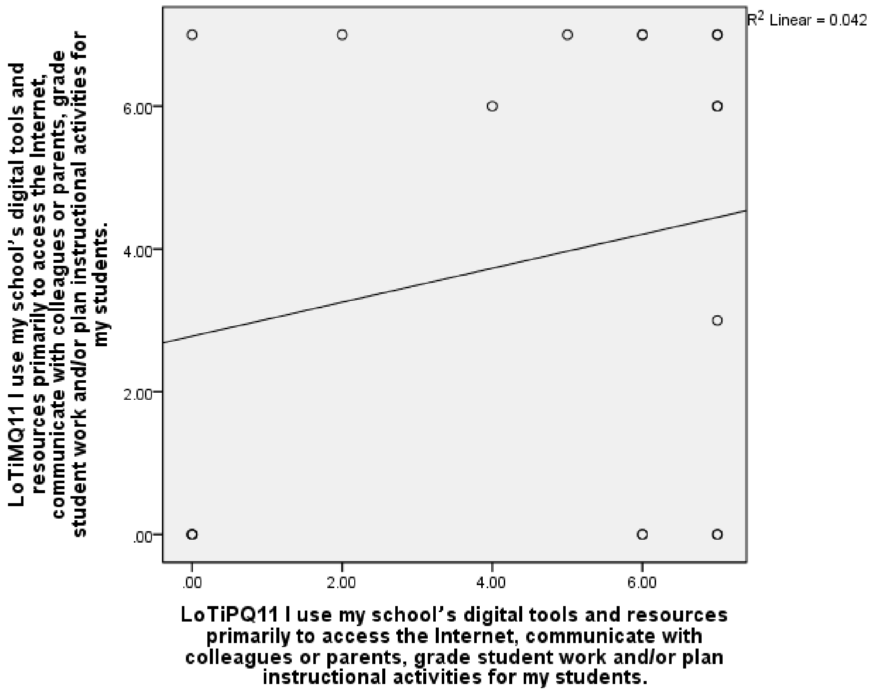

Figure G11. Scatter plot graph for LoTiMQ11 and LoTiPQ11.

Table G34

Quantitative Data Sources – LoTiMQ12 and LoTiPQ12

Q12 I alone use the digital tools and resources in my classroom for tasks such as planning, preparing, presenting, and/or grading instructional activities.

LoTiMQ12

Score	Label	Frequency
0	Never	6
1	At least once a year	0
2	At least once a semester	0
3	At least once a month	2
4	A few times a month	0
5	At least once a week	3
6	A few times a week	2
7	At least once a day	5

Note. Mean = 3.78

Table G35

LoTiPQ12

Score	Label	Frequency
0	Never	2
1	At least once a year	0
2	At least once a semester	2
3	At least once a month	1
4	A few times a month	1
5	At least once a week	4
6	A few times a week	3
7	At least once a day	4

Note. Mean = 4.50

Table G36

Correlation Table - LoTiMQ12 and LoTiPQ12

Parameter		LoTiMQ12 Score	LoTiPQ12 Score
LoTiMQ12 Score	Pearson Correlation	1	.249
	Sig. (2-tailed)		.319
	N	18	18
LoTiPQ12 Score	Pearson Correlation	.249	1
	Sig. (2-tailed)	.319	
	N	18	18

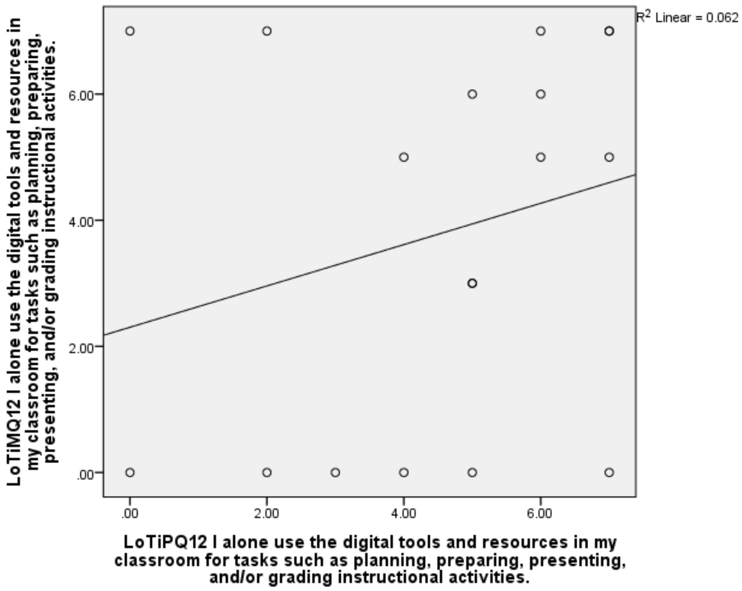

Figure G12. Scatter plot graph for LoTiMQ12 and LoTiPQ12.

Table G37

Quantitative Data Sources – LoTiMQ13 and LoTiPQ13

Q13 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.

LoTiMQ13

Score	Label	Frequency
0	Never	5
1	At least once a year	2
2	At least once a semester	2
3	At least once a month	3
4	A few times a month	0
5	At least once a week	1
6	A few times a week	2
7	At least once a day	3

Note. Mean = 2.94

Table G38

LoTiPQ13

Score	Label	Frequency
0	Never	8
1	At least once a year	2
2	At least once a semester	0
3	At least once a month	1
4	A few times a month	1
5	At least once a week	1
6	A few times a week	2
7	At least once a day	1

Note. Mean = 2.28

Table G39

Correlation Table - LoTiMQ13 and LoTiPQ13

Parameter		LoTiMQ13 Score	LoTiPQ13 Score
LoTiMQ13 Score	Pearson Correlation	1	.112
	Sig. (2-tailed)		.657
	N	18	18
LoTiPQ13 Score	Pearson Correlation	.112	1
	Sig. (2-tailed)	.657	
	N	18	18

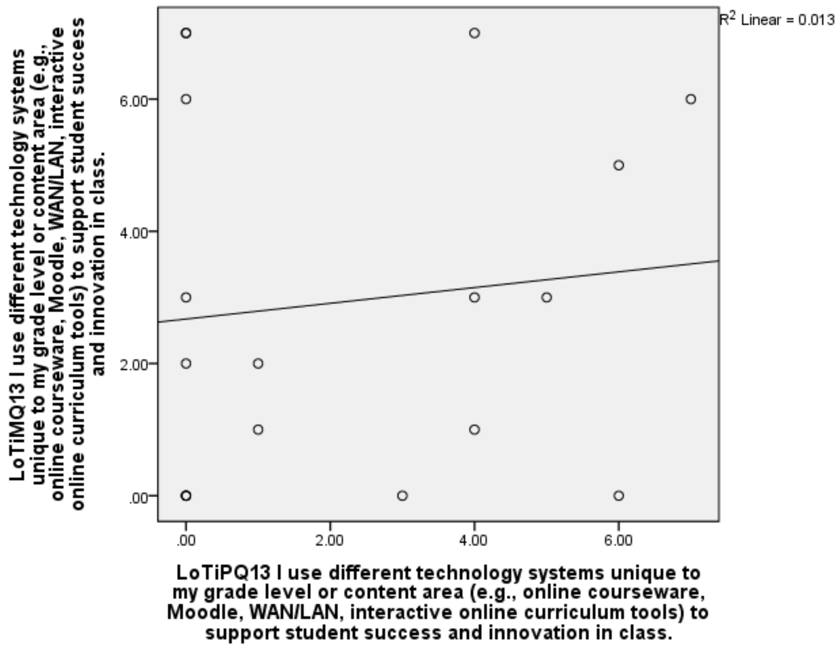

Figure G13. Scatter plot graph for LoTiMQ13 and LoTiPQ13.

Table G40

Quantitative Data Sources – LoTiMQ14 and LoTiPQ14

Q14 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.

LoTiMQ14

Score	Label	Frequency
0	Never	0
1	At least once a year	1
2	At least once a semester	2
3	At least once a month	1
4	A few times a month	1
5	At least once a week	3
6	A few times a week	6
7	At least once a day	4

Note. Mean = 5.05

Table G41

LoTiPQ14

Score	Label	Frequency
0	Never	2
1	At least once a year	0
2	At least once a semester	0
3	At least once a month	2
4	A few times a month	3
5	At least once a week	2
6	A few times a week	4
7	At least once a day	5

Note. Mean = 4.83

Table G42

Correlation Table - LoTiMQ14 and LoTiPQ14

Parameter		LoTiMQ14 Score	LoTiPQ14 Score
LoTiMQ14 Score	Pearson Correlation	1	.016
	Sig. (2-tailed)		.949
	N	18	18
LoTiPQ14 Score	Pearson Correlation	.016	1
	Sig. (2-tailed)	.949	
	N	18	18

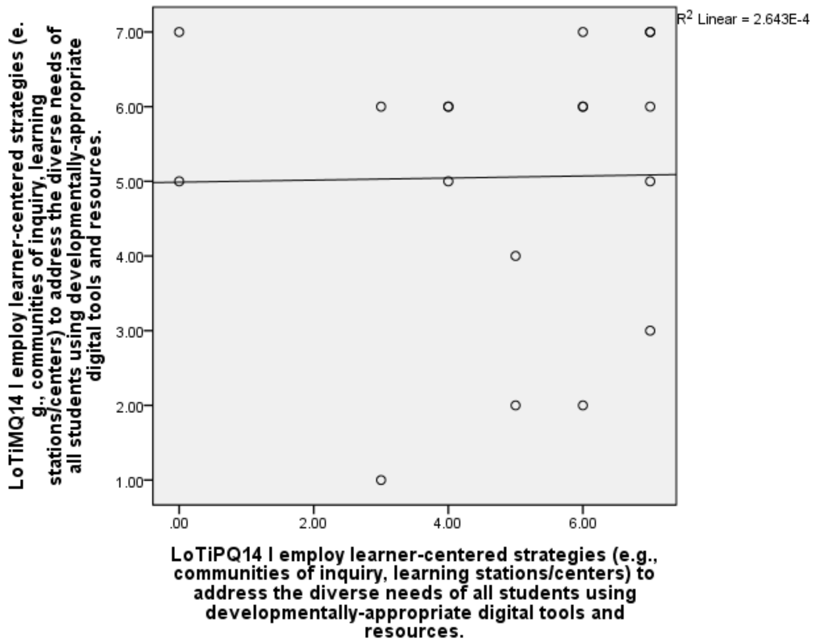

Figure G14. Scatter plot graph for LoTiMQ14 and LoTiPQ14.

Table G43

Quantitative Data Sources – LoTiMQ15 and LoTiPQ15

Q15 Students' use of information and inquiry skills to solve problems of personal relevance influences the types of instructional materials used in my classroom.

LoTiMQ15

Score	Label	Frequency
0	Never	3
1	At least once a year	3
2	At least once a semester	0
3	At least once a month	2
4	A few times a month	5
5	At least once a week	3
6	A few times a week	0
7	At least once a day	2

Note. Mean = 3.22

Table G44

LoTiPQ15

Score	Label	Frequency
0	Never	2
1	At least once a year	0
2	At least once a semester	0
3	At least once a month	2
4	A few times a month	2
5	At least once a week	2
6	A few times a week	4
7	At least once a day	6

Note. Mean = 5.00

Table G45

Correlation Table - LoTiMQ15 and LoTiPQ15

Parameter		LoTiMQ15 Score	LoTiPQ15 Score
LoTiMQ15 Score	Pearson Correlation	1	.000
	Sig. (2-tailed)		1.000
	N	18	18
LoTiPQ15 Score	Pearson Correlation	.000	1
	Sig. (2-tailed)	1.000	
	N	18	18

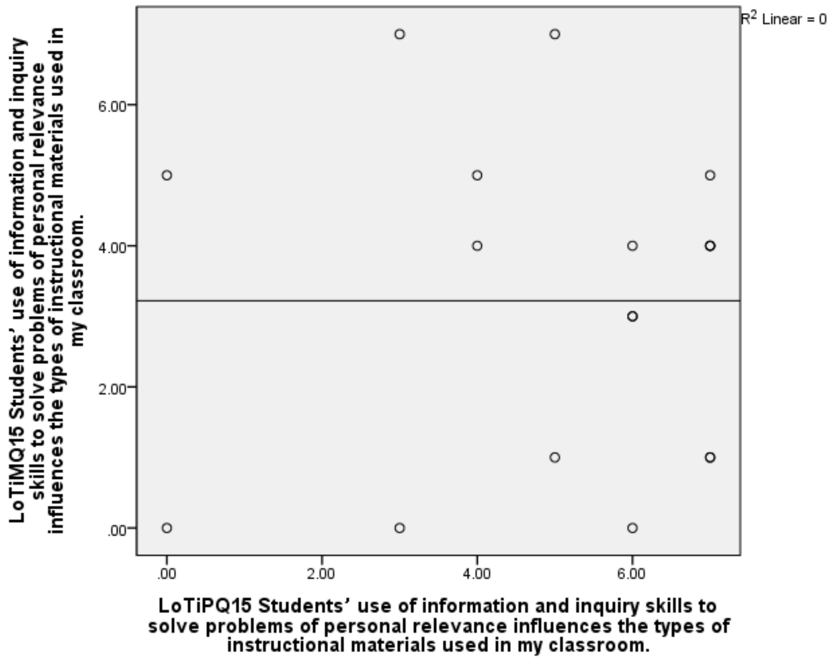

Figure G15. Scatter plot graph for LoTiMQ15 and LoTiPQ15.

Table G46

Quantitative Data Sources – LoTiMQ16 and LoTiPQ16

Q16 My students participate in collaborative projects (e.g., Jason Project, GlobalSchool-Net) involving face-to-face and/or virtual environments with students of other cultures that address current problems, issues, and/or themes.

LoTiMQ16

Score	Label	Frequency
0	Never	15
1	At least once a year	1
2	At least once a semester	1
3	At least once a month	1
4	A few times a month	0
5	At least once a week	0
6	A few times a week	0
7	At least once a day	0

Note. Mean = .33

Table G47

LoTiPQ16

Score	Label	Frequency
0	Never	13
1	At least once a year	2
2	At least once a semester	2
3	At least once a month	0
4	A few times a month	0
5	At least once a week	1
6	A few times a week	0
7	At least once a day	0

Note. Mean = .61

Table G48

Correlation Table - LoTiMQ16 and LoTiPQ16

Parameter		LoTiMQ16 Score	LoTiPQ16 Score
LoTiMQ16 Score	Pearson Correlation	1	.235
	Sig. (2-tailed)		.347
	N	18	18
LoTiPQ16 Score	Pearson Correlation	.235	1
	Sig. (2-tailed)	.347	
	N	18	18

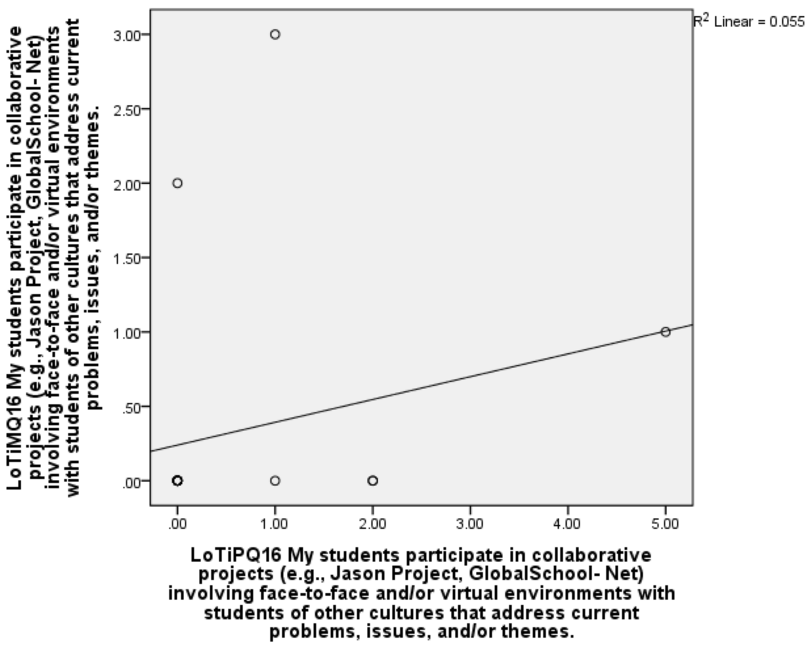

Figure G16. Scatter plot graph for *LoTiMQ16 and LoTiPQ16*

Table G49

Quantitative Data Sources – LoTiMQ17 and LoTiPQ17

Q17 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.

LoTiMQ17

Score	Label	Frequency
0	Never	3
1	At least once a year	2
2	At least once a semester	2
3	At least once a month	2
4	A few times a month	4
5	At least once a week	1
6	A few times a week	2
7	At least once a day	2

Note. Mean = 3.28

Table G50

LoTiPQ17

Score	Label	Frequency
0	Never	3
1	At least once a year	1
2	At least once a semester	2
3	At least once a month	3
4	A few times a month	4
5	At least once a week	2
6	A few times a week	2
7	At least once a day	1

Note. Mean = 3.28

Table G51

Correlation Table - LoTiMQ17 and LoTiPQ17

Parameter		LoTiMQ17 Score	LoTiPQ17 Score
LoTiMQ17 Score	Pearson Correlation	1	.054
	Sig. (2-tailed)		.831
	N	18	18
LoTiPQ17 Score	Pearson Correlation	.054	1
	Sig. (2-tailed)	.831	
	N	18	18

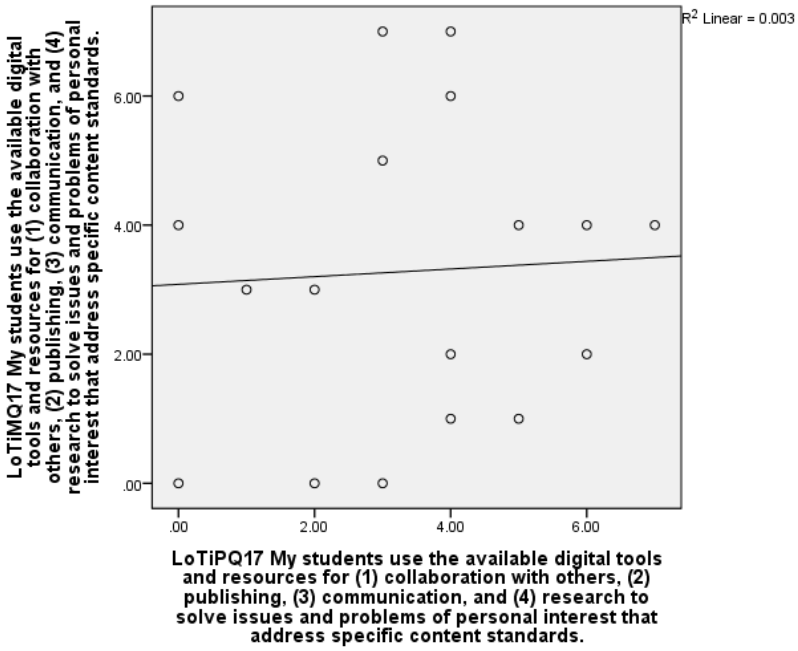

Figure G17. Scatter plot graph for LoTiMQ17 and LoTiPQ17.

Table G52

Quantitative Data Sources – LoTiMQ18 and LoTiPQ18

Q18 I model for my students the safe and legal use of digital tools and resources when 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.

LoTiMQ18

Score	Label	Frequency
0	Never	3
1	At least once a year	1
2	At least once a semester	1
3	At least once a month	1
4	A few times a month	2
5	At least once a week	2
6	A few times a week	3
7	At least once a day	5

Note. Mean = 4.28

Table G53

LoTiPQ18

Score	Label	Frequency
0	Never	3
1	At least once a year	0
2	At least once a semester	0
3	At least once a month	1
4	A few times a month	1
5	At least once a week	1
6	A few times a week	6
7	At least once a day	6

Note. Mean = 5.00

Table G54

Correlation Table-0 LoTiMQ18 and LoTiPQ18

Parameter		LoTiMQ18 Score	LoTiPQ18 Score
LoTiMQ18 Score	Pearson Correlation	1	-.628**
	Sig. (2-tailed)		.005
	N	18	18
LoTiPQ18 Score	Pearson Correlation	-.628**	1
	Sig. (2-tailed)	.005	
	N	18	18

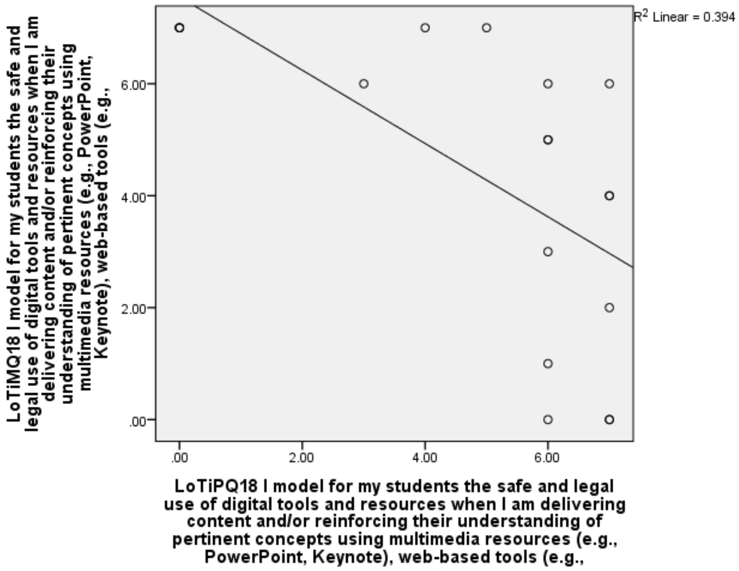

Figure G18. Scatter plot graph for LoTiMQ18 and LoTiPQ18.

Table G55

Quantitative Data Sources – LoTiMQ19 and LoTiPQ19

Q19 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.

LoTiMQ19

Score	Label	Frequency
0	Never	5
1	At least once a year	1
2	At least once a semester	1
3	At least once a month	2
4	A few times a month	1
5	At least once a week	2
6	A few times a week	2
7	At least once a day	4

Note. Mean = 3.50

Table G56

LoTiPQ19

Score	Label	Frequency
0	Never	2
1	At least once a year	2
2	At least once a semester	0
3	At least once a month	2
4	A few times a month	2
5	At least once a week	2
6	A few times a week	5
7	At least once a day	3

Note. Mean = 4.28

Table G57

Correlation Table - LoTiMQ19 and LoTiPQ19

Parameter		LoTiMQ19 Score	LoTiPQ19 Score
LoTiMQ19 Score	Pearson Correlation	1	.176
	Sig. (2-tailed)		.485
	N	18	18
LoTiPQ19 Score	Pearson Correlation	.176	1
	Sig. (2-tailed)	.485	
	N	18	18

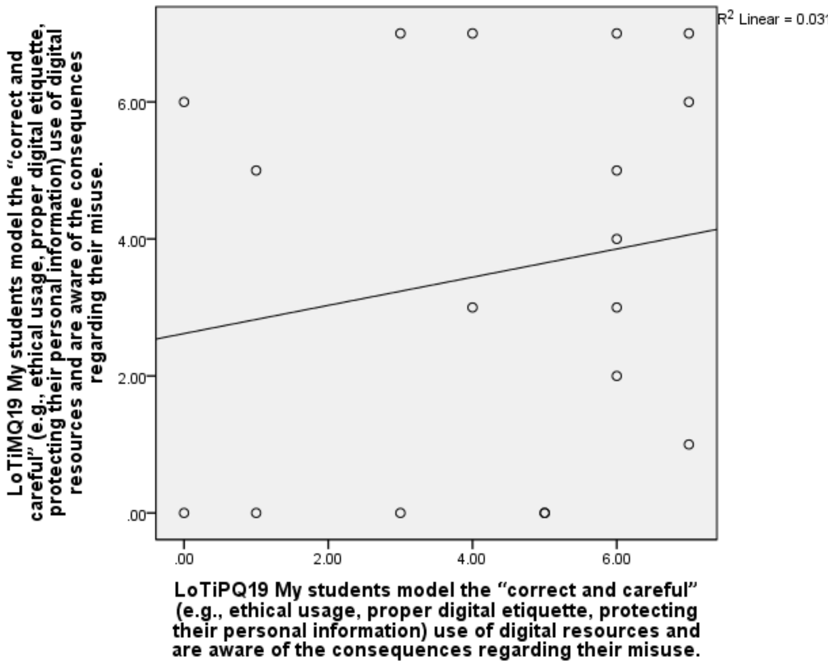

Figure G19. Scatter plot graph for LoTiMQ19 and LoTiPQ19.

Table G58

Quantitative Data Sources – LoTiMQ20 and LoTiPQ20

Q20 I participate in local and global learning communities to explore creative applications of technology toward improving student learning.

LoTiMQ20

Score	Label	Frequency
0	Never	6
1	At least once a year	0
2	At least once a semester	6
3	At least once a month	1
4	A few times a month	0
5	At least once a week	4
6	A few times a week	0
7	At least once a day	1

Note. Mean = 2.33

Table G59

LoTiPQ20

Score	Label	Frequency
0	Never	4
1	At least once a year	2
2	At least once a semester	3
3	At least once a month	3
4	A few times a month	4
5	At least once a week	1
6	A few times a week	0
7	At least once a day	1

Note. Mean = 2.50

Table G60

Correlation Table - LoTiMQ20 and LoTiPQ20

Parameter		LoTiMQ20 Score	LoTiPQ20 Score
LoTiMQ20 Score	Pearson Correlation	1	.134
	Sig. (2-tailed)		.597
	N	18	18
LoTiPQ20 Score	Pearson Correlation	.134	1
	Sig. (2-tailed)	.597	
	N	18	18

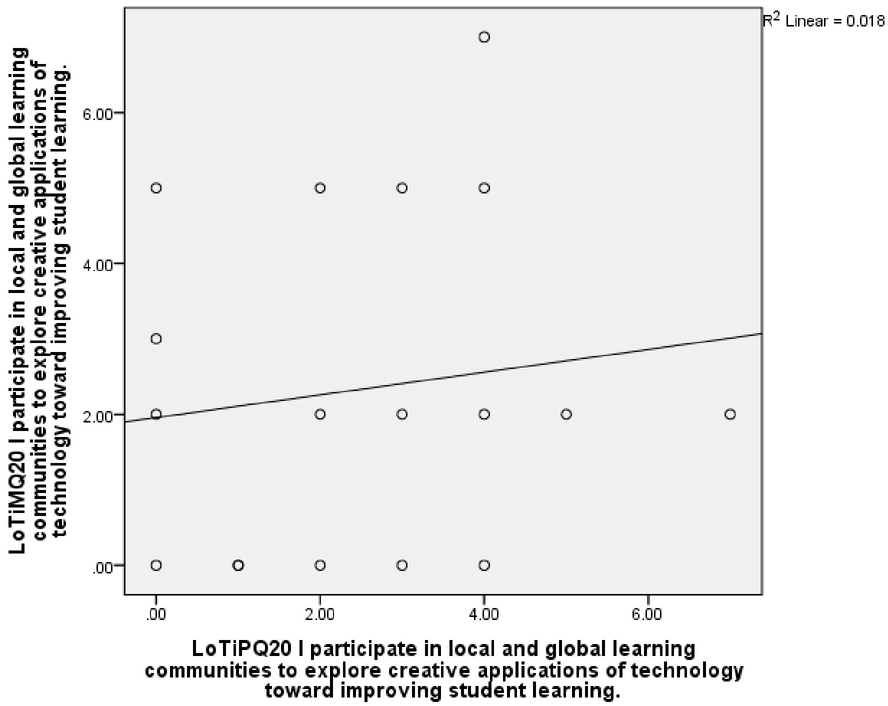

Figure G20. Scatter plot graph for LoTiMQ20 and LoTiPQ20.

Table G61

Quantitative Data Sources – LoTiMQ21 and LoTiPQ21

Q21 I continue to offer students learning activities that emphasize the use of digital tools and resources to solve "real-world" problems or issues, even though I sometimes experience issues during project implementation (e.g., student discipline problems, network errors, lack of time to plan the lessons, technical glitches).

LoTiMQ21

Score	Label	Frequency
0	Never	2
1	At least once a year	1
2	At least once a semester	3
3	At least once a month	3
4	A few times a month	0
5	At least once a week	4
6	A few times a week	1
7	At least once a day	4

Note. Mean = 3.90

Table G62

LoTiPQ21

Score	Label	Frequency
0	Never	3
1	At least once a year	1
2	At least once a semester	4
3	At least once a month	1
4	A few times a month	3
5	At least once a week	2
6	A few times a week	2
7	At least once a day	2

Note. Mean = 3.33

Table G63

Correlation Table - LoTiMQ21 and LoTiPQ21

Parameter		LoTiMQ21 Score	LoTiPQ21 Score
LoTiMQ21 Score	Pearson Correlation	1	-.117
	Sig. (2-tailed)		.644
	N	18	18
LoTiPQ21 Score	Pearson Correlation	-.117	1
	Sig. (2-tailed)	.644	
	N	18	18

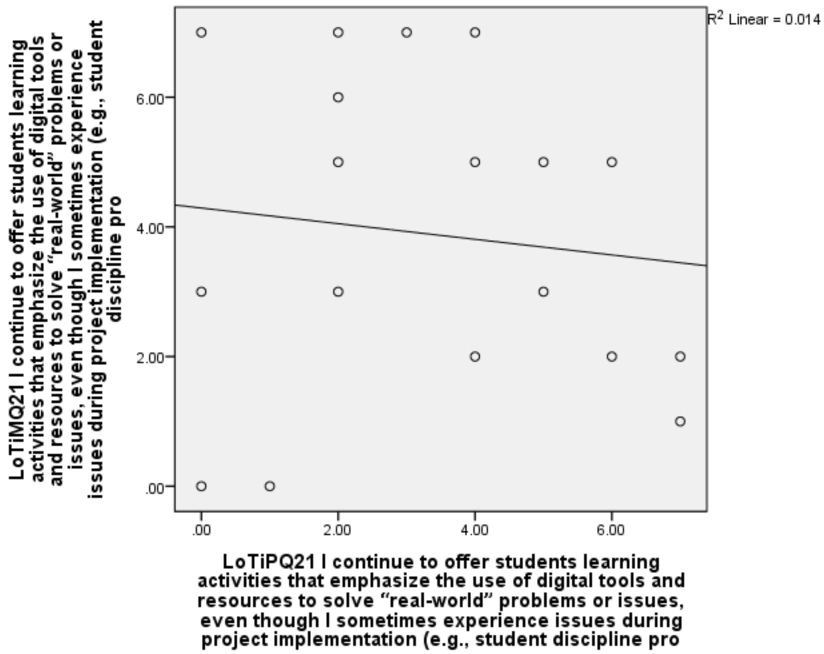

Figure G21. Scatter plot graph for LoTiMQ21 and LoTiPQ21.

Table G64

Quantitative Data Sources – LoTiMQ22 and LoTiPQ22

Q22 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.

LoTiMQ22

Score	Label	Frequency
0	Never	1
1	At least once a year	0
2	At least once a semester	1
3	At least once a month	1
4	A few times a month	1
5	At least once a week	7
6	A few times a week	1
7	At least once a day	6

Note. Mean = 5.11

Table G65

LoTiPQ22

Score	Label	Frequency
0	Never	1
1	At least once a year	1
2	At least once a semester	0
3	At least once a month	0
4	A few times a month	5
5	At least once a week	3
6	A few times a week	3
7	At least once a day	5

Note. Mean = 4.94

Table G66

Correlation Table - LoTiMQ22 and LoTiPQ22

Parameter		LoTiMQ22 Score	LoTiPQ22 Score
LoTiMQ22 Score	Pearson Correlation	1	.002
	Sig. (2-tailed)		.995
	N	18	18
LoTiPQ22 Score	Pearson Correlation	.002	1
	Sig. (2-tailed)	.995	
	N	18	18

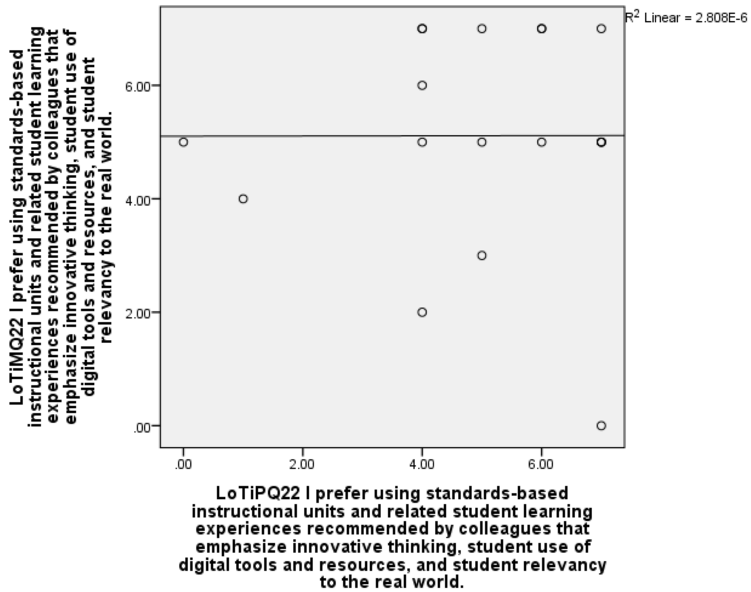

Figure G22. Scatter plot graph for LoTiMQ22 and LoTiPQ22.

Table G67

Quantitative Data Sources – LoTiMQ23 and LoTiPQ23

Q23 I seek outside help with designing student-centered performance assessments using the available digital tools and resources that involve students transferring what they Gave learned to a real world context.

LoTiMQ23

Score	Label	Frequency
0	Never	3
1	At least once a year	1
2	At least once a semester	1
3	At least once a month	3
4	A few times a month	4
5	At least once a week	1
6	A few times a week	1
7	At least once a day	4

Note. Mean = 3.72

Table G68

LoTiPQ23

Score	Label	Frequency
0	Never	3
1	At least once a year	0
2	At least once a semester	2
3	At least once a month	0
4	A few times a month	6
5	At least once a week	2
6	A few times a week	2
7	At least once a day	2

Note. Mean = 3.72

Table G69

Correlation Table- LoTiMQ23 and LoTiPQ23

Parameter		LoTiMQ23 Score	LoTiPQ23 Score
LoTiMQ23 Score	Pearson Correlation	1	-.047
	Sig. (2-tailed)		.853
	N	18	18
LoTiPQ23 Score	Pearson Correlation	-.047	1
	Sig. (2-tailed)	.853	
	N	18	18

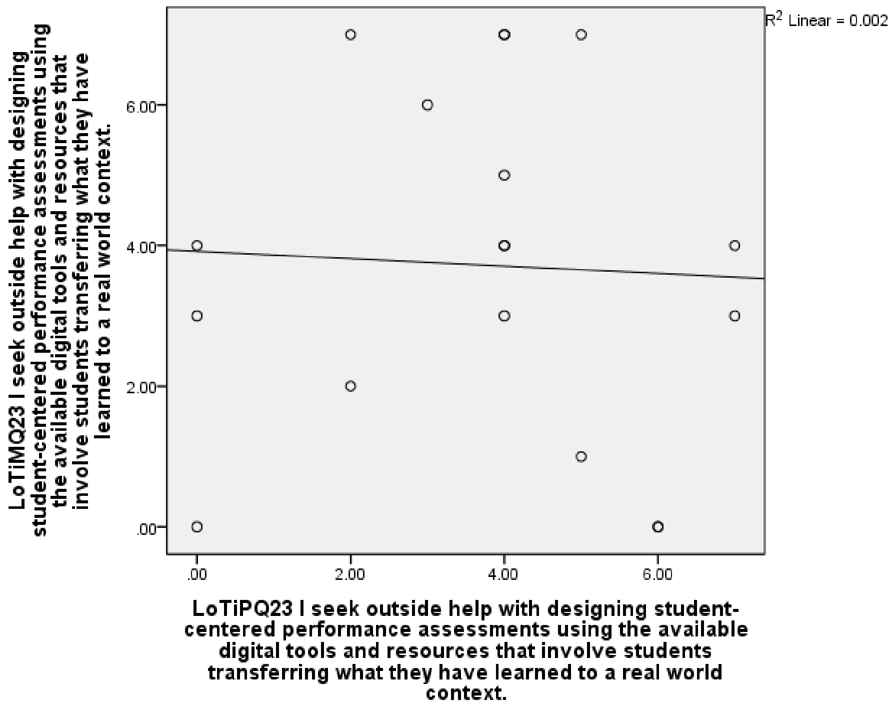

Figure G23. Scatter plot graph for LoTiMQ23 and LoTiPQ23.

Table G70

Quantitative Data Sources – LoTiMQ24 and LoTiPQ24

*Q24 I rely heavily on my students' questions and previous experiences when designing learning activities that address the content that I teach***.**

LoTiMQ24

Score	Label	Frequency
0	Never	0
1	At least once a year	0
2	At least once a semester	1
3	At least once a month	1
4	A few times a month	3
5	At least once a week	1
6	A few times a week	1
7	At least once a day	11

Note. Mean = 5.83

Table G71

LoTiPQ24

Score	Label	Frequency
0	Never	0
1	At least once a year	0
2	At least once a semester	0
3	At least once a month	2
4	A few times a month	2
5	At least once a week	2
6	A few times a week	2
7	At least once a day	10

Note. Mean = 5.89

Table G72

Correlation Table - LoTiMQ24 and LoTiPQ24

Parameter		LoTiMQ24 Score	LoTiPQ24 Score
LoTiMQ24 Score	Pearson Correlation	1	-.031
	Sig. (2-tailed)		.902
	N	18	18
LoTiPQ24 Score	Pearson Correlation	-.031	1
	Sig. (2-tailed)	.902	
	N	18	18

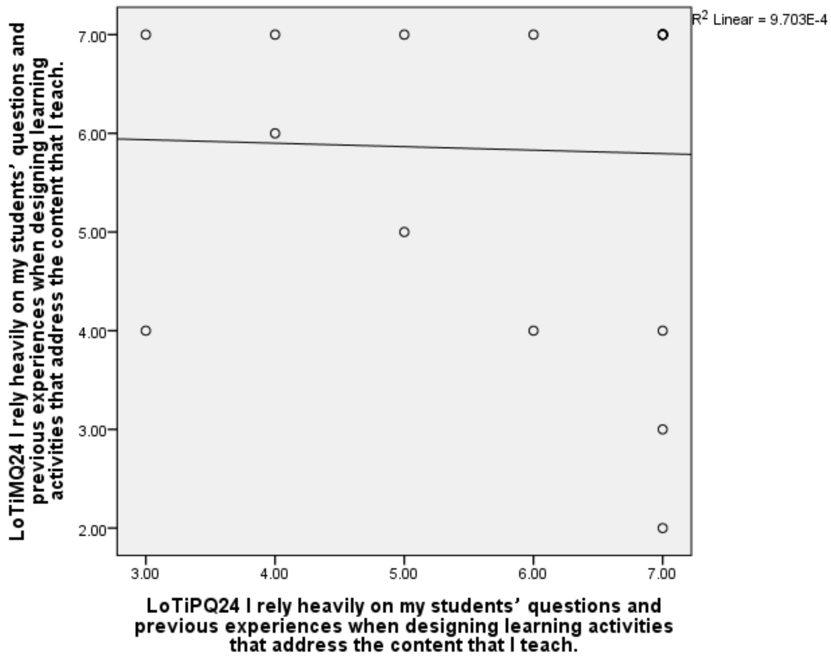

Figure G24. Scatter plot graph for LoTiMQ24 and LoTiPQ24.

Table G73

Quantitative Data Sources – LoTiMQ25 and LoTiPQ25

Q25 My students use the classroom digital tools and resources to engage in relevant, challenging, self-directed learning experiences that address the content standards.

LoTiMQ25

Score	Label	Frequency
0	Never	3
1	At least once a year	2
2	At least once a semester	5
3	At least once a month	3
4	A few times a month	2
5	At least once a week	3
6	A few times a week	8
7	At least once a day	3

Note. Mean = 3.90

Table G74

LoTiPQ25

Score	Label	Frequency
0	Never	2
1	At least once a year	0
2	At least once a semester	3
3	At least once a month	2
4	A few times a month	2
5	At least once a week	1
6	A few times a week	5
7	At least once a day	3

Note. Mean = 4.22

Table G75

Correlation Table - LoTiMQ25 and LoTiPQ25

Parameter		LoTiMQ25 Score	LoTiPQ25 Score
LoTiMQ25 Score	Pearson Correlation	1	.078
	Sig. (2-tailed)		.758
	N	18	18
LoTiPQ25 Score	Pearson Correlation	.078	1
	Sig. (2-tailed)	.758	
	N	18	18

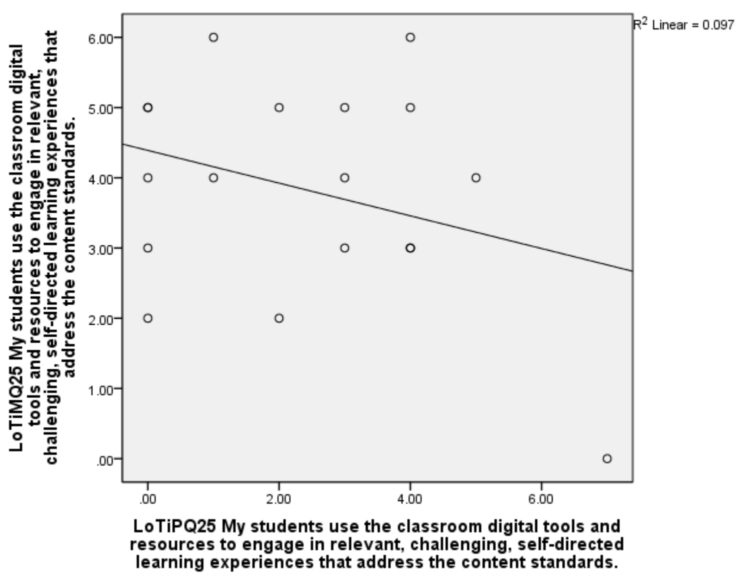

Figure G25. Scatter plot graph for LoTiMQ25 and LoTiPQ25.

Table G76

Quantitative Data Sources – LoTiMQ26 and LoTiPQ26

Q26 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).

LoTiMQ26

Score	Label	Frequency
0	Never	8
1	At least once a year	3
2	At least once a semester	1
3	At least once a month	2
4	A few times a month	2
5	At least once a week	0
6	A few times a week	2
7	At least once a day	0

Note. Mean = 1.72

Table G77

LoTiPQ26

Score	Label	Frequency
0	Never	10
1	At least once a year	1
2	At least once a semester	0
3	At least once a month	1
4	A few times a month	2
5	At least once a week	1
6	A few times a week	0
7	At least once a day	1

Note. Mean = 1.67

Table G78

Correlation Table - LoTiMQ26 and LoTiPQ26

Parameter		LoTiMQ26 Score	LoTiPQ26 Score
LoTiMQ26 Score	Pearson Correlation	1	-.033
	Sig. (2-tailed)		.895
	N	18	18
LoTiPQ26 Score	Pearson Correlation	-.033	1
	Sig. (2-tailed)	.895	
	N	18	18

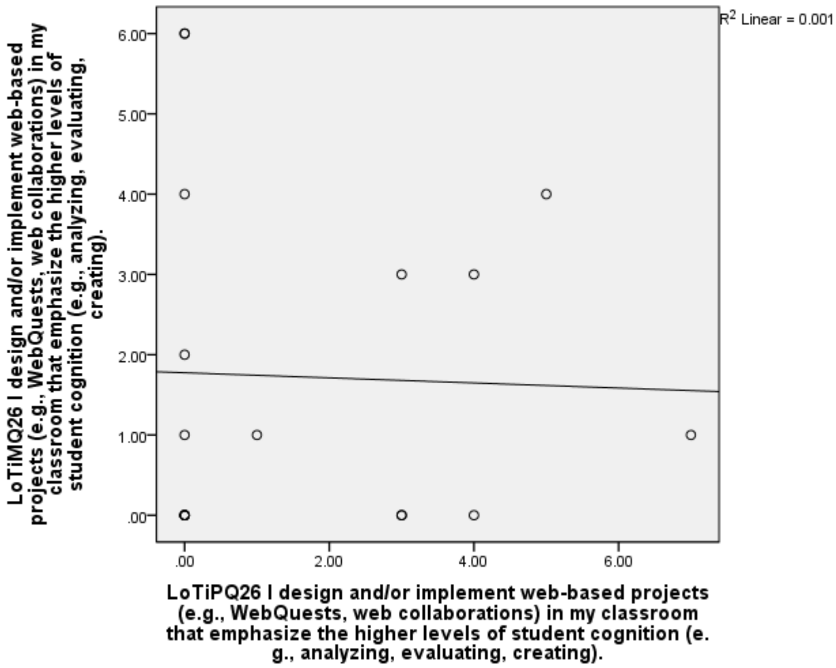

Figure G26. Scatter plot graph for LoTiMQ26 and LoTiPQ26.

Table G79

Quantitative Data Sources – LoTiMQ27 and LoTiPQ27

Q27 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). LoTiMQ27

Score	Label	Frequency
0	Never	1
1	At least once a year	0
2	At least once a semester	0
3	At least once a month	1
4	A few times a month	2
5	At least once a week	4
6	A few times a week	2
7	At least once a day	8

Note. Mean = 5.50

Table G80

LoTiPQ27

Score	Label	Frequency
0	Never	3
1	At least once a year	0
2	At least once a semester	0
3	At least once a month	0
4	A few times a month	2
5	At least once a week	4
6	A few times a week	4
7	At least once a day	5

Note. Mean = 4.83

Table G81

Correlation Table - LoTiMQ27 and LoTiPQ27

Parameter		LoTiMQ27 Score	LoTiPQ27 Score
LoTiMQ27 Score	Pearson Correlation	1	.263
	Sig. (2-tailed)		.292
	N	18	18
LoTiPQ27 Score	Pearson Correlation	.263	1
	Sig. (2-tailed)	.292	
	N	18	18

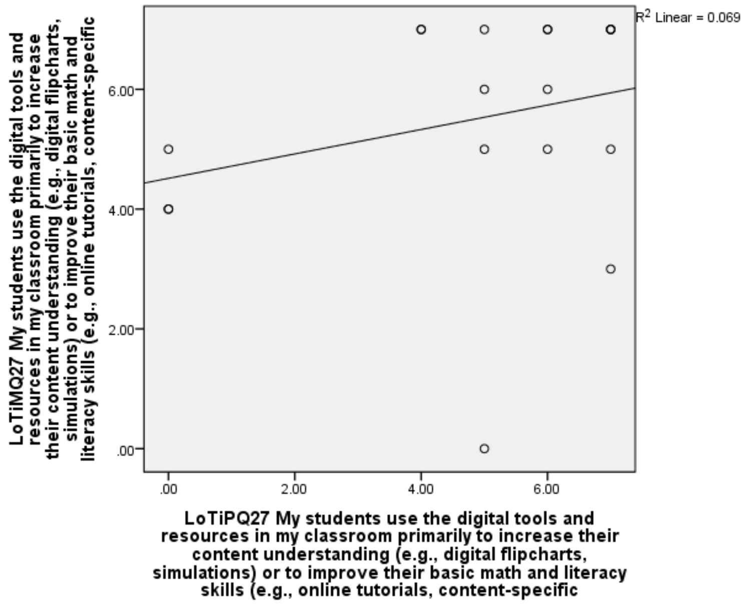

Figure G27. Scatter plot graph for LoTiMQ27 and LoTiPQ27.

Table G82

Quantitative Data Sources – LoTiMQ28 and LoTiPQ28

Q28 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.

LoTiMQ28

Score	Label	Frequency
0	Never	5
1	At least once a year	1
2	At least once a semester	4
3	At least once a month	3
4	A few times a month	4
5	At least once a week	1
6	A few times a week	0
7	At least once a day	0

Note. Mean = 2.17

Table G83

LoTiPQ28

Score	Label	Frequency
0	Never	5
1	At least once a year	1
2	At least once a semester	2
3	At least once a month	3
4	A few times a month	4
5	At least once a week	1
6	A few times a week	0
7	At least once a day	1

Note. Mean = 2.39

Table G84

Correlation Table - LoTiMQ28 and LoTiPQ28

Parameter		SPSSIQ28 Score	LoTiPQ28 Score
SPSSIQ28 Score	Pearson Correlation	1	-.205
	Sig. (2-tailed)		.413
	N	18	18
LoTiPQ28 Score	Pearson Correlation	-.205	1
	Sig. (2-tailed)	.413	
	N	18	18

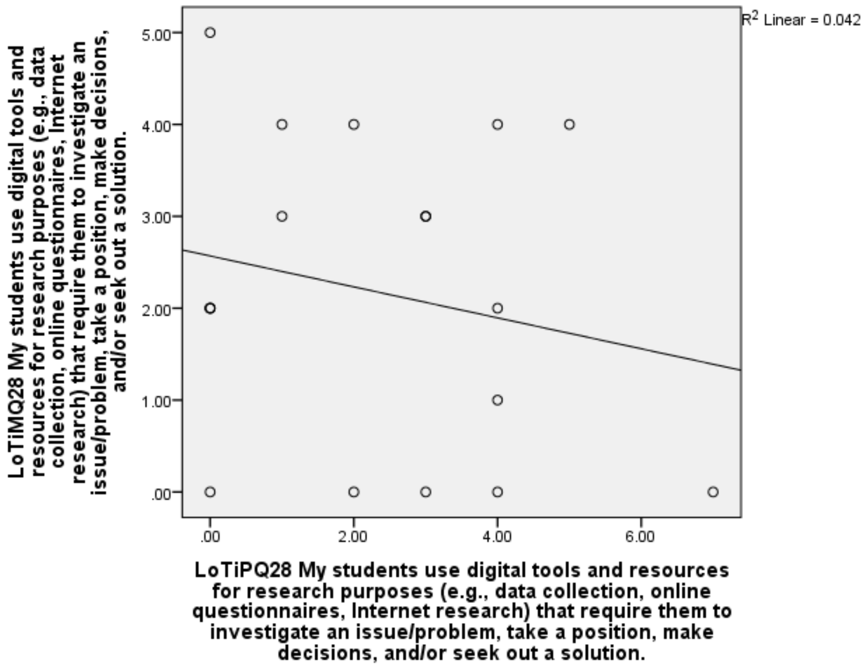

Figure G28. Scatter plot graph for LoTiM.Q28 and LoTiPQ28

Table G85

Quantitative Data Sources – LoTiMQ29 and LoTiPQ29

Q29 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.

LoTiMQ29

Score	Label	Frequency
0	Never	7
1	At least once a year	1
2	At least once a semester	2
3	At least once a month	0
4	A few times a month	2
5	At least once a week	3
6	A few times a week	1
7	At least once a day	2

Note. Mean = 2.68

Table G86

LoTiPQ29

Score	Label	Frequency
0	Never	3
1	At least once a year	0
2	At least once a semester	1
3	At least once a month	0
4	A few times a month	2
5	At least once a week	6
6	A few times a week	2
7	At least once a day	4

Note. Mean = 4.44

Table G87

Correlation Table - LoTiMQ29 and LoTiPQ29

Parameter		LoTiMQ29 Score	LoTiPQ29 Score
LoTiMQ29 Score	Pearson Correlation	1	-.085
	Sig. (2-tailed)		.737
	N	18	18
LoTiPQ29 Score	Pearson Correlation	-.085	1
	Sig. (2-tailed)	.737	
	N	18	18

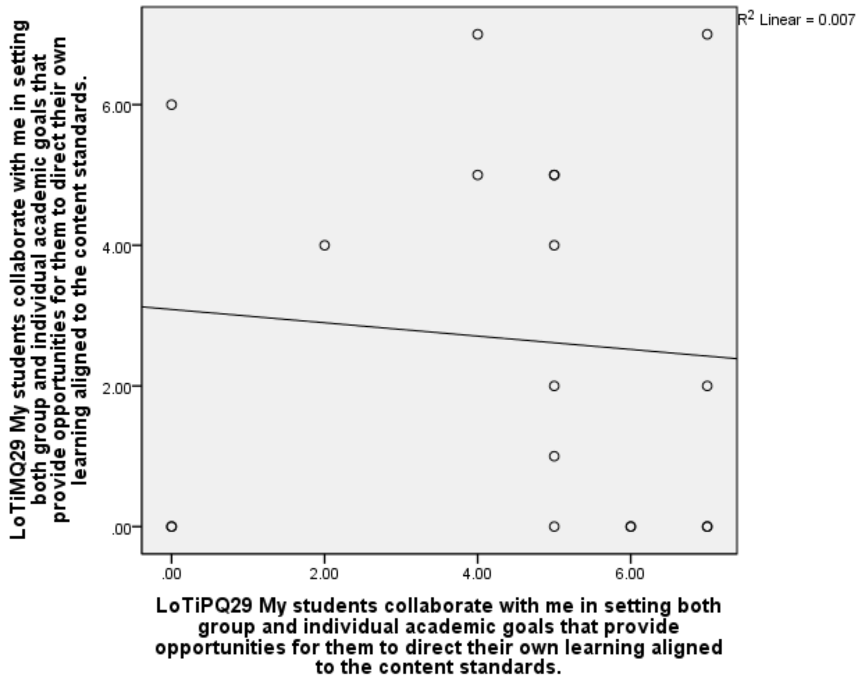

Figure G29. Scatter plot graph for LoTiMQ29 and LoTiPQ29.

Table G88

Quantitative Data Sources – LoTiMQ30 and LoTiPQ30

Q30 I promote global awareness in my classroom by providing students with digital opportunities to collaborate with others of various cultures.

LoTiMQ30

Score	Label	Frequency
0	Never	11
1	At least once a year	1
2	At least once a semester	3
3	At least once a month	2
4	A few times a month	0
5	At least once a week	1
6	A few times a week	0
7	At least once a day	0

Note. Mean = 1.00

Table G89

LoTiPQ30

Score	Label	Frequency
0	Never	6
1	At least once a year	1
2	At least once a semester	3
3	At least once a month	4
4	A few times a month	2
5	At least once a week	0
6	A few times a week	2
7	At least once a day	0

Note. Mean = 2.16

Table G90

Correlation Table- LoTiMQ30 and LoTiPQ30

Parameter		LoTiMQ30 Score	LoTiPQ30 Score
LoTiMQ30 Score	Pearson Correlation	1	-.118
	Sig. (2-tailed)		.642
	N	18	18
LoTiPQ30 Score	Pearson Correlation	-.118	1
	Sig. (2-tailed)	.642	
	N	18	18

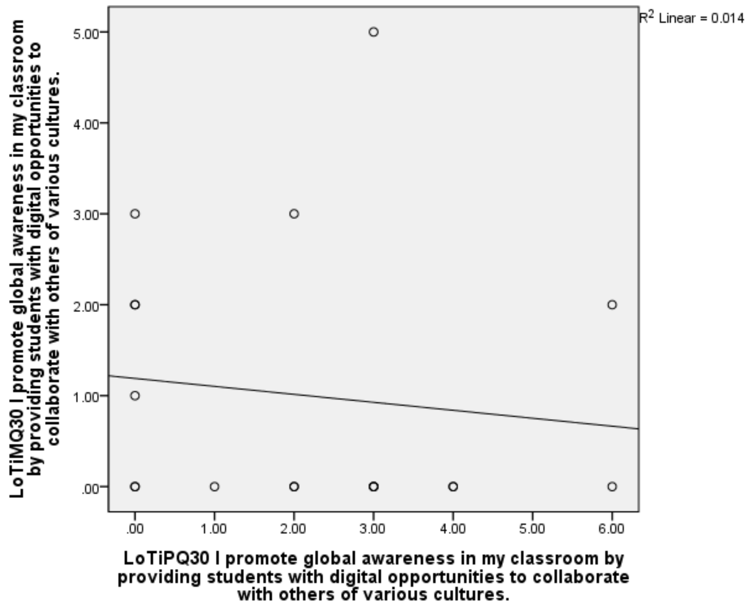

Figure G30. Scatter plot graph for LoTiMQ30 and LoTiPQ30.

Table G91

Quantitative Data Sources – LoTiMQ31 and LoTiPQ31

Q31 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.

LoTiMQ31

Score	Label	Frequency
0	Never	4
1	At least once a year	1
2	At least once a semester	4
3	At least once a month	2
4	A few times a month	1
5	At least once a week	3
6	A few times a week	3
7	At least once a day	0

Note. Mean = 2.90

Table G92

LoTiPQ31

Score	Label	Frequency
0	Never	5
1	At least once a year	1
2	At least once a semester	1
3	At least once a month	1
4	A few times a month	5
5	At least once a week	0
6	A few times a week	1
7	At least once a day	4

Note. Mean = 3.33

Table G93

Correlation Table - LoTiMQ31 and LoTiPQ31

Parameter		LoTiMQ31 Score	LoTiPQ31 Score
LoTiMQ31 Score	Pearson Correlation	1	.075
	Sig. (2-tailed)		.769
	N	18	18
LoTiPQ31 Score	Pearson Correlation	.075	1
	Sig. (2-tailed)	.769	
	N	18	18

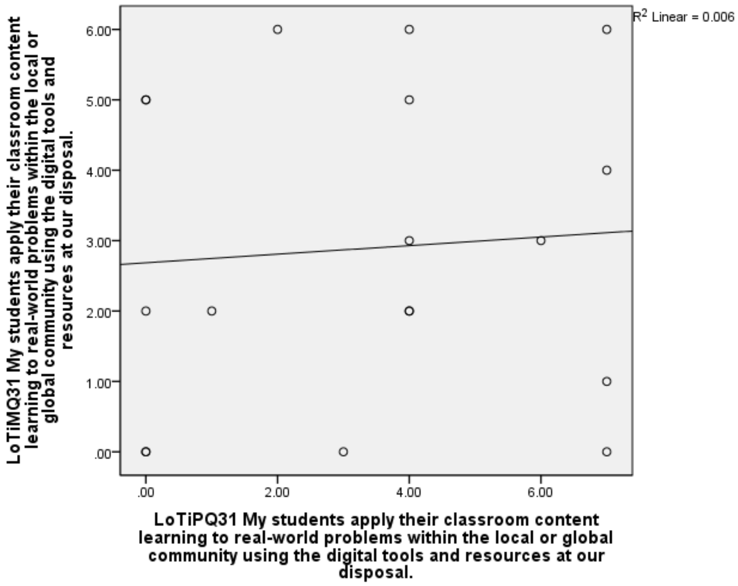

Figure G31. Scatter plot graph for LoTiMQ31 and LoTiPQ31.

Table G94

Quantitative Data Sources – LoTiMQ32 and LoTiPQ32

Q32 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.

LoTiMQ32

Score	Label	Frequency
0	Never	2
1	At least once a year	1
2	At least once a semester	0
3	At least once a month	1
4	A few times a month	1
5	At least once a week	0
6	A few times a week	4
7	At least once a day	9

Note. Mean = 5.78

Table G95

LoTiPQ32

Score	Label	Frequency
0	Never	2
1	At least once a year	0
2	At least once a semester	0
3	At least once a month	2
4	A few times a month	1
5	At least once a week	2
6	A few times a week	5
7	At least once a day	6

Note. Mean = 5.11

Table G96

Correlation Table - LoTiMQ32 and LoTiPQ32

Parameter		LoTiMQ32 Score	LoTiPQ32 Score
LoTiMQ32 Score	Pearson Correlation	1	.157
	Sig. (2-tailed)		.533
	N	18	18
LoTiPQ32 Score	Pearson Correlation	.157	1
	Sig. (2-tailed)	.533	
	N	18	18

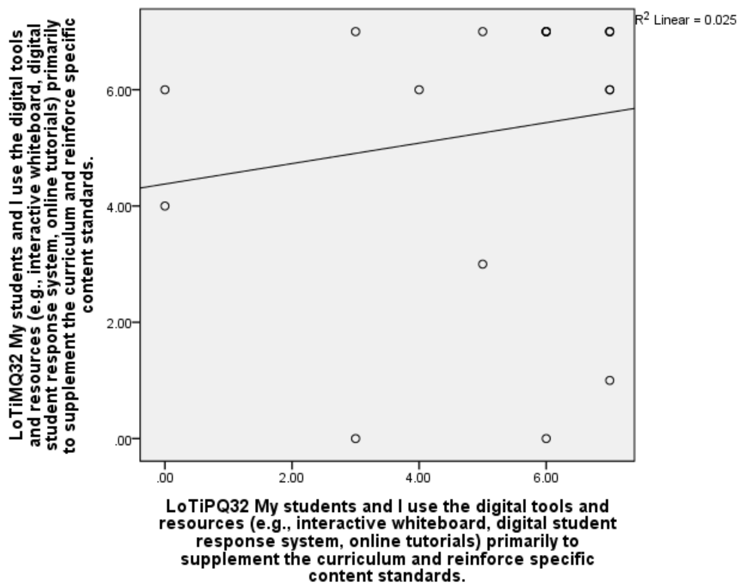

Figure G32. Scatter plot graph for LoTiMQ32 and LoTiPQ32.

Table G97

Quantitative Data Sources – LoTiMQ33 and LoTiPQ33

Q33 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.

LoTiMQ33

Score	Label	Frequency
0	Never	3
1	At least once a year	2
2	At least once a semester	1
3	At least once a month	1
4	A few times a month	3
5	At least once a week	3
6	A few times a week	3
7	At least once a day	2

Note. Mean = 3.68

Table G98

LoTiPQ33

Score	Label	Frequency
0	Never	3
1	At least once a year	1
2	At least once a semester	1
3	At least once a month	2
4	A few times a month	2
5	At least once a week	3
6	A few times a week	4
7	At least once a day	2

Note. Mean = 3.90

Table G99

Correlation Table - LoTiMQ33 and LoTiPQ33

Parameter		LoTiMQ33 Score	LoTiPQ33 Score
LoTiMQ33 Score	Pearson Correlation	1	.53
	Sig. (2-tailed)		.835
	N	18	18
LoTiPQ33 Score	Pearson Correlation	.53	1
	Sig. (2-tailed)	.835	
	N	18	18

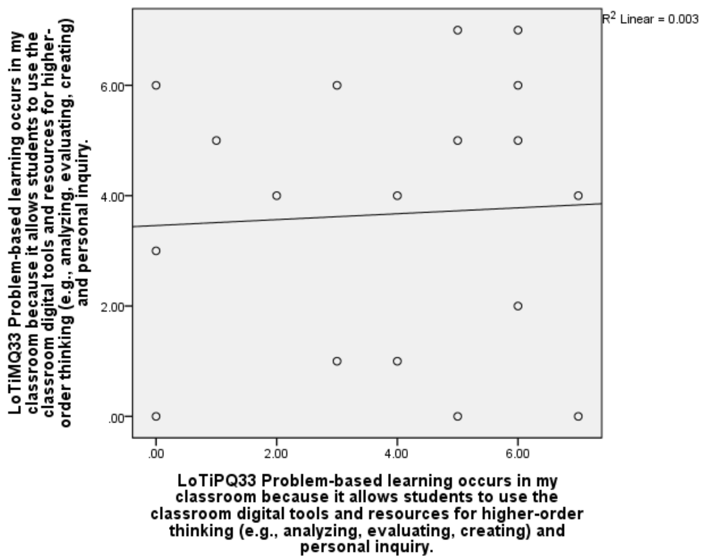

Figure G33. Scatter plot graph for LoTiMQ33 and LoTiPQ33.

Table G100

Quantitative Data Sources – LoTiMQ34 and LoTiPQ34

Q34 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.

LoTiMQ34

Score	Label	Frequency
0	Never	10
1	At least once a year	3
2	At least once a semester	2
3	At least once a month	1
4	A few times a month	1
5	At least once a week	0
6	A few times a week	0
7	At least once a day	1

Note. Mean = 1.17

Table G101

LoTiPQ34

Score	Label	Frequency
0	Never	8
1	At least once a year	0
2	At least once a semester	3
3	At least once a month	4
4	A few times a month	3
5	At least once a week	0
6	A few times a week	0
7	At least once a day	0

Note. Mean = 1.67

Table G102

Correlation Table - LoTiMQ34 and LoTiPQ34

Parameter		LoTiMQ34 Score	LoTiPQ34 Score
LoTiMQ34 Score	Pearson Correlation	1	.152
	Sig. (2-tailed)		.548
	N	18	18
LoTiPQ34 Score	Pearson Correlation	.152	1
	Sig. (2-tailed)	.548	
	N	18	18

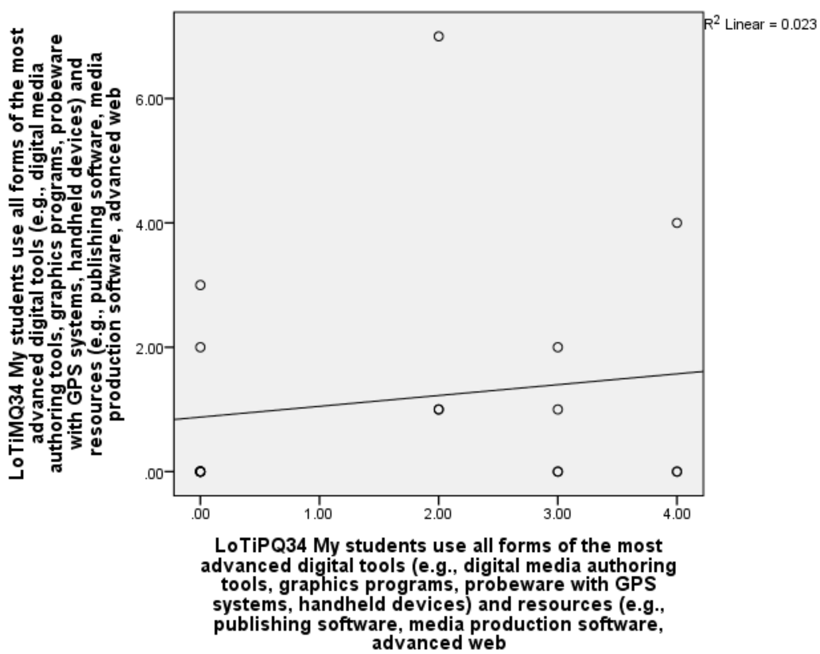

Figure G34. Scatter plot graph for LoTiMQ34 and LoTiPQ34.

Table G103

Quantitative Data Sources – LoTiMQ35 and LoTiPQ35

Q35 I advocate for the use of different assistive technologies on my campus that are available to meet the diverse demands of special needs students.

LoTiMQ35

Score	Label	Frequency
0	Never	4
1	At least once a year	2
2	At least once a semester	5
3	At least once a month	2
4	A few times a month	1
5	At least once a week	0
6	A few times a week	1
7	At least once a day	3

Note. Mean = 2.72

Table G104

LoTiPQ35

Score	Label	Frequency
0	Never	4
1	At least once a year	2
2	At least once a semester	4
3	At least once a month	0
4	A few times a month	3
5	At least once a week	2
6	A few times a week	1
7	At least once a day	2

Note. Mean = 2.89

Table G105

Correlation Table - LoTiMQ35 and LoTiPQ35

Parameter		LoTiMQ35 Score	LoTiPQ35 Score
LoTiMQ35 Score	Pearson Correlation	1	-.035
	Sig. (2-tailed)		.891
	N	18	18
LoTiPQ35 Score	Pearson Correlation	-.035	1
	Sig. (2-tailed)	.891	
	N	18	18

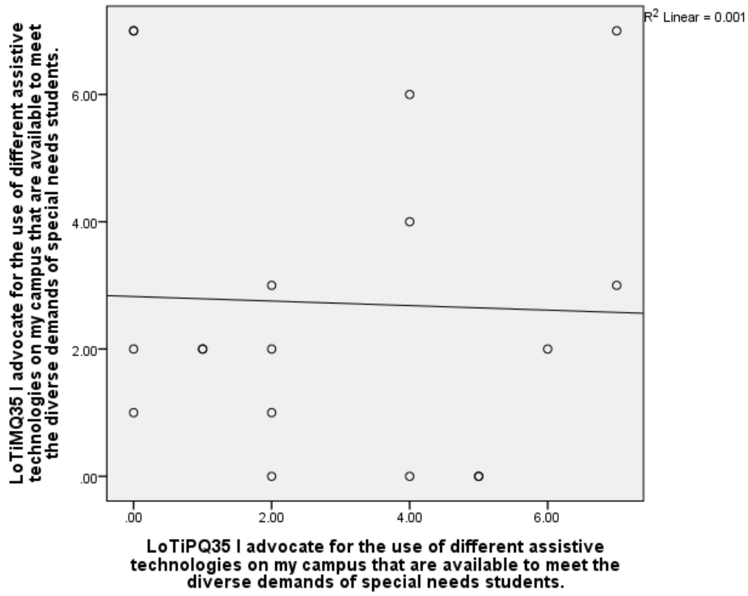

Figure G35. Scatter plot graph for LoTiMQ35 and LoTiPQ35.

Table G106

Quantitative Data Sources – LoTiMQ36 and LoTiPQ36

Q36 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.

LoTiMQ36

Score	Label	Frequency
0	Never	3
1	At least once a year	1
2	At least once a semester	2
3	At least once a month	1
4	A few times a month	1
5	At least once a week	4
6	A few times a week	2
7	At least once a day	4

Note. Mean = 4.00

Table G107

LoTiPQ36

Score	Label	Frequency
0	Never	2
1	At least once a year	2
2	At least once a semester	0
3	At least once a month	2
4	A few times a month	3
5	At least once a week	5
6	A few times a week	1
7	At least once a day	3

Note. Mean = 4.00

Table G108

Correlation Table - LoTiMQ36 and LoTiPQ36

Parameter		LoTiMQ36 Score	LoTiPQ36 Score
LoTiMQ36 Score	Pearson Correlation	1	-.110
	Sig. (2-tailed)		.664
	N	18	18
LoTiPQ36 Score	Pearson Correlation	-.110	1
	Sig. (2-tailed)	.664	
	N	18	18

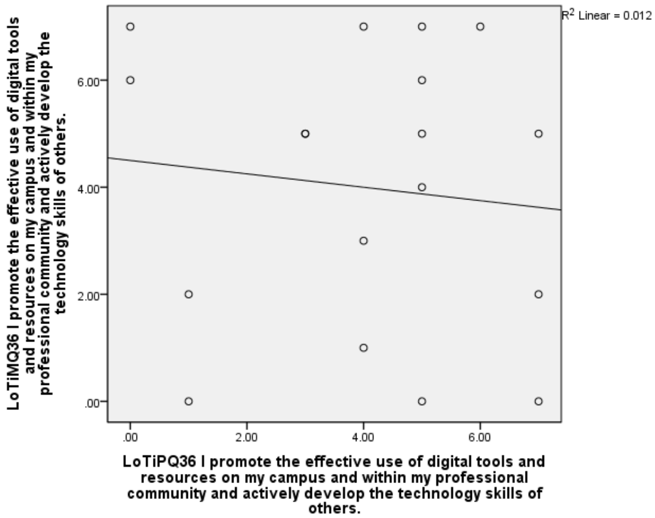

Figure G36. Scatter plot graph for LoTiMQ36 and LoTiPQ36.

Table G109

Quantitative Data Sources – LoTiMQ37 and LoTiPQ37

Q37 I consider how my students will apply what they Gave learned in class to the world they live when planning instruction and assessment strategies.

LoTiMQ37

Score	Label	Frequency
0	Never	1
1	At least once a year	0
2	At least once a semester	0
3	At least once a month	1
4	A few times a month	0
5	At least once a week	1
6	A few times a week	3
7	At least once a day	10

Note. Mean = 5.86. Two no responses.

Table G110

LoTiPQ37

Score	Label	Frequency
0	Never	1
1	At least once a year	0
2	At least once a semester	0
3	At least once a month	0
4	A few times a month	4
5	At least once a week	4
6	A few times a week	5
7	At least once a day	7

Note. Mean = 5.55

Table G111

Correlation Table - LoTiMQ37 and LoTiPQ37

Parameter		LoTiMQ37 Score	LoTiPQ37 Score
LoTiMQ37 Score	Pearson Correlation	1	.036
	Sig. (2-tailed)		.896
	N	18	18
LoTiPQ37 Score	Pearson Correlation	.036	1
	Sig. (2-tailed)	.896	
	N	18	18

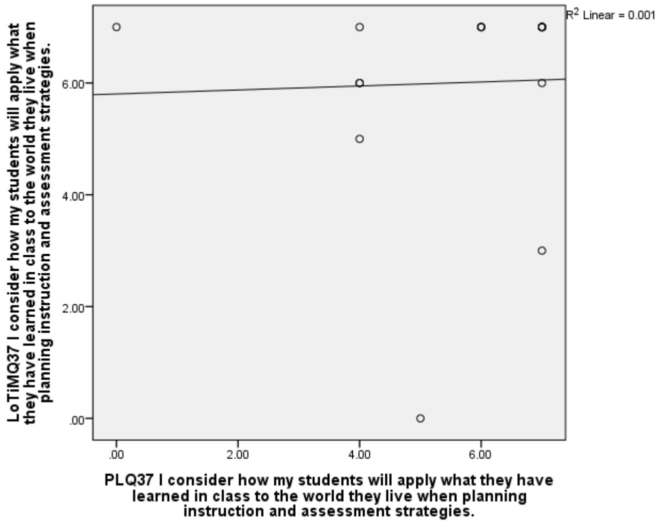

Figure G37. Scatter plot graph for LoTiMQ37 and LoTiPQ37.

Appendix H

LoTi M and *LoTiP* Individual Competencies Insignificant Correlations

LoTi Competency	*LoTiM* Mean	*LoTiP* Mean	r	N	Sig.
1. Engage students in learning activities that require them to analyze information. digital tools and resources (e.g., Inspiration/Kidspiration, Excel, InspireData)	5.05	3.94	-.104	18	.680
2. Students use the digital tools and resources to create web-based (e.g., web posters, student blogs or wikis, basic web pages) or multimedia presentations (e.g., PowerPoint)	2.05	1.78	.021	18	.933
3. Assign web-based projects (e.g., web collaborations, WebQuests) to my students that emphasize complex thinking strategies	1.17	1.78	-.016	18	.949
4. Provide multiple and varied formative and summative assessment opportunities that encourage students to “showcase” their content understanding in nontraditional ways.	5.11	5.11	.123	18	.628
5. 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).	5.50	3.67	-.246	18	.326
6. Students identify important real world issues or problems then use collaborative tools and human resources beyond the school building to solve them	1.28	3.11	-.563	18	.081

LoTi Competency	*LoTiM* Mean	*LoTiP* Mean	r	N	Sig.
7. Promote, monitor, and model the ethical use of digital information and technology in my classroom	4.17	3.28	-.139	18	.582
8. 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.	3.94	2.44	-.229	18	.361
9. Students discover 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)	1.44	1.50	-.149	18	.555
10. Model and facilitate the effective use of current and emerging digital tools and resources (e.g., streaming media, wikis, podcasting)	2.89	3.67	-.347	18	.158
11. Use my school's digital tools and resources primarily to access the Internet, communicate with colleagues or parents, grade student work and/or plan instructional activities for my students	3.89	4.67	.206	18	.413
12. Use the digital tools and resources in my classroom for tasks such as planning, preparing, presenting, and/or grading instructional activities.	3.78	4.50	.249	18	.319

LoTi Competency	*LoTiM* Mean	*LoTiP* Mean	r	N	Sig.
13. Use different technology systems unique to my grade level or content area (e.g., online courseware, Moodle, WAN/LAN, interactive online curriculum tools)	2.94	2.28	.054	18	.833
14. 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.	5.05	4.83	.016	18	.949
15. Students' use of information and inquiry skills to solve problems of personal relevance influences the types of instructional materials used in my classroom.	3.22	5.00	.000	18	1.00
16. 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.	0.33	0.61	.235	18	.347
17. 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.	3.28	3.28	.054	18	.831
19. Students model the "correct and careful" (e.g., ethical usage, proper digital etiquette,	3.50	4.28	.176	18	.485

LoTi Competency	*LoTiM* Mean	*LoTiP* Mean	r	N	Sig.
protecting their personal information) use of digital resources					
20. I participate in local and global learning communities to explore creative applications of technology toward improving student learning.	2.33	2.50	.134	18	.597
21. Continue to offer students learning activities that emphasize the use of digital tools and resources to solve “real-world” problems or issues, even though I sometimes experience issues during project implementation	3.89	3.33	-.117	18	.644
22. 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.	5.11	4.94	.002	18	.995
23. Seek outside help with designing student-centered performance assessments using the available digital tools and resources	3.72	3.72	-.047	18	.853
24. Rely heavily on my students’ questions and previous experiences when designing learning activities that address the content that I teach.	5.83	5.89	-.031	18	.902
25. Students use the classroom digital tools and resources to engage in relevant, challenging, self-directed learning experiences that address	4.61	4.22	.078	18	.758

LoTi Competency	*LoTiM* Mean	*LoTiP* Mean	r	N	Sig.
the content standards.					
26. Design and/or implement web-based projects (e.g., WebQuests, web collaborations) in my classroom that emphasize the higher levels of student cognition.	1.72	1.68	-.033	18	.895
27. 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.	5.50	4.83	.263	18	.292
28. 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.	2.17	2.39	-.205	18	.413
29. 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.	2.67	4.44	-.085	18	.737
30. Promote global awareness in my classroom by providing students with digital opportunities to collaborate with others of various cultures.	1.00	2.17	-.118	18	.642
31. 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.	2.89	3.33	.075	18	.769

LoTi Competency	*LoTiM* Mean	*LoTiP* Mean	r	N	Sig.
32. 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.	5.28	5.11	.157	18	.533
33. Problem-based learning occurs in my classroom because it allows students to use the classroom digital tools and resources for higher-order thinking.	3.66	3.89	.053	18	.835
34. Students use all forms of the most advanced digital tools (e.g., digital media authoring tools..) and resources (e.g., publishing software..) to pursue collaborative problem-solving opportunities surrounding issues of personal and/or social importance.	1.17	1.67	.152	18	.548
35. Advocate for the use of different assistive technologies on my campus that are available to meet the diverse demands of special needs students.	2.72	2.89	-.035	18	.891
36. 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.	4.00	4.00	-.110	18	.664
37. Consider how my students will apply what they have learned in class to the world they live when planning instruction and assessment strategies.	6.00	5.56	.036	18	.896

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LoTi Competency	*LoTiM* Mean	*LoTiP* Mean	r	N	Sig.

*p < .05, two-tailed.

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Curriculum VITAE

David Robinson, Ed.D.
Lecturer
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Education

Ed.D. in Instructional Technology - Towson University (January, 2013)

Certificate in Administration and Supervision - Loyola College of Baltimore (spring, 1995)

Master of Science Degree in Instructional Technology – Towson University (spring, 1989)

Bachelor of Arts Degree in Economics – University of Maryland Baltimore County, (spring, 1985)

Employment History

Lecturer and Graduate Program Director (Non-Tenure Track): Towson University, Department of Educational Technology and Literacy, School Library Media Program (summer, 2005-present)

Upper School Library and Technology Coordinator: The Boys' Latin School of Maryland (fall, 1995 – spring, 2005)

Adjunct Instructor: Towson University, Department of Reading Special Education and Instructional Technology (fall, 1995-summer, 2005)

Elementary and Middle School Library Media Specialist: The Howard County Public Schools (fall, 1989 – spring, 1995)

Team Leader: Maryland Technology Academy (summer, 2001-spring, 2003)
Served as a team leader and mentor to 21 Maryland teachers (also known as fellows) in 2001-2002, and 23 fellows in 2002-2003

Academic Advisor: Towson University (fall, 2000-spring, 2003)

Awards and Honors

Recipient of the Burton, Dietz, Jones, Rosecrans Graduate Fellowship in Instructional Technology (summer, 2006 and fall, 2007) - awarded for the pursuit of studies in Instructional Technology at Towson University.

Mae I Graham Award – Maryland Educational Media Organization (1994) - awarded for Maryland's outstanding School Library Media Program.

Recent Professional Development

Conference Presentations:

Frazier, L, **Sadera, B.** and **Robinson, D. (2012)** Teacher candidate technology use: The what and the why. Presentation at the Society for Information Technology & Teacher Education (SITE) International Conference, held in Austin, Texas.

Sadera, W. and Robinson, D. (2010). Cultural Implications for Teaching Online Students a World Away. In C. Crawford et al. (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2010* (pp. 829-830). Chesapeake, VA: AACE.

Robinson, D. (2009). Teaching across cultures: Factors for consideration in online instruction. Presentation at the Maryland Distance Learning Association Spring Conference held in Towson, Maryland.

Book chapter:

Sadera, W. & Robinson, D. (2010). Teaching across cultures: Factors for consideration in teaching students a world away. In Edmundson, A. (Ed.), *Cases on globalized and culturally appropriate e-learning: Challenges and solutions.*

Curriculum Development:

Co-developed a fully online graduate course with Dr. Sarah Lohnes for Towson University, titled, *Instructional Development* (spring, 2009)

Co-developed a fully online graduate course with Dr. William Sadera and Nichelle Midon for Towson University, titled, *Concepts and Issues in Education* (summer, 2008)

Professional Organizations

- Maryland Society for Educational Technology (MSET)
- Maryland Association of School Librarians (MASL)
- Maryland Distance Learning Association (MDLA)
- American Library Association (ALA)