12-2015

Secondary English Teachers Dispositions Toward Technology Integration in One-to-One Environments

Reed Chewning
Clemson University, reed.chewning@converse.edu

SECONDARY ENGLISH TEACHERS DISPOSITIONS TOWARD TECHNOLOGY INTEGRATION IN ONE TO ONE ENVIRONMENTS

A Dissertation
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy
Curriculum and Instruction

---

by
Reed Martin Chewning
December 2015

Accepted by:
Lienne Medford, Committee Chair
Ryan Visser
Rebecca Kaminski
Sarah Hunt-Barron

ABSTRACT

This study examined how high school English teachers define technology integration and how teacher beliefs regarding technology integration impacts teacher and student use of digital technologies for instructional purposes. Thirty-nine teachers from three high school English departments in their initial year of a one-to-one device implementation participated in this study. Qualitative and quantitative data were collected and analyzed to examine how high school English teachers define technology integration and to examine if teacher beliefs informs technology integration practices. Quantitative data included the use of the TPACK formative assessment tool and an instructional technology use survey. Qualitative data included open-ended survey questions, interviews, and observation notes. Analysis of the qualitative data identified five themes as to what it means to teachers in their first year of a one-to-one device implementation program to integrate technology into their instructional practices. The potential impact of professional development on teachers' reported TPACK scores, as well as the reported frequency of technology use by teachers and students are discussed.

DEDICATION

To my father, who encouraged me to “be the best one.”

To my mother, who continues to inspire with her passion to learn and teach.

To Michael whose words of encouragement and push for perseverance rings in my ears. To Mary Fields and Ligon for always believing I would finish.

ACKNOWLEDGMENTS

I would first like to thank my committee. I do not think I would ever finish this if it were not for the kindness of you all. Dr. Kaminski, your positive encouragement made sitting down to complete this dissertation possible. Thank you for making sure I saw the positive side of critique, it enabled me to move forward. Dr. Visser, thank you for your insights into the role of technology and your dedicated response to each draft of my dissertation over the many many years of revision. Dr. Hunt-Barron, you are my friend, my mentor, and now a committee member. You have made finishing this dissertation a possibility. I am ready to get reading this dissertation behind us so that we may get back to our friendships, although I think I will still call you weekly to ask questions. You inspire me with your work ethic and attention to detail. Dr. Medford, I would have quit many years ago if it had not been for your kindness at a time when I thought all was lost. I look forward to a time when I can sit in your office and talk about adolescent literature rather than the poor progress of my dissertation.

To the village that got me through the dissertation. While I may not have enjoyed the constant question of how's the dissertation coming at the time, I am grateful for all of your constant encouragement. You made it difficult to stop thinking about the dissertation or to contemplate quitting. Thank you, all.

TABLE OF CONTENTS

Table of Contents (Continued) Page

LIST OF TABLES

Table of Contents (Continued) Page

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

"The challenge for our education system is to leverage the learning sciences and modern technology to create engaging, relevant, and personalized learning experiences for all learners that mirror students' daily lives and the reality of their futures. In contrast to traditional classroom instruction, this requires that we put students at the center and empower them to take control of their own learning by providing flexibility on several dimensions."

U.S. Department of Education (2010*)*

As of October 2014, 91% of Americans have a cell phone, 64% of cellphones are smartphones, 42% own a tablet computer, and 32% own an e-reader suggesting the tools we use to participate in daily life have evolved from a community dependent upon pen, paper, and books to a community in which 98% of 18-29 year olds have a cellphone and 70% of those users use their smart devices to complete daily tasks (Pew Research, 2015). The Pew Research Center (2015) also reports 88% of high school students access a smart phone daily. This prevalence of portable devices suggests an opportunity for brick and mortar schools to extend learning beyond the traditional school walls. However, this may require a pedagogical shift for some teachers, employing a more constructivist approach to help students develop higher order thinking skills in order to analyze and to manipulate seemingly limitless information and develop meaningful opportunities for students to apply their technological skills for educational purposes. For several decades, the presence of technology in schools has led to predicted changes in pedagogy in an effort to enhance student learning with available digital technological tools (Purcell, Buchanan, & Friedrich, 2013).

In 2010, the U.S. Department of Education released The National Education Technology Plan (NETP), extending previous initiatives like the No Child Left Behind Act (2001) and the Enhancing Education Through Technology Act (2001). The NETP outlined the need for integration of the technological resources available in our daily and professional lives into the entire education system as a means to improve student learning. Recent research conducted by Purcell, Heaps, Buchanan, & Friedrich (2013) reveals 73% of Advanced Placement and National Writing Project teachers report they and/or their students use technology in the classroom through smartphones, tablets, or e-readers. The same research examines student access to technology in which teachers report 54% of students have sufficient access to technology at school but just 18% of students have access to technology at home. Accessibility and integration of portable devices in classrooms has inspired conversations to resurface with a renewed urgency, as school administrators evaluate the benefit of designating funding for computer labs, bring-your-own-device (BYOD), or one-to-one device programs to meet the academic needs of students at school as well as at home.

A challenge associated with one-to-one programs is, in some cases, an emphasis placed on acquiring the device, rather than emphasizing how the device will be integrated into the culture of the school, the curriculum, and the teaching practices of individual teachers (Storz & Hoffman, 2013). As a result, one-to-one initiatives may not consistently yield the expected learning outcomes. November (2013) warned one-to-one programs often fail to meet their objectives unless they have a clear vision of how to make technology an integral part of student learning. He states with support, teachers can

learn to apply disciplinary expectations to leverage technology to extend and enhance student learning.

Statement of the Problem

With the increased prevalence of technology, administrators, teachers, students, and parents are faced with the challenge of determining how to leverage technology associated with communication and social interaction to extend and enhance learning opportunities in the classroom. How that technology is integrated is uncertain because the role and purpose of technology in classrooms varies from classroom to classroom. This variance can be attributed to an ambiguous definition of what it means to incorporate technology into instructional practices, diverse perspectives among teachers regarding the role and purpose of technology in the classroom, and the uncertainty of how to incorporate technology in ways that are effective and transformative rather than to reproduce tasks completed prior to technology integration.

The definition of technology integration is vaguely defined throughout the education community. A review of the literature by Hew and Brush (2007) reveals a common definition of technology integration as "the use of computing devices such as desktop computers, laptops, handheld computers, software, or Internet in K-12 schools for instructional purposes" (p. 225). It is unclear from this definition if use of technology by the teacher alone constitutes technology integration, or if the technology must be used by the student to be considered integrated into the curriculum. This ambiguity may lead a teacher to believe using a Smartboard to project a PowerPoint presentation or using email to communicate with students, parents, and school officials is a viable means to meet the

standards for technology integration (Hutchinson & Reinking, 2010). The International Society of Technology in Education (ISTE) notes that to achieve exemplary technology integration, "effective teachers model and apply the *NETS·S* [National Education Technology Standards for Students] as they design, implement, and assess learning experiences to engage students and improve learning; enrich professional practice; and provide positive models for students, colleagues, and the community" (NETS·S, 2008). This definition encourages teachers to adhere to the NETS·S, which state "today's students need to be able to use technology to analyze, learn, and explore" (NETS-S, 2008). In this definition of technology integration, technology use by students is a fundamental component for both engagement and improved student outcomes. Recent disciplinary standards have also incorporated technology, unifying content, technology, and pedagogy in their descriptions of student learning activities. For example, The National Council for the Teachers of English (2012) calls for students to "use a variety of technological and information resources to gather and synthesize information and to create and communicate knowledge." This squarely puts technology into the hands of students, making it clear students are expected to use technology and teachers should integrate technology into their classroom instruction. Technology integration could perhaps be more simply stated as teachers and students using technology daily, including using a variety of digital resources to complete assignments and create projects to demonstrate an understanding of the content.

Ertmer (2005) argues using technological tools for instruction depends on the teachers and their beliefs about technology. Mishra and Kohler (2006) note there is a

correlation between attitudes and beliefs and technology knowledge and skills; for a teacher to integrate technology he or she must be convinced it is relevant to his or content and offers more advantages and benefits than traditional methods of instruction. For example, an English teacher would need to be convinced that making a video of a literature interpretation offers more advantages and benefits than writing a literary analysis.

There is currently very little research regarding in-service secondary English teachers' technology integration practices. Miller's (2007) research of technology use among English teachers revealed teachers believed "technology to be the degradation and reduction of the sanctity of classical literature and the critical thinking requisite to understanding it and enjoying it" (p.114), suggesting secondary English teachers may be resistant to integrating technology into their instruction. Jewitt, Bezemer, Jones, and Kress (2009) and Kadjer (2007), pioneers in the field of technology integration in secondary English, have called for more research regarding teacher perceptions and teacher practices with regard to technology integration; the majority of research surrounding secondary English teachers and technology integration focuses on how to incorporate technology, rather than research into what motivates or hinders teachers to integrate technology.

Hew and Brush (2007) classified 123 reported barriers associated with technology integration and reported in peer-reviewed journals into six categories: "(a) resources, (b) knowledge and skills, (c) institution, (d) attitudes and beliefs, (e) assessment, and (f) subject culture" (226). In order to overcome these pervasive barriers, Mishra and Kohler

(2006) found successful technology integration requires an understanding of how the use of technology relates to both content and pedagogy. Hew and Brush (2007) define the knowledge and skill barrier as a "lack of specific technology knowledge and skills, technology-supported pedagogical knowledge and skills, and technology-related-classroom management knowledge and skills" (p. 228). Expanding upon Shulman's (1986) concepts of pedagogical content knowledge to include technology, they view interaction between content, pedagogy, and technology to be unique to each teaching experience; therefore, the teacher needs to understand how content, pedagogy, and technology interact before he or she can successfully integrate technology as a tool to extend and enhance student learning.

One-to-one initiatives are supported by a belief that technology can impact student learning; however, barriers associated with integrating technology into instructional practices persists. November warns (2013) providing the tool does not necessarily mean technology will be integrated into instructional practices due to teacher belief and teacher practices. As a result, one-to-one device programs have a history of mixed results and often schools cancel the programs after trying them for a relatively brief period of time (Sortz & Hoffman, 2013). If a teacher believes the device provided might distract or interfere with his or her proven method of instruction, he or she will not integrate the device into their instruction. One way to help teachers see the pedagogical possibilities provided by technology and support teachers as they integrate technology into their instructional practice is through professional development. Reviews of one-to-one literature reveal the successes of one-to-one programs outweigh the failures when

professional development programs are in place ensuring teacher attitudes and beliefs are formed through knowledge and skills (Drayton, Falk, Stroud, Hobbs, & Hammerman, 2010; Shapley, Sheehan, Sturges, Caranikas-Walker, Huntsberger, & Maloney, 2010). There is limited research on the impact of professional development programs as a means to influence technology integration practices (Mouza, 2009), but the 2010 study of technology professional development programs conducted by The United Federation of Teachers supports professional development as a means to influence teacher attitudes and beliefs as well as teacher knowledge and skills (Mazzella, 2011).

Professional development can target teacher knowledge and skills, which may influence teacher beliefs regarding integrating technology into their instructional practices. The TPACK framework developed by Mishra and Koehler (2006) defines technology domains and the intersection between technology, pedagogy, and content. For teachers to understand the connection between technology, pedagogy, and content may help a teacher define his or her technological pedagogical content knowledge strengths to assist him or her in evaluating his or her own attitudes and beliefs (Mishra & Koehler, 2006). Schmidt, Baran, Thompson, Mishra, Koehler, and Shin (2009) developed an assessment tool for the TPACK framework in an attempt to identify the knowledge necessary to support teachers in their integration of digital technologies into their instruction.

Given that technology is an integral part of the education landscape either through one-to-one device programs or student unlimited access to digital resources through personal devices, this study explores how we define technology integration in schools

with one-to-one and BYOD policies and how teachers perception of their own technological pedagogical content knowledge influences instruction practices. .

Statement of Purpose

November (2013) warns that a technology vision must extend beyond a device itself for one-to-one programs to be successful. In this study, I examine three separate high schools in different school districts, each with separate visions of technology integration. The schools in this study were all experiencing their initial year of a one-to-one device program. This research examines how high school English teachers define technology integration and how teachers' perceive their own technological pedagogical content knowledge, as well as how this perception affects classroom instruction. This study will examine individual as well as departmental definitions of technology integration and examine the impact of varying professional development opportunities housed in different school cultures on technological instructional choices.

Overview of Research Methods

An integral part of one-to-one technology programs is teacher beliefs (Hutchinson & Reinking, 2010; November, 2013). If a teacher believes integrating technology will extend and enhance student learning, he or she will be more inclined to include technology (Ertmer, 2005). As a result, teacher beliefs need to be studied to inform teacher education and professional development programs to target the knowledge and skills necessary to support teachers in their belief that technology can be an effective tool in classroom instruction. In this mixed methods, multiple case study, teachers were surveyed using a paper survey, a TPACK assessment, interviews, and observations. The

teachers selected were involved in the first year of a one-to-one initiative and teaching high school English courses. The schools varied in geography and size, from a suburban school with 900 students to an urban school with 1500 students to a suburban school with 3200 students. The English departments differed in student demographics, degree of departmental collaboration, administrative expectations for technology integration, devices available in the classroom, and professional development opportunities.

Open-ended questions on the survey were used to ascertain how secondary English teachers participating in a one-to-one laptop program define technology integration. Teachers defined in their own words what technology integration meant to them. The TPACK self-assessment (Schmidt et al., 2009) was used to measure teachers' self-perceptions of their own technological pedagogical content knowledge. This tool was selected because it assesses teacher attitudes and beliefs with regard to their perceived knowledge and skills to ascertain if TPACK scores influence instructional practices. Observations and follow up interviews were conducted to examine if TPACK scores align with observed instructional practices.

Summary

This dissertation is in five chapters, including this introductory chapter. Chapter two is a review of literature, which provides a comprehensive review of relevant literature to this research including defining technology integration, barriers of technology integration, TPACK, one-to-one programs, and technology professional development opportunities. Chapter three provides the methods used in this research project. Chapter four presents the findings of the research. These findings are qualitative

and quantitative, focusing on themes the research analysis identified. Chapter five includes discussion, analysis, conclusions, and future research implications.

CHAPTER TWO

LITERATURE REVIEW

Introduction

Digital technology is pervasive and is essential in the way we communicate, learn, and live. Digital technology tools have penetrated the brick and mortar walls of educational institutions and classrooms where teachers define how and when various technologies will be used for instructional purposes. Over one third of U.S. students have a school issued device to use throughout the school year and 89% of high school students have access to a smartphone throughout the school day (Pew Research, 2014), reinforcing an expectation for teachers to leverage the digital technologies available into their instructional decisions. Teachers are a critical component to the success of technology integration and the success of one-to-one device programs in education; unfortunately, some inservice teachers are unprepared to use technology to extend and enhance student learning (U.S. Department of Education, 2010). In recent years, schools have implemented one-to-one device programs, either with a school provided device or with bring your own device (BYOD) option. Schools addressing teacher preparedness through professional development opportunities prior to or throughout the implementation process place those one-to-one device programs in a position to succeed (Drayton, Falk, Stroud, Hobbs, & Hammerman, 2010).

Computers, smartphones, tablets, and other devices have changed the landscape of our society and the landscape of education as the potential for students and teachers to leverage technology to enhance student learning and prepare students for the 21st century

workplace (Lowther, Inan, Ross, & Strahl, 2012). Obstacles for integrating digital technology into school curricula are a lack of teacher experience, education, and training in the use of digital tools to meet the curricular demands of their discipline (Elamnani, 2013; MacDonald, 2008; Means, 2010; Morris, 2012).

This study is predicated on the understanding that technology integrated into the secondary English classroom can enhance and extend student learning by providing alternate ways to construct meaning (Kadjer, 2007). Effective technology integration into instruction provides an opportunity to employ constructivist-teaching models.

Constructivist Learning Theory

Digital portable technologies enable a transition from the traditional theory of technology integration, often enacted through an occasional visit to a computer lab, to an environment of seemingly unlimited digital use. As more and more students gain access to portable digital devices, the opportunities for student learning expand from classroom lectures on specific content to opportunities to learn anything, anywhere, at anytime. This prospect of unlimited access to information challenges the role of a teacher as the sole provider of content knowledge, as students are constantly exposed to information that was at one time limited to specialists in their educational field. Digital access enables individual learning to be self-directed and knowledge to be constructed through personal experiences. Constructivist learning theory supports the notion of students working independently to construct their own knowledge, with teachers as facilitators of learning.

The basis of Constructivism is that students build upon experiences and prior knowledge to create new understandings (Schunk, 2014; Yoders, 2014). There is no

single Constructivist learning theory but according to a literature review conducted by Baviskar, Hartle, and Whitney (2009) common practices in the implementation of Constructivism are: students are active in their learning process, learning should be in context, students build on prior knowledge to apply new knowledge, and student reflection. Lev Vygotsky (1978), a sociocultural learning theorist foundational to Constructivism, posited that learning was socially constructed through interactions within a community of learners. Constructivist-learning theory balances the roles of teacher and students as co-contributors to the learning environment, with each bringing in prior knowledge and experiences. Morphew (2009) identifies three key elements for a constructivist-learning environment: a meaningful experience, prior knowledge, and interactions. According to Morphew (2009), a meaningful experience must make sense to the student and connect curricula to what students already know (their prior knowledge). Prior knowledge enables students to associate, retain, and value the learning experience (Morphew, 2009). Interactions in the constructivist-learning classroom are essential. The interaction between a teacher and a student or a student and another student may trigger prior knowledge or experiences that foster growth for all involved (Morphew, 2009).

The teacher identifies students Zone of Proximal Development (ZPD) to tailor instruction to overcome the difference between what the student can do with or without support (Vygotsky, 1978). A teachers can use scaffolding to support student-centered learning with digital resources to reduce the gap between what the learner can do and cannot do without assistance (Azevedo & Hadwin, 2005). Scaffolding enables students to learn difficult concepts that may be outside of their ability range initially. For example, it

is common practice for high school English teacher to front load students with background knowledge about a text before the students begin to read a text. If a teacher were to demonstrate his or her process in acquiring and synthesizing the background information such as finding images and articles about the time period of the work students could build their skills in finding background information about a text to apply to the next text. This process is what Reiser (2004) and Collins (1991) define as cognitive apprenticeships in which the role of the teacher transforms from knowledge expert to a mentor that evaluates progress and supports students in their construction of knowledge when necessary.

Teacher attitudes and perceptions regarding altering their role in the classroom may prevent teachers from integrating digital technologies effectively into instructional practices (Teo, 2008). When a teacher is hesitant to relinquish control of student knowledge construction, particularly when a teacher is uncomfortable permitting students to access information on portable digital devices, rather than obtaining information from teacher-provided materials or lectures, the integration of digital technology tools may be sacrificed for the safety of traditional teaching practices (Judson, 2006).

Educational standards acknowledge this apprehension and define ways for teachers to use technology. The standards may support teacher technological pedagogy as a way to regularly incorporate student use of technology as a tool to enhance and extend content knowledge. The constructivist view of New Literacies, as defined by Leu, Kinzer, Coiro and Kammack (2006), stipulates twenty-first century students who are digitally literate in information and communication technologies associate, retain, and value

information they can access often. The ubiquitous access to information redefines the role of education as a means for students to recall content knowledge to education as a means for students to evaluate, interpret, and synthesize information. This redefinition inspires the adaptation of educational and pedagogical learning theories to meet the demands of the 21st century (Leu, Kinzer, Coiro & Kammack, 2006).

Role and Purpose of the Learner.

In an age of No Child Left Behind, teachers often prepare for the end of course test in the English classroom, before devoting time to text analysis and disciplinary skills requiring higher-order thinking skills (IRA & NCTE, 2001; NCREL, 2005). Experts warn that literacy demands are changing and schools are failing to modify teaching practices to support the literacy demands of the 21st century (Biancarosa & Snow, 2004; Lang & Legters, 2002; O'Brien, Stewart, & Moje, 1995). Thoman and Jolls (2005) aptly state the challenges facing twenty-first century teachers:

> For centuries, schooling has been designed to make sure students learned facts about the world – which they proved they knew by correctly answering questions on a test. Such a system is no longer relevant when most up-to-date facts are available at a touch of a button. What students need today is to learn how to find what they need to know, when they need to know it, and to have the higher order thinking skills to analyze and evaluate whether the information, they find is useful for what they want to know.

The increased access to digital technology and the accessibility of information through the Internet impacts the role of the student because students can acquire information that once was restricted to teacher resources or research databases. Typically, teachers identify what students need to know to understand a text, find the information, evaluate it, and synthesize it for the students. In this model, the teacher thinks critically for the students and the students accept the interpretation provided so they may reproduce it when evaluated. Applebee (1996) calls this example "deadly traditions" because students learn to memorize the teacher directed interpretation of the text rather than to question, reason, or engage with the text. In this quote, Thoman and Jolls (2005) are arguing for a shift in the teacher's role to a guide-on-the-side supporting students. Students would be better prepared for the future, if they learn how to identify what they need to know to extend their learning and how to access, evaluate, and synthesize information to assist them in their understanding. For example, if a student did not know a term or phrased used in literature, they could use digital resources to find an image or definition and apply that information to support their interpretation of a text. The teachers as a guide- calls for rethinking secondary English instruction from the students' point of view, guided by approaches that validate students' own responses to what they read yet providing the support to help them question, consider, and reach more developed understandings of texts (Langer,1991).

Technology integration may offer one tool to student engagement with a variety of texts. Students may actively participate in educational conversations using digital tools and apply these concepts in their practice of meaningful learning (Applebee, 1996). For

example, students may discuss literature through a wiki or blog extending their conversation beyond the classroom context to a broader, potentially global community or a student could develop a multi-media interpretation of a text and post it online for other students to compare to traditional presentations. Applebee (1996) supports social constructivist learning theory in which the teacher's role is facilitator of knowledge, as one who provides guidance and clarification for the student when they construct their meaning of a text; the teacher becomes a guide on the side. Thoman and Jolls (2005) believe "creative classrooms today are ones where everyone is learning, including the teacher" which is in direct contrast with the notion of a teacher as the keeper of knowledge.

Self-Efficacy

Bandura (1997) defines self-efficacy as "beliefs in one's capabilities to organize and execute the courses of actions required to produce given attainments" (p.3). These beliefs influence teacher behavior, and according to Abbitt (2011), when it comes to technology integration in classrooms, these beliefs are associated with the amount of effort and emotional cost required to take action or to integrate technology. Self-efficacy is developed through social influences, vicarious, experiences, enactive mastery, and affective states (Abbitt, 2011). This construct suggests when a teacher's knowledge increases; his or her self-efficacy may increase motivation to incorporate technology into their instructional practices. In the case of digital technology integration, as understanding of technology increases, use will increase because it will be based on knowledge of pedagogy and content rather than technology use in isolation (Niess, 2010).

Teachers with an opportunity to apply digital technologies to their content area prior to incorporating it into their teaching practices through school provided or personal professional development opportunities have higher self-efficacy and the likelihood of technology integration into their instructional practices increases (Bagozzi, Davis, & Warshaw, (1992). Abbitt (2011) asserts enactive mastery experiences or observing the performance of others technology integration experiences associated with professional development opportunities have the strongest influence on beliefs, which in turn influence behavior. Teachers observing teachers with strong self-efficacy beliefs, who integrate technology into teaching practices, have an increased self-efficacy as a result of their vicarious technology experiences (Al-Awidi & Algahzo, 2012). Kopcha and Alger (2011) also attribute an increase in self-efficacy and technology integration practices to observing peers integrate technology due to their access to feedback based on technology use because they feel better informed and supported in their integration practices.

"Technology can foster a shift in a teachers' role from a traditional one to that of a facilitator in the classroom" (Paraskeva, Bouta, & Papagoammo. 2008, p.1085). This shift requires teachers to have a high self-efficacy of personal technology use and technology integration practices so they can support student technology integration beliefs. Traditionally, the role of teacher in the classroom is expert and the role of the student is novice; when technology is introduced into classroom instruction, these roles may reverse as students assume the role of technology expert. If a teacher has an opportunity to become proficient in using a digital tool to support or extend student learning, they may be more inclined to permit students to use that same tool. Content

specific technology integration material would provide teachers support in technology integration practices and promote their self-efficacy as well as ensure a better quality of learning for instruction as teachers learn to use technology with in their content (Kocakaya & Gonen, 2010). Unfortunately, exposure to these resources is limited and teachers often lack time to locate tools to support them in their technology integration practice and to support their self-efficacy with regard to technology integration establishing a need for an increased training in content specific technology integration practices for preservice and in-service teachers to boost motivation, self-efficacy, and computers habits (Al-Awidi & Alghazo, 2012; Curts, Tanguma, & Pena, 2008; Milbrath & Kinizi, 2000; Paraskeva et al. , 2008; Robertson & Al-Zahrani, 2012).

Understanding teachers' beliefs has been a challenge for decades. Thurstone (1928) defined attitude as "the sum total of a man's inclinations and feelings, prejudice or bias, preconceived notions, ideas, fears, threats, and convictions about any specified topic" (p. 530). Katz and Raths (1985) defined an attitude as a "predisposition to action". They went on to define dispositions as "a summary of actions observed." (p. 306). In 2002, NCATE defined dispositions as the "values, commitments, and professional ethics that influence behaviors toward students, families, colleagues, and communities and affect student learning, motivation, and development as well as the educator's growth. Dispositions are guided by beliefs and attitudes related to values such as caring, fairness, honesty, respect, and social justice" (p. 52).

According to Wilkerson and Lang (2007), the value in determining teacher dispositions is to guide teacher education programs and professional development

programs to "produce highly qualified teachers" (p. 2). "Without assessment of dispositions, there is no way to program or predict improvement of dispositions … There are many very bright teachers who attempt to teach – and fail miserably because they do not have the values and commitment it takes" (Wilkerson & Lang, 2007, p. 3). Wilkerson and Lang (2007), differentiates between unacceptable, acceptable, and target NCATE dispositions. Teachers who have acceptable dispositions are familiar with the requirements of their profession. Teachers who score a target in their dispositions reflect the adherence to the requirements or standards of their profession. Wilkerson and Lang (2007) caution teachers with characterizing dispositions that they may need to adjust their practices to make sure the controlling tendencies of the dispositions are not influencing the best practices of teaching. In the case of technology integration, a teacher with characterizing dispositions would use the device to use the device without taking into account the pedagogy or how that device extends or enhances content knowledge. Simply put, they use the device to use the device, not to enhance student learning.

A Vision for 21st Century Learning

Technology is changing the landscape of education, forcing agencies, governments, organizations, and individuals to define what 21st century learning should include. Kereluik, Mishra, Fahnoe, & Terry (2013) reviewed and analyzed most of the 21st century knowledge frameworks to define the components of learning valued by the educational community. Their research revealed three domains of knowledge: Foundational Knowledge (to know), Humanistic Knowledge (to value), and Meta Knowledge (to act). Each of these domains of knowledge are broken into subcategories.

Foundational knowledge includes content knowledge, digital and information literacy, and cross disciplinary knowledge. This knowledge domain values students maintaining foundational knowledge so they may make connections and use digital resources to evaluate and assess information to continue to grow. Meta knowledge relies on foundational knowledge to think critically, problem solve, communicate, collaborate, innovate, and create (Kereluik, et al., 2013). The final domain, humanistic knowledge, broadens the learning perspective to global and social context such that learning supports life skills, job skills, leadership, cultural competence, and ethical and emotional awareness. When these knowledge domains are combined, students and teachers "work in purposeful communities engages with questions that require reflection, defend conclusions, problem solve like detectives while responding like investigative reporters" (Kereluik, et al. (2013), p.133).

Technology Integration

Why Integrate Technology

The National Center for Education and the Economy (2007) suggests workers need new, sophisticated skills to compete in the modern day work place. Their study recommends future workers will need to be able to create with technology and to renew innovations with twenty-first century tools (Gardner, 2008; Jerald, 2009; Kereluik, Mishra, Fahnoe, & Terry, 2013). These studies support a belief that teaching with technology will prepare students for the twenty-first century work place and will engage students by incorporating tools they use everyday.

With calls like this, educators have felt the pressure to meet the demands of the twenty-first century student by finding ways to incorporate technology into their classrooms (Williams, Fougler, & Wetzel, 2009). Despite recommendations and the increasing prevalence of technology, teachers and students may not view technology as a means to extend learning. Teachers in content-driven courses may feel like they do not have time to teach students how to use technology when they have proven methods yielding high scores on high-stakes tests without the distraction of technology in their classrooms.

Labbo and Reinking (1999) suggest that the incorporation of technology transforms instruction, the way students think, and the classroom culture. In their research, they determined there is no set path for the incorporation of technology into instruction or into content. They go on to express the incorporation of technology as formidable and see "technology as a potential catalyst for transforming instruction" (p. 488). However, students and teachers may not naturally connect personal technology to academic growth, as the initial purpose of technology was to facilitate ways to communicate, share, and play (Towndrow & Vaish, 2009). The limitations schools have placed on the presence of mobile devices has maintained a separation of technology as a means to communicate and share socially, rather than using technology as a means to extend learning beyond the knowledge of the teacher, the information provided in the printed text, or the opportunities to demonstrate understanding.

Mobile devices and laptops, however, have become a part of the educational landscape through one-to-one programs, bring-your-own-device programs, and increased

access to computers throughout the school day; as a result, teachers and students are repurposing personal devices as tools for teaching and learning. How technology is repurposed varies from classroom to classroom, presenting a challenge sometimes associated with technology integration, which is the diverse perception of what it means to integrate technology into the classroom (Bebell, Russell, & O'Dwyer, 2004, Hew & Brush, 2007).

One-to-One Initiatives

In 2014 the percentage of schools using bring your own device increased from 34 to 56 percent in one year (Pew Research, 2015). Research suggests students with laptops can be engaged, reflective, and active in their learning (Holcomb, 2009). In one study, laptop students spent more time engaged in collaborative and project-based instruction than non-laptop students (Holcomb, 2009). Research also revealed students participating in one-to-one programs earned higher scores on high stakes tests (Daniel, 2012; Holcomb, 2009). In addition to higher test scores, Rockman (2000) found teachers in one-to-one technology schools producing increased test scores have also moved toward more constructivist pedagogy in which students participate in student led inquiry and work collaboratively (Muir, 2004; Ross & Strahl, 2005).

In 1996, Microsoft and Toshiba partnered to create one of the first one-to-one device programs in the United States. By the end of the Anytime Anywhere Learning Project (AALP) over 800 schools had a one-to-one program. Teachers were provided professional development opportunities to assist them in creating content specific lesson plans to use the technology available to extend and enhance student learning. The AALP

research revealed students were more active learners than in classrooms without one-to-one learning opportunities. Students in one-to-one environments improved in collaborating, writing production, project based learning, critical thinking, and problem solving (Rockman, 1998).

Inserra and Short's (2012) study of high school teacher implementation in a one-to-one program found English teachers integrating technology required higher order thinking skills, incorporated more collaboration, and provided differentiated learning for their students. They argue, however, that providing one-to-one technology for students is not enough; how the teachers choose to integrate technology impacts the success of one-to-one technology initiatives (Holcomb, 2009,Inserra & Short, 2012; Muir, 2004; Ross & Strahl, 2005). For one-to-one laptop initiatives to be successful teachers need to believe technology will positively impact student learning and their teaching before their behavior will change (Fullan, 2007; Rogers, 2003).

Curricular demands and time constraints often influence instructional decisions to integrate technology into lesson plans. One-to-one programs alter the role of the teacher in the classroom, challenge teachers' classroom management, and require an ability to adapt to technology challenges (Spires, Oliver, & Corn, 2011). Westin and Bain (2010) suggest the impact of student learning in one-to-one programs is dependent on teachers because teachers make instructional decisions. One-to-one technology programs can create a new perspective of school environments but cannot change individual classroom environments (November, 2013). Technology integration places new time and planning

demands on teachers to locate and evaluate current and relevant technology tools to use in instruction (Spires, Oliver, & Corn, 2011).

Many one-to-one programs have failed because they lack classroom and curriculum integration strategies. Johnson, Maddux, and Liu (2000) argue successful integration requires opportunities for students to create, manipulate, and produce with technology, to work problem based assignments, and be housed in a constructivist-learning environment. Su (2009) suggests standardized test format needs changed if constructivist-learning environments are to be nurtured and technology is to be integrated.

Defining Technology Integration

Ertmer (2005) defines technology as transformative when technology brings qualitative changes to education instead of adding technology onto traditional ways of teaching. This definition alludes to a pedagogical shift in teaching in which students use technology as a tool to learn and express understanding in ways that are different than traditional ways of learning such as lecture, written papers, or pencil and paper tests. Hew and Brush (2007) define technology integration as "the use of computing devices such as desktop computers, handheld computers, software, or internet in K-12 for instructional purposes" (p. 225). This definition does not designate who should use technology or how technology should be used for it to be considered integrated into instruction. This ambiguity is in part due the time period in which this definition was developed which was before a majority of students had ubiquitous access to technology during the instructional day. Hew and Brush's definition permits varied interpretations; for example,

a teacher using a computer to record attendance and to send emails would satisfy this definition of technology integration. Reigeluth and Joseph (2002), in an effort to define technology integration differentiate between the concept of technology integration and technology transformation to illustrate the varied interpretations of technology integration and to highlight the expectation for technology to transform the ways teachers teach and the ways students learn. Reigeluth and Joseph (2002) allude to a pedagogical shift associated with technology integration from traditional teaching methods for technology integration to be effective. Each of these definitions of technology integration includes the use of technology, but it cannot designate who should be using the technology or how technology should be used to transform teaching or learning. As a result, many applications of technology to instruction do not yield the predicted transformation. The result is a consistent understanding that technology should be incorporated into instructional practices, but it is up to the teacher to determine if he or she will be the one incorporating technology through lecture presentations or video clips or if the students will be incorporating technology as part of their learning process. For technology integration to be complete and transformative, I subscribe to a definition of technology integration in which technology is seamlessly intertwined into daily practice in which students use digital resources to construct knowledge and demonstrate their learning.

The ambiguity associated with technology integration forces teachers to look for other examples of how to integrate technology. Teachers often follow standards to determine curricular expectations, which may include technology integration. An English teacher would refer are the National Council for Teachers of English (NCTE) standards,

International Reading Association (IRA) standards, and state standards for guidance in constructing long range and short range plans. According to the NCTE standards, "students are required to use a variety of technological and informational resources to gather and synthesize information and to create and communicate knowledge" (p. 8). This standard defines who should use the technology and how the technology should be used, making it clear to the teacher and student the expectation for students to gather and synthesize information from a variety of sources. How, when, and for what purposes, students access those sources is left to the teacher. The IRA standards have technology embedded throughout the standards, in which the student is called to "use traditional print, digital, and online resources" to complete specific tasks highlighted throughout the standards, setting an expectation for students to use digital and online resources to extend their learning throughout their learning process.

The Common Core State Standards (CCSS) were eventually adopted by 43 states. Although states have subsequently abandoned the CCSS, many of those states revised their own standards informed by the CCSS. The CCSS incorporate student technology use as a tool to support and demonstrate learning. For example a writing Anchor Standard for college and career readiness calls for students to "use technology, including the Internet, to produce and publish writing and to interact and collaborate with others" (CCRA.W6). This examples of integration may make writing about a specific topic relevant and meaningful for students because their audience would extend beyond the teacher. Students are asked to leverage technology to extend and enhance their learning as part of the learning process (Roberts, Shedd, & Norman, 2012). In this case,

technology is transforming learning by providing students opportunities previously unavailable to be active in their meaning construction and technology transforms the role of the teacher to a mentor supporting student learning by providing guidance and support as the students publish their understanding for a broad audience.

Teachers interested in technology integration may be aware of the International Society for Technology in Education (ISTE) and the standards created to support the use of technology in classrooms. The National Education Technology Standards for Students (NETS-S) call for students to "be able to use technology to analyze, learn and explore" the content for each discipline. Edutopia, an online resource for teachers, defines technology integration as a point when "the use of technology is routine and transparent and when technology support curricular goals," again using the tool of technology to extend and enhance student learning (Edutopia, 2014, p. 4).

Throughout the standards and definitions there is a hint of technology transforming the way teachers teach and students learn. Researchers assert technology has the potential to alter the way teachers teach, enabling them to differentiate teaching strategies to reach all learners. That transformation is not certain, however, teachers may not know how to use technology intentionally to differentiate instruction or have the skills to access technology to extend and enhance student learning, leaving them to incorporate technology in the best way they know how, which may be to apply technology to proven instructional practices.

Automating Tasks. Experts in the field of educational technology integration have challenged self-reports of teacher use of technology in the classroom, arguing some

technology use does not transform student learning. November (2010) argues much of technology use is automating tasks already in place before the technology was available. He equates a laptop to a $2,000 pencil in many classrooms because teachers and students are using laptops to do they same thing they were doing prior to one-to-one initiatives (November, 2013). Hutchison and Reinking (2011) argue technology integration is meaningless until teachers conceptualize technology as part of the curriculum rather than separate from the curriculum. Speak Up (2007) conducted a nationwide survey of teachers in grades 6-12 to report how they use technology in the classroom. The study revealed the majority of teachers used technology to search a specific site for predetermined information, write papers, or for skill and drill exercises to reinforce student learning. Stoll's (2008) observation and interview of secondary teachers concurs "teachers are limited by their ability to envision beyond what they know to do" (p.65) because they have not learned or been taught how to use technology as a tool in their subject culture; therefore, teachers find ways to use technology to complete tasks they did before technology was accessible. November (2010) calls these automating tasks and argues that automating tasks does not transform education in the ways educational reformist predict nor does it constitute technology integration.

Technology transformation. November (2010) goes on to define ways for teachers and students to leverage technological tools to transform learning environments and experience. To leverage technology often requires a change in approach and assessment of student learning. Su (2009) states when technology becomes an integral part of the classroom and the instruction is less about the technology and more about

student learning technology is integrated into the classroom because the presence of technology has transformed student-learning opportunities.

Pedagogical shifts Associated with Technology integration. In 2006, the United States Department of Education Preparing Teachers to Teach with Technology (PT3) initiative provided funding for colleges, schools, government agencies, and state departments of education to prepare pre-service and in-service teachers to integrate technology in K-12 classrooms. Research suggests that technology integration alters to the interaction between the teacher and students, as technology used well may engage higher order thinking among teachers and students. As a result, effective technology integration often challenges teacher pedagogical beliefs (Dwyer, 1994; Kinchin, 2012; Koehler & Mishra, 2005; Mishra & Koehler, 2006 Rientes, Brouwer, & Barker, 2012). Research also suggests teacher content knowledge influences pedagogy, which may influence the adoption or failure to adopt particular technologies (Kinchin, 2012; Koehler & Mishra, 2005; Mishra & Kohler, 2006). Research suggests teachers in their initial years of teacher are less likely to incorporate technology into their instructional designs as they become familiar with the material (Kinchin, 2012). Teachers with experience teaching a specific content are more apt to integrate technology because they are more confident with their content knowledge and they are aware how and what the students need to know to extend and deepen their learning. In addition to content knowledge, teacher pedagogical philosophies often influence technology integration; teachers with a more student-centered approach are more likely to integrate technology (Rientes, et al., 2012).

The Role of Technology in the English Classroom

Student use of technology may enable students to construct and envision literature through multimodal discussion in which students write and create images simultaneously as they envision and share a text, making learning more meaningful and more relevant to an individual's experience (Kress, 2003; Jewitt, 2008; Jewitt, Bezemer, Jones, & Kress, 2009). When given the opportunity to construct meaning on their own, adolescents in a technology-rich classroom may explore which media and modality best represent their ideas and explore how develop texts in ways that invite their readers to select links leading to relevant information, making their envisionments more relevant and meaningful for them as well as for their peers (Doering, Beach & O'Brien, 2007). Instruction that integrates technology effectively presents more opportunities for adolescents to become engaged when given the opportunity to construct meaning on their own terms, as well as manipulate and utilize media, technology, and advanced communication systems (Hinchman, Alvermann, Boyd, Brozo, & Vacca, 2004).

Much of the research surrounding English curriculum and technology focuses on the integration of technology for instruction (Kadjer, 2007). It is largely up to teachers to determine if and how they will use technology in their instruction. Research suggests many English teachers use the same technology available in the 1980s and 1990s to engage students (Doering, Beach & O'Brien, 2007). Teachers integrate technology through the use of movies, television, and music to stimulate student active reading response. This incorporation of technology is an instructional strategy to engage students in literature discussions (Alvermann, Moon, & Hagood, 1999; Hobbs, 2005). Websites

like *YouTube* support this method of extending student learning through visual representations of a text. *YouTube* enables teachers to integrate smaller clips into their instruction rather than spending three days watching the film as a treat. Websites hosting video provide an opportunity for teachers to rethink how students could use the same clips or find similar clips to enhance their own interpretation of a work.

Digital tools can support learners if granted permission. In *What Education Can Learn from the Arts,* Eisner refers to Dewey (1938) to suggest teaching literature should enable readers to slow down and develop their perception of a text. Eisner states students should have the time and opportunity to create their own meaning. "English education emphasizes the use of media and technology calls for representing ideas in verbal, visual, or graphic forms for the purpose of self expression and communication" (Hobbs, 2005). For example, a dyslexic, auditory learner required to read *Othello* for homework each night may elected to listen to a version of *Othello* online for homework rather than read the play independently from the assigned texts. This practice may impact the learner's understanding of the play and level of questions may extend beyond basic comprehension and knowledge-based questions to questions seeking answers to assist in analysis and synthesis of the play. A teacher accustomed to being the Keeper of Knowledge (Applebee, 1996) when teaching literature, may adapt instructional practices to encourage other students to try listening to the play and reading along. If the class leverages technology to assist them in their meaning making and interpretation of *Othello,* it may extend their learning such that they are more likely connect the themes discussed in *Othello* to their own experiences.

Film and visual media may be used as forms of expression or communication (Kruger & Christel, 2001; McCarthy & Ondaatje, 2002; Hobbs, 2005), as well as a way to enable students to construct meaning from the culture, identity and values depicted in the text or through visual media (Alvermann, Moon, & Hagoon, 1999; Hobbs, 2005). For example, the digital resources available permit students to explore different interpretations of a work or to find images to support their understanding of a text. Werner (2002) says critical reading can be present if three conditions are met: students are permitted to read the text critically, students have the capacity to interact with the text, and the students are among a community of peers to develop and share their interpretations. Gaudelli (2009) carries Werner's analysis of critical readings to visual texts, as he applies Langer's principles to interpreting visuals in addition to supporting Applebee's notion of the need for students to engage in academic discourse. He states "continuous, interpretation can result in shared meanings being achieved through authentic conversations where participants truly seek to be changed by the encounter… which lead to a discovery not only of what we know but more importantly of what we do not understand as an art of thinking" (pp. 114-115). Gaudelli also asserts that visual texts "extend, enrich, and deepen" curriculum conversation. (p. 128). The pervasiveness of technology in one-to-one classrooms may enable students to access visuals in this manner. If a student does not know what a harvester is, he or she can search for an image of a harvester and in turn may have a better understanding of a text.

Research also suggests the twenty-first century learner prefers to create or construct their own meaning rather than sitting complacently absorbing the interpretation

the teacher has provided for them (Nesbitt, 2003). In an age of instant information, if a student is interested and truly engaged they prefer to find out for themselves rather than rely on a teacher for their information. In classrooms where students bring laptops to class and have Internet access, students can constantly access information during a lecture to reinforce a lesson or find out for themselves if the lecturer is accurate; if provided the skills and permission to leverage technology to extend and enhance their own learning.

Digital Literacy. Literacy demands have changed as a result of technology's prevalence in our daily and professional lives. There is an increase in calls for an expansion of the definition of literacy to include the ability to use technology to locate, evaluate, create, and communicate information (Hutchinson & Reinking, 2011). In education, it is the expectation of teachers within specific disciplines to teach students to navigate digital resources necessary to extend their learning or they will be unprepared for mainstream reading and writing (Hutchison & Reinking, 2011). The International Reading Association (2009) asserts, "to become fully literate in today's world, students must become proficient in the new literacies of the 21st century technologies" (p.3). As a result, literacy educators have a responsibility to effectively integrate these new technologies into the curriculum, preparing students for the literacy future they describe. In many high schools, it is the English teacher that is seen as the "literacy" teacher adding additional content demands in the English classrooms. Digital literacy extends beyond being able to read and write digitally and those skills differ between disciplines despite the designation for digital literacy skills to be addressed in the English classroom.

In the English classroom, digital literacy defined above would enable digitally literate students to locate information regarding Prometheus, to extend the comparison of Walter Younger to Prometheus, in *A Raisin in the Sun*; evaluate if the information retrieved is credible or relevant to their purpose; create a response or connection between the reference of Prometheus, in *A Raisin in the Sun* and the description of Prometheus, found; and finally communicate that learning to peers or a teacher.

Information Literacy. Information literacy is a term often used in libraries. However as technology becomes increasingly available to students, information literacy will likely become part of classroom instruction. Information literacy is the combination of digital literacy, new literacies (multimodal literacies), academic literacy, and media literacy (Coonon & Secker, 2013). Teaching information literacy is helping students identify and evaluate source information based on informational needs, as well as determining the appropriateness of the method and information discovered. Often students use Internet search engines to locate information and unfortunately because it is located on the Internet they believe the information to be reliable. Prior to the availability of research on the Internet, teachers were able to limit resources to the resources available in the library. These resources are vetted and are known to be reliable; however, expanse of information now available beyond the library bookshelves requiring teachers to adapt their curriculum such that they provide students with the tool necessary to evaluate sources prior to accepting them as reliable.

Technology integration or access can promote student's critical thinking skills if they are in a classroom that supports student-constructed knowledge. Technology

integration can help students learn to gather information from different sources to express their point of view or envisionment of a text (Giroux & Simon, 1989 Considine & Haley, 1999), such that when students create presentations of their interpretations through a wide range of media production tools the meaning may extend and become relevant to the student (Hobbs, 2005). But a teacher must also be aware of how technology can impact student learning in diverse ways. Purchell, Buchanan, and Freidrich's (2013) research reveals teachers are addressing new issues as a result of technology integration. English teachers report the need to teach about writing for different audiences and purposes as a result of students sharing work globally; they also express a concern that students need to learn the difference between formal and informal writing as formal writing was once designated by typed or hand written papers (Purcell, Buchanan, and Friedrich, 2013). Lawless and Pelligrino (2007) attribute the poorer quality of writing to a lack of professional development, which is supported by Purcell, Buchanan, and Friedrich's (2013) assertion that quality issues are a result of teachers adhering to pre-technology teaching practices. As their technological pedagogical teaching practices develop, students and teachers will see improvement in the quality of student artifacts.

Barriers To Technology Integration

Teachers do not merely decide they will use technology on Monday and use technology in meaningful ways to impact student learning initially. Integrating technology takes time for the teacher to embrace technological resources, time for teachers to research and practice using the resources, and confidence that the use of

digital tools will prepare students for state mandated high stakes testing of content knowledge.

Studies have attributed to the success of technology integration to teacher training and district and school level influence (Bitner & Bitner, 2002; Cuban, Kirkpatrick & Peck, 2001; November, 2010). For technology integration to be effective, teachers should believe technology can help them achieve their goals more effectively, but will not interfere with student learning. Teachers also should believe they have "adequate ability and sufficient resources to use technology (Zhao & Cziko, 2001; and Zhao & Frank, 2003).

Ertmer (2005) references teacher pedagogical beliefs as a determining factor for technology integration. It is important to address some beliefs that are resistant to change, especially when it is difficult to determine if the resistance is related to belief or technological knowledge (Calderhead, 1996; Pajares, 1992; Richardson, 1994). Teacher beliefs are defined by Ertmer (2005) as teacher attitudes about education, including attitudes about schooling, teaching, learning, and students. November, (2010) goes on to define teacher beliefs to include pedagogical beliefs and beliefs about how technology can facilitate student learning. Brunsford (2000), Kadjer (2004) and November (2010) express that technology is a tool that can enhance student performance when integrated into the curriculum and when integrated into teacher pedagogy, but the access or existence of technology does not guarantee that student learning will improve. The research supports that technology has to be part of a coherent educational approach (Brunsford, 2000 and November, 2010).

The Council for Educator Preparation (CAEP) calls for technology facilitators in schools to support teachers as they work to incorporate technology into their instructional practices. The role of the technology facilitator is further supported by research conducted by Choy, Wong, and Gao (2009) as they followed preservice teachers in Singapore into their first year of teaching. The researchers discovered a lack of exposure to technology integration during their education led to apprehension toward integrating technology when given the opportunity to teach (Choy, et al, 2009). Their study revealed teachers did not have the schema to integrate technology into their curriculum because they were not taught in classrooms that effectively integrated technology into instruction. The challenge to manage their content and incorporate technology proved too daunting and as a result, young teachers forgo incorporating technology in an effort to be become better acquainted with their content (Choy, et al., 2009). Because of studies like this one, CAEP and ISTE have partnered to support teachers meet the demands and to develop a schema to support technology integration.

While education programs are trying to equip their preservice teachers to be twenty-first educators, including courses incorporating or demonstrating teaching with technology in their teacher preparation programs, they are largely attempting this preparation through twentieth century avenues, simply converting existing assignments into ones that use technology in some way. Incorporating technology into instruction and assignments in this way may become a gimmick rather than an effective teaching tool (Hobbs, 2005). Most teachers simply have not had the time to become fluent in using media tools or the training to understand how to use media texts or media issues to

promote critical thinking (Hobbs, 2005) and practiced teachers, as well as beginning teachers, may believe "the implementation of new technologies could result in reductions in efficiency" (Chityo & Harmon, 2009). In an assessment driven society, this is a risk they are not willing to take.

High Stakes Testing. Another factor influencing teacher beliefs is the inability to control the information students learn or to be certain the material covered is as thorough as the information covered in a lecture (Butin, 2004). In fact, Schneider (2004) suggests that NCLB actually undermines technology use by placing greater emphasis on content driven testing, thereby reinforcing the need to lecture and cover content through traditional methods of lectures, notes on blackboard, whiteboard, or PowerPoint**.** Bailey (2009) cautions that technology use in school may become an add-on to traditional teaching methods. There is a growing concern teachers will search for applications replicating current teaching practice; for example, skill and drill, rather than use technology to support and extend student learning (Bailey, 2009; Boling, 2008; Bruce & Hogan, 1998; Cuban, 2003; Hew & Brush, 2007; Kadjer, 2007; November, 2010).

School Environment. Another barrier to technology integration comes from the school administration; often teachers cannot immediately verify the impact of incorporating technology and are denied access to enrich their instruction through technology for fear student outcomes may suffer (Martin, 2003). Teachers may feel hampered by district limitations on technology. In many schools teachers have access to the Internet from their classrooms, but cannot use certain sites due to Internet filters put in place by district administrators (November, 2013). Internet limitations enforced by the

districts, rather than by the technology available in the classroom, may hinder teachers' and students' abilities to access and integrate technology as often was they would like.

The Influence of Teacher Perception of Technology

Teacher beliefs influences student learning and technology integration because teachers' are decision makers in the classroom (Dewey, 1929). Teacher belief is a crucial factor for technology integration (Brunsford, 2000; Frank, Zhao, & Borman, 2004; Judson, 2006; Levin & Wadmany, 2006). The teacher factors that influence success are teacher attitude toward change, teacher pedagogical and pedagogical knowledge and teacher perception of school as a learning organization (Fullan, 2000, Kontoghiorches, Awbre, & Feurig, 2005; Sandy, 2010). To improve teacher preparation or integration of technology, teacher educators' address teacher belief because their belief often influences their teaching practice (Ertmer, 2005; Pajares. 1992) and technology often does not fit instructional practices and beliefs (Halverson & Smith, 2009; Harris & Hofer, 2009). CAEP and teacher education programs are addressing teaching beliefs by modeling and exposing preservice and inservice teachers to teaching practices that incorporate technology into instructional practices. Stand-alone courses to expose teachers to educational technology have been a staple in teacher education programs (Gronseth, et al., 2010; Kleiner, Thomas, & Lewis, 2007) but Bielefeldt's (2001) research argues these stand-alone courses may not provide the necessary preparation for teachers to use technology in their instruction. The ability to envision and use technology in instructional practices is influenced by individual teacher belief and belief may not be influenced by

experiences in stand-alone courses or professional development opportunities that are not specific to content (Ertmer & Ottenbreit- Leftwich, 2010).

Technological Pedagogical Knowledge

Research suggests that currently very little student technology use in classrooms is meaningful or transformative for students (Boling, 2008; Bruce & Hogan, 1998; Cuban, 2003). November (2013) continues to caution schools as they invest in one-to-one devices that digital technologies are tools that should transform education rather that tools used to assimilate tasks already present in the classroom. Similar studies support November's concern and highlight the need for teachers to have the knowledge and skills necessary to use digital resources effectively in their instructional practices (Warschaeur & Ames, 2010; Woolf, 2010). Studies indicate most technology use is teacher centered, in which technology influences administrative teaching responsibilities and lesson plan preparation, but technology rarely affects instructional purposes (Hennessy, Ruthven, & Bridley, 2003; Russell, Bebell, O'Dwyer, & O'Connor, 2003). Researchers argue teachers' need support from education programs and professional development to transition pedagogically from a classroom where the teachers was once viewed as the "keeper of knowledge" to a "guide on the side" (Applebee, 1996), to integrate technology into their instruction and to create student centered technological learning opportunities. Wetzel, Buss, Folger and Lindsey (2014) argue technology integration practices ought to be a part of methods courses because methods courses address pedagogy and content and for technology uses to support content it must also be a part of teacher pedagogy or a teachers' technological pedagogical content knowledge.

Teacher technological pedagogical knowledge may hinder technology integration in classrooms (Harris, et al., 2009). Hughes (2005) cautions technology is often seen as a "(a) different means to reach the same goal, *replacement;* (b) way to accomplish the same goal more efficiently, *amplification;* or (c) means to reorganize cognitive process and problem solving activities, *transformation* (Lawless & Pelligrino, 2007; Pea, 1985). This caution addresses the need identified by Harris, Mishra, and Koehler (2009) in which they emphasize the importance of helping teachers develop and apply integrated and independent understandings of technology, pedagogy, content, and context. This is in contrast to most professional development programs for teachers which focus, on teaching technology skills in isolation, which in turn does little to help teachers use technology effectively (Harris, et al., 2009) as well as to extend or enhance student learning. Kadjer (2004) argues for students to remain at the center of instruction and "use technology as a tool, not as a goal," for technology does not replace knowledge or experience.

The most common reasons teachers provide for "failure to use technology" are a lack of knowledge or skills necessary to incorporate technology into their pedagogy (Hew & Brush, 2007, p. 303). Often teachers have limited understanding or experience about how technology should be integrated into various, instructional formats or how integrate technology to facilitate teaching and learning. As a result, teachers elect to continue teaching the way they believe to be successful for fear of compromising their curriculum or pedagogy that has proven to earn his scores on high stakes tests. As for first year or second year teachers, Miller (2007) discovered these teachers feared a "loss of position as

knowledge expert" when confronted with keeping up with current technology trends and knowing how to use them effectively in their classroom instruction.

Technology Acceptance Theories

The decision to incorporate technology into instructional practices is not one inservice teachers grapple with as they are confronted with one-to-one device opportunities. Teacher belief is an integral part of that decision-making; as a result, several theories and models have been applied to technology integration practices as a means to inform teacher education programs, professional development programs, and instructional resources.

Theory of Planned Behavior

The Theory of Planned Behavior (TPB) suggests that actions are guided by behavioral, normative, and controlling beliefs or dispositions. To better understand teachers' in this study's decisions relating to technology integration, it is important to examine factors that may influence decision-making. The Theory of Planned Behavior helps describe factors influencing decision-making. Ajzen (1991) developed four categories to describe beliefs related to decision making. Behavior beliefs are beliefs about the probable outcomes of behavior and the judgment of these outcomes. For example, teachers have beliefs about the how technology will impact student learning, one teacher may believe using digital tools engages his or her students in their learning and another teacher may believe using digital resources during class time distracts students from their learning. Normative beliefs are the perceived expectations of other people and the motivation to comply with their expectations. For example, in schools participating in one-to-one device programs a

teacher may feel compelled to incorporate technology into instructional practices because colleagues are perceived to be incorporating technology into instructional practices. Control beliefs are both internal and external factors that may facilitate or impede performance behavior For the teacher to elect to use digital tools, he or she needs to feel confident with his or her skills, understanding, and ability (internal factors) with digital resources available and he or she needs to feel in control that the device (external factors) will work consistently to support student learning.

Technology Acceptance Model

In addition to understanding the behavioral intentions of teachers in this study, factors influencing teachers' acceptance of technology as a tool for students to use to enhance and extend their learning is often influenced by the compatibility of technology to existing content requirements. The Technology Acceptance Model (Bagozzi, Davis, & Warshaw, 1992) adapts behavioral belief outcomes from the Theory of Planned Behavior with two beliefs: ease of use and perceived usefulness. The Technology Acceptance Model focuses on behavioral beliefs and does not consider control beliefs or normative beliefs. Bagozzi et al. (1992) defines perceived usefulness as the extent a teacher believes using technology will enhance student learning, or their teaching, and perceived ease of use as the personal belief that using technology will be effortless. Stols (2008) review of literature regarding technology integration among inservice teachers found pedagogical compatibility, perceived ease of use, and perceived usefulness as influencing factors contributing to the behavior beliefs of practicing teachers. Teacher belief in personal technology proficiency and software compatibility also has been found to influence

teachers' decisions to incorporate technology into their classroom teaching practice (Kadjer, 2007).

The Apple Classroom of Tomorrow Technology Acceptance Model (ACOT*)*

The ACOT states teachers pass through phases of integration into teaching practices: entry, adoption, adaptation, appropriation, and invention. (Table 2:1) These different phases demonstrate the evolution of teaching practices as teachers and students become more confident with technological hardware as well as the software available for students and teachers to extend student learning. The ACOT model is a good resource in evaluating how technology is being incorporated into classroom instruction through classroom observations, lesson plan assessment, and student artifact assessment. For this study, the ACOT model is used to review the reported teacher technology use based on the ACOT phases to determine if there is a distinction between technology integration phases and TPACK scores.

Phase	*Teacher Pedagogy*	*Student Use*
Entry Phase: Limited technology confidence.	Lecturer, uses technology to support lecture based instruction, PowerPoint Presentations and for seat work	Students use technology using a step-by-step approach, must stay on the same screen as the rest of the class.
Adoption Phase: Willing to use technology but does not have the knowledge to implement.	Relies on traditional instructional practices: tests, textbooks, whiteboards with some use of technology. May use the internet to access documents in place of providing handouts.	Students use computers for word processors or may use software for tutorials (skill and drill) for extra practice.
Adaptation Phase: More confident with the hardware and willing to use technology to extend learning.	Technology is used to differentiate instruction and pace to meet individual student needs.	Less time is spent on how to use the technology and more is spent on extending depth of knowledge and understanding.
Appropriation: Confident with technology hardware and has a variety of technological resources to pull from.	Wikis, blogs Select from a variety of resources to meet course objectives and to incorporate more collaboration among students. Differentiated	Students demonstrate mastery through wikis, blogs, creative expressions and simulations.

	assessment beyond paper and pencil tests	
Invention Phase: rarely use lecture or direct methods of instruction. Technology is ever present	Provides opportunities for students to construct their own meaning. Project based learning and self reflection for assessment	Students are responsible for their learning. They determine how they will approach a topic and demonstrate mastery.

Table 2.1 *Apple Classroom Of Tomorrow Technology Acceptance Model (Rowe, 2014)*

SAMR Model

The SAMR model was developed by Ruben Puentedura (2012) to assesses the types of technology used in the classroom and their effect on student learning. There are four levels of technology used in his model (Table 2.2): substitution, in which the student would complete the same task using technology that they would use without technology; augmentation, which is similar to substitution with some improvements to instructional practices but the student assignments do not change; modification, in which assignments are created that could not be done without technology; and redefinition, in which assignments could not be created without technology and are developed for a global audience. Puentedura (2015) aligns this model with Blooms taxonomy to connect these categories to more familiar education terms. Substitution / remembering would include a teacher using eBooks in place of textbooks and students could type a paper but would not be permitted to use the grammar or spelling functions available when writing. Augmentation/ understanding would incorporate digital tools to locate information about a given topic. Augmentation / application would permit students to use the grammar and spell check when they type their papers in a computer lab. Modification / analyze students would use resources located on the Internet to support or refute their interpretation and modification / evaluation would support student evaluating the source and the credibility of the source as they analyze the content. Finally, redefinition / create

would encourage students to complete an assignment that was not possible prior to the introduction of digital tools like creating a podcast or vlogs to collaborate with classes studying the same information around the world.

Transformation	*Enhancement*
Redefinition: Technology allows for the creation of new tasks, previously inconceivable: • Students collaborate with classes around the world to create a brochure to represent multiple perspectives of a literary analysis	**Augmentation:** Technology acts as a direct substitute, with functional improvement: • Students create individual presentations with supporting resources, images, links, and videos
Modification: Technology allows for significant task redesign: • Students collaborate through assigned jobs to create a project: content specific researcher, designer, writer, image locator	**Substitution:** Technology acts as a direct tool substitute with no functional change: • Students type paper using the computer as a word processor

Table 2.2 *The SAMR Integration Model (Puentedura, 2006)*

Technological Pedagogical Content Knowledge (TPACK)

Technological Pedagogical Content Knowledge (Figure 2.1) is the framework developed to describe the relationship between technology and content, technology and pedagogy, and content and pedagogy (Koehler, Mishra, & Yahya, 2007; Mishra & Koehler, 2006).

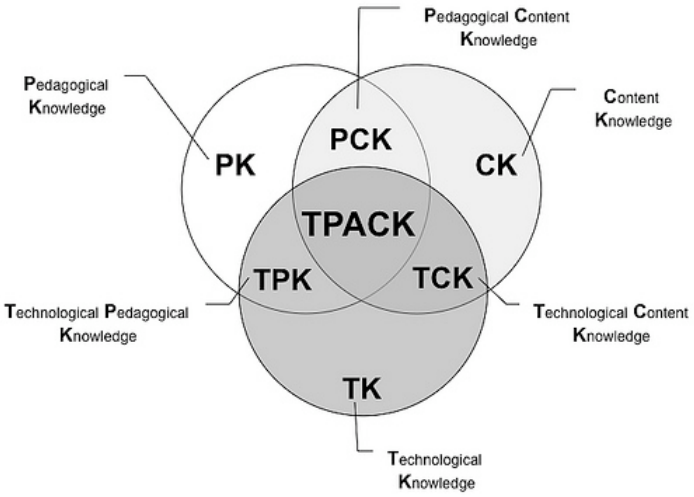

Figure 2:1 *Technological Pedagogical Content Knowledge (TPACK) framework*

(Koehler & Mishra, 2008)

For teachers to effectively integrate technology, understanding the relationship between content, technology, and pedagogy is essential. TPACK includes three types of knowledge and examines their intersection as teachers integrate technology in their classrooms. Content Knowledge (CK) includes the knowledge of subject matter, technological knowledge (TK) includes technology defined broadly (books, boards, projection systems, Internet resources, videos, tablets, laptops, etc.), and pedagogical knowledge (PK) includes methods of teaching and learning (techniques, values, purposes, and methods used to teach and evaluate student learning) (Mishra & Koehler, 2006).

The intersection of technology, content, and pedagogy determine which technologies may facilitate or support learning of specific content. Teachers who are comfortable with the intersections of technology, pedagogy, and content generally integrate technology effectively (Koehler, et al, 2007). Teachers often make pedagogical decisions in relation to content demands first. As technology becomes more prevalent in

classrooms, teachers are tasked with determining which, if any, digital tools will best support their content and pedagogical aims. Currently, there is little documentation regarding teacher beliefs with regard to technology integration as it pertains to using technology to support and extend student learning of specific content areas (Polly, Mims, Shepherd, & Inan, 2010).

Schmidt, Baran, Thompson, Mishra, Koehler, and Shin (2009) created a self-report assessment tool to assess technological pedagogical content knowledge perceptions of educational technology integration. This assessment tool was created to help identify teacher strengths and weaknesses to inform teacher education programs as they prepare teachers for classrooms with technology rich opportunities. A review of literature regarding TPACK conducted by Voogt, Fisser, Parela Roblins, Tondeur, and van Braak (2013) found fifty-five peer reviewed articles between 2005-2011. Ten of these articles were studies using the same self-assessment instrument used with preservice and in-service teachers to report variations within TPACK domains and to examine the correlation between TPACK scores and teacher practice.

TPACK differs from the SAMR model in that is a report of teacher knowledge and beliefs about technology rather than an assessment of teacher artifacts to determine the level of technology integration. Technological pedagogical content knowledge (TPACK) defines effective teachers as "individuals providing students opportunities to construct their own knowledge through new literacies" (Mishra & Kohler, 2006). This requires an understanding by the teachers of how technology integration relates to content and how technology integration relates to pedagogy. Abbitt's (2011) study of predicted

TPACK domains revealed a strong, positive correlation between teacher self-efficacy and technology integration. The goal for TPACK is using technology enhanced instruction to teach teachers technology integration concepts and skills building upon prior knowledge to improve teachers' self-efficacy and technology integration practice (Lux, Bangert, & Whittier, 2012). Making teachers aware of specific TPACK domains impacts self-efficacy beliefs and in turn impacts technology integration practices (Abbitt, 2011).

Professional Development

Legislators and administrators may cite professional development opportunities as a means to address the technological pedagogy associated with technology integration (Brinkerhoff, 2006). A prominent reason provided by teachers for not integrating technology into instruction is a lack of professional development (Bauer & Kenton, 2005; Hutchison & Reinking, 2011; NCLB, 2002). In a culture of "content must come first" due to an emphasis placed on high stakes test scores teachers question how technology allows them to teach better or what can teachers do with technology that they cannot do with something else (Kadjer, 2004). High stakes tests often focus on content knowledge of the given subject culture as a result teachers seek digital tools to support construction of content knowledge versus critical thinking skills which are often not assessed in high stakes testing environments. This concern is often addressed through professional development opportunities provided by schools interested in integrating technology into their curriculum (Hutchison & Reinking, 2011). Lawless and Pellegrino (2007) researched the effectiveness of professional development programs for technology use in the classroom and determined them to be inadequate. One reason professional

development programs focused on technology integration are cited as ineffective is these programs rarely focus, on one content area (November, 2010) and these programs may not allow teachers the opportunity to develop pedagogy for their particular subject culture (Kadjer, 2004). According to a New York Teacher Center Staff report, seventy percent of teachers report professional development impacts they way they assess and monitor student, instructional groupings, and content for instruction (Mazzella, 2009). Professional development requires schools and teachers to invest time and money for professional development to be effective. In the study conducted by the New York Teacher Center Staff report teachers participated in a yearlong professional development program that maintained a staff to support teachers throughout the year. This is not an opportunity available for a majority of teachers and therefore the professional development opportunities they are exposed to may be less effective.

Mousa (2011) argues effective professional development "allows teachers to design, enact, and reflect on teaching experience from their own classrooms in order to construct records of practice to share" with colleagues (p.2). Effective professional development programs for technology integration should support teachers as they determine how, when, and where to use technology to extend content and pedagogy (Niess, 2010).

Using TPACK to Inform Professional Development

TPACK began as a model for teacher educators to understand how technology intersected with content and pedagogy. The TPACK framework (Figure 2.1) has gained increased acceptance as a theoretical model to help teachers think about their technology

Use (Doering, Beletsianos, Scharber, & Miller, 2009). Schmit et al. (2009) created a formative assessment tool to align with the TPACK framework to support teachers, professors, and professional development leaders in identifying the individual teacher beliefs regarding their own technological knowledge, technological content knowledge, and technological pedagogical content knowledge. At the National Technology Leadership Summit's (NTLC) annual meeting representatives from 20 of the leading technology organizations, including ISTE, explored using TPACK for school-based professional development programs (Foulger & Slykhuis, 2013). Archambault & Barnett, 2010; Archambault & Crippen, 2009; Chai et al., 2010). Schmidt et al (2009) support this incorporation of the TPACK framework into professional development opportunities when they state "using TPACK as a framework for measuring teacher knowledge could potentially have an impact on the type of training and professional development experiences that are designed for preservice and inservice teachers" (p.125). Bos (2011) the incorporation of the TPACK model in professional development settings permits teachers to break instructional practices a part and identify how and why incorporating digital tools could benefit students versus a concentration of how to use the digital tool (Matherson, 2012).

Summary

This chapter began with a discussion relative to the role of technology in the classroom. A review of literature reveals an inconsistent perception of what technology integration means to teachers, administrators, and students. The definition lacks clarity as to what constitutes technology integration versus the use of technology in the classroom.

The review continued by exploring the barriers associated with technology integration. A prominent barrier to technology integration is teacher belief as a review of literature associated with teacher belief and technology acceptance was included. The literature indicates teacher knowledge of digital technologies and abilities influence their beliefs. In recent years many schools have invested in technology and in several cases schools are providing a device to every student; therefore this review examines the literature associated with one-to-one initiatives and the challenges and successes associated with these programs. With one-to-one programs teachers are often expected to incorporate the digital device into their instructional practices. The literature lends indication that teachers would be more inclined to use technology within their instructional practices if they felt more comfortable with the technology.

The central focus of this study is aimed at how do the participants define technology integration and how do their perceptions about technology influence their instructional practices? The theoretical framework used is the TPACK framework. Much has been written about TPACK but the research concerning secondary teachers and secondary English inservice teacher TPACK is limited supporting the need for a study of this kind.

CHAPTER THREE

METHOD

Introduction

One-to-one technology programs are becoming a part of the secondary teaching landscape; as a result, teachers are tasked with deciding how technology use relates to teaching practice and if technology is the best tool to enhance instruction. Researchers suggest teacher dispositions toward technology integration are the essential component to successful technology integration into classroom instruction (Bebell, 2005; Bitner & Bitner, 2002; Brush & Saye, 2009; Ertmer, 2005; Fullan, 2007; Graham, 2011; Inserra & Short, 2012; Koehler, et al., 2007; Lux, Bangert, Whittier, 2011; Ottenbreit-Leftwich, et al., 2010; Pope, Hare, & Howard, 2002; Schmidt, et al., 2009). Pierson (2001) stresses the importance of a common understanding among teachers and students of the definition of technology integration (Ertmer, 2005; Hew & Brush, 2007), which should be a tool used by students to extend and enhance the curriculum. Defining technology integration in this manner enables teachers to understand the connection between pedagogy, content, and technology (Mishra & Kohler, 2006). Understanding this intersection fosters creating learning environments to support technology integration (Pierson, 2001). Mishra and Kohler (2006) defined this intersection in their technology acceptance framework commonly known as TPACK. This study was designed to better understand how English teachers define technology integration for themselves, their perception of their technological pedagogical content knowledge, and in turn how those perceptions affect instruction.

The following research questions were addressed to achieve the purpose of this study: How do high school English teachers define technology integration? How does a teacher's self-perception of his or her own technological pedagogical content knowledge and how does that perception affect classroom instructional choices?

Stance

I have been a teacher for more than fifteen years and during that time the concept of technology integration has evolved from using the overhead during instruction to students incorporating a vast array of digital tools into their learning process. Prior to taking a digital literacy course, I considered myself to be a tech savvy teacher; however after reviewing the literature, reviewing assessment modules, and completing this research I realized that my initial concept of technology integration was limited and that ultimately I am a Luddite.

In the respects of this study, I know one person in each department that facilitated my attendance at the department meetings to make connections and gather research, but essentially I am an outsider. Qualitative research often notes the relationship between the researcher and the research as an integral factor in the collection and analysis of data. As an outsider and with the promise of anonymity teachers commented they were more forthcoming with their responses than if they had a connection with the researcher. Despite being an outsider, I recognize that there may have been some bias based on my own perspective, but I made a conscious effort to set aside bias as we coded qualitative responses and grouped them into themes.

Context

This multiple case study examines teachers in three English departments teaching in the initial year of one-to-one device programs. In years prior to the one-to-one device programs, these teachers had limited access to computer labs shared by all teachers in the high school. The implementation of one-to-one devices offers teachers unlimited access and opportunity to integrate the technological tools available to extend and enhance their student learning daily as opposed to scheduling a limited number of days in the computer lab throughout the year for students to use technology. As a result, teachers in one-to-one device programs may be faced with adapting their teaching strategies to include the technology, which may be impacted by their knowledge and skills as well as their attitudes and beliefs. This environment supports the need for a study to address inservice teachers' beliefs regarding technological pedagogical content knowledge and how their perceived knowledge and their perceived abilities may influence instructional choices in an effort to meet the teacher needs to integrate technology such that it meaningfully extends and enhances student learning

The study took place in three public high schools, which will be referred to throughout this study as BYOD, Laptop, or Tablet school as an indicator of the device used in the one-to-one implementation. Teachers completed a paper survey early during the second semester, a TPACK assessment at a department meeting nearing the end of the academic year, and follow up interviews and observations in the final month of the school year were used as data sources.

Since the purpose of this study was to understand the lived experiences of high school English teachers in the initial year of a one-to-one instructional environment (Moutaskas, 1994), an appropriate approach to this research is a mixed method study using a blend of qualitative and quantitative data.

Multiple Case Study

The participants in this study are all high school English teachers participating in the initial year of a one-to-one device program. Conducting a multiple case study permits me to not only examine common characteristics of this phenomenon but also examine the unique experiences and conditions for teachers at each implementation site (Stake, 2006). The English departments represented in this study meet the three criteria for selecting cases for a multiple case study analysis: (1) the cases (departments) share a common thread in that they are all participating in the implementation year of a one-to-one program initiative; (2) the cases provide a diversity in context based on the school environment, implementation procedures, faculty support, and professional development opportunities; and (3) the cases provide good opportunities to learn about complexity and context (Stake, 2006). A multiple case study permits me to examine how the implementation of one-to-one device programs may vary in different environments and if those implementation practices influence a teacher's perception of his or her technological pedagogical content knowledge.

Multiple Case Analysis Approach

This is mixed methods, multiple case study examines secondary English teachers' definitions of technology integration, as well as assesses the self-perception of teachers at

two points during the first year of implementation and tracks instructional choices made by teachers regarding technology during this first year. TPACK scores of secondary English teachers during the initial year of a one-to-one device program were used to better understand their perceived technological, pedagogical, and content knowledge and their self reported technology use practices. This study incorporated open-ended questions, surveys with selected response answers to choose from, interviews, and classroom observations to report the lived experiences of secondary English teachers completing the first year of a one-to-one device program.

Limiting the study to English departments in their initial year of one-to-one technology use permitted me to collect all of the data and ensure the research data was embraceable in which I can look at the "data as an integrated, holistic comprehension of the case" (Stake, 2006). The multiple collections of data permitted me to analyze the research data as it pertains to the case (department) in addition to analyze the data as it pertains to individuals within the case. A cross case analysis permitted me to look at the themes that emerged from the overall study and to divide those themes among cases to discern if there are differences in the data due to special circumstances like professional development opportunities, device distribution process, years experience, and degree held (Stake, 2006, p.41).

Patton (2002) asserts that triangulation of data provides a dynamic picture of the research environment because there are multiple measures to gain insight "between the selected methodological approach and the area of study" (p. 68) Quantitative methods were used to collect demographic data and selected response method of teachers

regarding their perception in knowledge domains related to technological knowledge, technological content, technological pedagogy, and technological pedagogical content knowledge through a TPACK self assessment tool created by Schmidt, Baran, Thompson, Mishra, Koehler, and Shin (2009) for preservice teachers and adapted for use with inservice teachers by Archumbault and Crippen (2009). Qualitative data collected through surveys using constructed response method, interviews, and observations. Participants are referred to by their pseudonyms throughout notes and digital recordings.

In measuring dispositions, it is important to incorporate a variety of data collection techniques to triangulate the data to check and establish validity of the study by analyzing the research questions from multiple perspectives (Creswell, 2003). In this study, multiple perspectives provided by surveys (Appendix A), interviews (Appendix C) and observation notes may reveal consistency of individual teacher dispositions towards technology integration or they may reveal an inconsistency of individual teacher dispositions. Patton (2002) argues that uncovering inconsistencies may give strength to multiple perspectives because it provides an opportunity to uncover deeper meaning in the data.

Qualitative Approach. Qualitative research uses multiple sources of data; focuses on participant experiences or beliefs, uses the researcher as data collector and inductive analyzer of data (Creswell, 2009). I used the phenomenological approach to research the phenomenon of English teachers lived experiences of teaching in their first year of a one-to-one device program. Teacher's responses to open-ended survey questions and interview questions were coded and analyzed using an

ethnomethodological approach to research in an attempt to understand the meaning of technology integration to teachers expected to implement it (Bogdan & Biklen, 1992). "Ethnomethodologists try to understand how people go about seeing, explaining, and describing order in the world in which they live" (Bogdan & Biklen, 1992, p. 40). Teacher participants in the study completed a survey (Appendix A). This survey includes constructed response or open ended questions asking the teacher to define technology integration, describe technology use, describe the impact of technology on student learning, and discuss the one-to-one technology initiative impact on student learning and teaching. I transcribed and coded data collected from the open-ended response questions interviews and observation notes were transcribed and coded for themes using a method of open coding (Creswell, 2009). I worked with two disinterested third parties through the coding process; we read through the transcripts several times highlighting relevant statements. We discussed inductive codes or themes after I created a list of significant statements from highlighting of relevant statements, we then color-coded a portion of the transcripts according to themes together to ensure interrater reliability. I counted the number of times a code was applied to a significant statement to quantify the occurrence of these themes in the data collected.

Quantitative Approach. Quantitative methods were used to collect demographic data. Teachers completed the TPACK (Appendix B), which incorporates selected response questions, regarding their perception in knowledge domains related to technological knowledge, technological content, technological pedagogy, and technological pedagogical content knowledge. Wilkerson and Lang (2007) define

selected-response method as "self-reported information that is based on a selection of predetermined responses for each item" (p. 26). The selected-response method limits opportunity for participant guessing (Wilkerson & Lang, 2007); participants indicate a level of agreement to specific characteristics on a Likert scale, which is an important method for measuring dispositions (Anderson, 1988).

The knowledge domains presented in the survey are outlined in Table 3:2. Content knowledge and pedagogical knowledge questions were excluded as the survey was administered to inservice teachers.

Knowledge Domain	*Content Area*
Technology Knowledge (TK)	Knowledge, skills, and uses of technology
Technological Content Knowledge (TCK)	Knowledge, skills, and uses of technologies related to the teaching of literature, research, grammar, and writing
Technological Pedagogical Knowledge (TPK)	Knowledge of how different technologies can be used for teaching, and understanding that the use of technology can change the way teaching and learning occurs.
Technological Pedagogical Content Knowledge (TPACK)	Knowledge, skills, and uses of technologies related to content knowledge, pedagogical knowledge, and technological knowledge and how these domains impact classroom management and organization of teaching, learning, and assessment in High School English classes

Table 3:1 *TPACK Knowledge Domains surveyed*

Data Collection and Analysis

Data Collection

For a phenomenological mixed methods case study, it is essential for all the participants in the study to participate in the same phenomenon being researched to describe in detail to the researcher (Creswell, 2007). In this case, all participants have

similar lived experiences in that they are high school English teachers from similar communities engaged in the first year of a one-to-one device program.

Participants. Creswell (2009) states "the idea behind qualitative research is to purposefully select participants of sites… that will best help the researcher understand the problem of the research question" (p.178); therefore, the teachers selected were a convenient sample, accessible to me, involved in the first year of a one-to-one initiative, and members of high school English departments. These participants can intentionally inform me of the phenomenon being studied to develop a clearer understanding of said phenomenon. The three departments differed in technology implementation practices, which may impact their lived experiences and may inform the research regarding professional development for one-to-one device programs and implementation practices of one-to one device programs in the high school setting.

One-to-One	*English Faculty*	*School Size*	*Percent Minority*	*Free / Reduced Lunch*	*Grad. Rate*	*Professional Development*
BYOD	21	2300	49%	47%	77%	No professional development was offered through the school. Teachers were encouraged to collaborate in department meetings.
Laptop	15	1300	65%	61%	54%	Teachers attended two, campus wide, after school, work sessions to learn how to charge, project, and use the laptops. During these sessions teachers learned about the content management software the district adopted to assist teachers with technology integration.
Tablet	7	900	25%	50%	73%	Teachers were paid a stipend to attended ten required workshop days throughout they summer. Five days were campus,-wide workdays to learn how to use, charge, and project, the tablets within their classrooms, as well as support days to build courses in Edmodo, a free educational social

		networking platform for teachers and students to connect, support, and share resources.. The teachers attended an additional five workdays to work with a discipline specific technology integration curriculum specialist to develop lesson plans and learn strategies to incorporate technology meaningfully into classroom instruction.

Table 3:2 *School Demographics*

BYOD is a southern suburban public high school with 21 English teachers (Table 3:3). In response to a neighboring high school implementing a one-to-one device program, BYOD instituted policies for students to use personal devices at the teacher's discretion. This policy was revealed to teachers on the initial workday of the BYOD implementation year and teachers could elect to implement the BYOD policy or elect to exclude devices from their classrooms. Teachers were provided a statement to include in their first day of class materials and syllabus to define the schools BYOD policies.

Laptop is a southern urban high school with 15 English teachers (Table 3:3). Teachers were issued MacBook Air Laptop computers at the beginning of the academic year, with a planned mid-October distribution to students. Students were issued textbooks at the beginning of the school year, but teachers could elect to have e-books loaded onto student computers if they desired. Students were permitted to take the laptops home with them throughout the school year.

Tablet is a southern suburban public high school with 7 English teachers (Table 3:3). Teachers were provided a Dell XPS Ultrabook before summer break to begin working with the devices. The discipline specific technology integration specialist had an office at the high school and supported teachers throughout the year to develop

technology integrated lesson plans and activities to support student-learning outcomes. Students received their tablets during registration days. Their e textbooks were loaded onto their tablets prior to school beginning. Students were permitted to take their tablets home throughout the school year.

Years Teaching Experience	*BYOD (N=18)*	*Laptop (N=15)*	*Tablet (N=6)*	*Total (N=39)*
1-2	*2*	*2*		*4*
3-5	*2*	*1*		*3*
6-10	*6*	*1*	*2*	*9*
11-15	*4*	*6*	*1*	*11*
16-20	*1*	*2*		*3*
20+	*3*	*3*	*3*	*9*
Education Levels				
Bachelors	*5*	*7*		*12*
Masters	*10*	*7*	*4*	*21*
Masters +30	*2*		*1*	*3*
Doctorate		*1*	*1*	*2*
National Board	*4*	*3*	*2*	*9*

Table 3.3 *Demographic Information of Participants*

Procedures

Once I received approval from school administrators, I attended an English department meeting in late February early March in the initial year of the one-to-one device implementations. Participants were asked at the initial meeting if they would be willing to participate in a follow up interview or permit me to observe instruction if selected.

BYOD and Tablet high school students and teachers have had access to their devices since the first day of school and Laptop high school teachers and students have had access to their devices since the end of the first quarter of the school year to obtain informed consent of participants and to complete the initial phase of the research the

open-ended survey questions (Appendix A) in this portion of the survey, teachers gave themselves a pseudonym to use throughout the study to maintain confidentiality. Participants were provided time during the department meeting to complete the open-ended questions to give to the researcher at the conclusion of the meeting.

In March, I returned to the department meeting for the same teachers to complete a TPACK assessment survey (Appendix C) using their same pseudonyms. The TPACK survey was originally designed for preservice teachers, but recent studies have adapted the TPACK assessment tool to survey inservice teachers (Doering, et al. 2009; Harris, Gradgenett, & Hofer, 2010). For example: a question phrased as "I know about technologies that I can use for understanding and analyzing literature" was modified for inservice teachers to read "I use technologies to understand and analyze literature;" participants were asked to mark either strongly agree, agree, disagree, or strongly disagree for each question statement. The survey instrument included a list of potential technologies for teacher use and student use. Participants were asked to note the frequency in which they used the items listed as either daily, weekly, infrequently, never, or NA. Teachers handed me their responses at the conclusion of the departmental meeting. Teachers absent from one of these meetings and unable to complete both portions of the research were excluded from the study at this time.

Teachers scoring the highest, lowest, and one middle range TPACK score from each school were interviewed and observed during late April and early May of the initial implementation year (Table 3:4). All nine teachers selected for interview and observations based on their self reported TPACK score consented to participate in an

interview following a classroom observation. The teachers were provided a copy of interview questions in advance within the email sent to schedule the observation and interviews (Appendix C).

Pseudonym	*Device*	*TPACK Score*	*Years Exp.*	*Ed. Level*	*National Board Cert.*	*Prof. Dev.*
Low BYOD – Ella	BYOD	1.43	6	BA	No	Self directed
Mid BYOD-Davis	BYOD	2.96	1	BA	No	Self directed
High BYOD – Natasha	BYOD	4.00	5	Masters	No	Self directed
Low Tablet – Claire	Tablet	2.93	4	Masters	Yes	10 days of professional development provided by school prior to school starting. Curriculum facilitator available at school.
Mid Tablet - Caroline	Tablet	3.08	20+	Doctorate	Yes	10 days of professional development provided by school prior to school starting. Curriculum facilitator available at school.
High Tablet – Helen	Tablet	3.86	20+	+30	No	10 days of professional development provided by school prior to school starting. Curriculum facilitator available at school.
Low Laptop-Paula	Laptop	1.88	16	Masters	No	After school professional development opportunities. Missed one of the two days.
Mid Laptop-Sally	Laptop	3.5	20+	Doctorate	No	After school professional development opportunities.
High Laptop-Alice	Laptop	3.94	11	BA	No	After school professional development opportunities and a master's course taken online.

Table 3.4*: Interview and Observation Participants*

Observation Procedures. I attended a class designated by the teacher for observation. I arrived before classes began and assumed a seat conducive to observe the resources made available to students using one-to-one devices and to observe the participant as they taught and or facilitated technology based assignments. I made field notes with paper and pencil of the class observations.

Interview Procedures. Bogdan and Biklen (2007) suggest the researcher assure the participants of the confidentially of the interview. I identified the participant by their chosen pseudonym on the digital recording to ensure confidentiality. Prior to beginning the interviews, participants were reminded of the informed consent letter and asked if they had any question and concerns regarding the research. Interviews were recorded on a password, protected iPhone under voice memos. I made notes on the interview question sheet to capture significant statements, to make notes for follow up, or to note nonverbal cues like body language or facial expressions as these provide "written accounts of what the researcher hears, sees, experiences, and thinks in the course of collecting and reflecting on the data in a qualitative study" (Bogdan & Biklen, 2007, p. 118-119). Each interview began with an informal discussion about the lesson observed in an effort to establish a rapport with each participant. The interview questions were semi-structured (Bogdan & Biklen, 2007) with specific questions and sub-questions regarding technology use beliefs, and one-to-one technology integration (Appendix C). Participants were permitted to elaborate and to provide additional information not related to the questions asked. The interviews did not exceed an hour. Each participant received copies of the transcribed interviews and field notes. These documents were member checked to ensure

accuracy and credibility of each participants account of my interpretations (Creswell, 2007).

Data Analysis

Research requires organization of all data; this study includes data from open-ended questions, TPACK survey instrument with technology use assessment, interview transcripts and observation notes. I used the data analysis process defined by Creswell (2007), allowing for the analysis, evaluation, and synthesis of the data collected in a meaningful and manageable way. The qualitative data was separated from the quantitative data to adhere to the appropriate conventions of qualitative and quantitative research.

Qualitative Analysis. The qualitative data collected included open-ended questions, survey, field notes, and transcripts from interviews and observations. Creswell (2007) defines a process of open-coding where there are no predetermined themes. The researcher reads transcripts through several times to become familiar with the material. She may need to bracket after reading through several times before highlighting meaning units or horizonaling the data. Through multiple examinations of participants written responses and transcripts common themes emerged. These multiple examinations are called comparative analysis because as the data is compared to emerging themes the data reduces to essential themes.

Horizonaling. Horizonaling the data is the process of "regarding every horizon or statement relevant to the topic and question having equal value" (Moutaskas, 1994, p. 118). This process involves reading and rereading the transcript and highlighting

significant statements. We used colored highlighters to group statements in common categories or themes and sub themes. We used post-it notes to list possible themes and categories and reread the transcript. This process occurred several times before the data was condensed to into the final themes. Finally, reporting those themes with quotes from the artifacts, responses, or interview questions (Moutaskas, 1994) takes place in the Chapter 4.

Member Checking. Several researchers support sharing the unedited transcript with the participant to make sure the participant agrees with the transcript and has the opportunity to add additional information if desired. Member checking is an essential component of validity (Polkinghorne, 1989). Participants were contacted a final time to review an unedited transcript for validation purposes. Any corrections or amendments were noted in my field notes and on their transcripts.

Inter-rater Reliability. Another way to avoid research bias is inter-rater reliability in which the researcher asks a disinterested party to read and highlight relevant statements for a percentage of the transcripts. For inter-rater reliability, the disinterested third party should highlight a high percentage of similar relevant statements thereby supporting the validity of the research. For this study, I asked two disinterested third parties to participate in the analysis of the transcripts. Both third party participants read and highlighted statements for all of the transcribed data and concurred with the primary researcher. We worked to have an eighty-percentage agreement for inter-rater reliability. Our agreement level was at eighty-four percent for both parties after the initial coding

process of relative statements and our coding of themes was a eighty-one percent agreement.

Quantitative Analysis. Analysis of the data took place after the administration of the survey and TPACK. Data including demographic data such as degree, teaching experience, and device were entered into excel. Likert scale TPACK question responses were entered as a point value of 4 for strongly agree, 3 for agree, 2 for disagree, and 1 for strongly disagree. These point values were averaged per domain; TK, TPK, TCK, TPCK, and the averages were averaged for the overall TPACK score (Schmidt, et.al, 2009).

I calculated mean values and standard deviations of each knowledge domain and technology usage indicators to compare teachers' TPACK self reported scores and reported technology use for this study. I ran a one-way analysis of variance to determine if there is a relationship between device implementation environment, and teachers' reported perceptions of their technological pedagogical content knowledge domains.

Cross Case Analysis. When conducting mixed methods multiple case analysis researchers often emphasize the common themes across cases but the purpose of conducting a multiple case study analysis is to also to examine the differences that exist among the cases. Stake (2006) differentiates between the two with terminology in which the themes emerge from the data collected to answer the research questions and findings emerge from the analysis of the factors unique to the particular cases. In this study the factors include professional development opportunities and device implementation process in which the researcher makes assertions regarding the impact of professional development opportunities and device implementation processes.

Summary

This chapter outlined the methodological approach for this multiple case study including quantitative and qualitative research methods. A detailed methodology used for conducting this study is provided, which include open-ended questions, a TPACK survey, a teacher and student use survey, interviews, and observations. The qualitative analysis included open-coding and comparative analysis to determine significant themes. The quantitative data analysis process was explained to demonstrate how the TPACK score was determined. Triangulation of data is demonstrated through the use of multiple data sources, multiple participants, member checking, and using disinterested third parties to participant in the coding of transcripts. The participants were limited to high school English teachers teaching in the initial year of a one-to-one device program. The cases were examined to indicate certain factors influence the research findings for the research to make assumptions about the impact of professional development and device implementation process.

CHAPTER FOUR

RESULTS

Introduction

The information in this chapter includes findings of secondary English teachers' experiences in the initial year of a one-to-one program implementation to examine teacher belief and the extent to which belief impacts technology use or integration by the teachers. Teachers were asked to define technology integration, explain how technology impacts student learning, and to discuss the relevance of technology in their classrooms.

This chapter includes qualitative data of open-ended questions, interviews, and observation notes to address the research question: how do high school English teachers define technology integration. The qualitative data presented includes responses by all 39 participants and then is divided by case, or device implementation, to explore the impact of device implementation on the teachers' perception of what it means to integrate technology. Quantitative data collected includes responses from all 39 participants and then divided by device to explore the impact of device implementation in the teachers perceived technological pedagogical content knowledge and how that perception affects classroom instructional choices.

Teachers were asked to use the TPACK assessment tool to rate on a scale from 1(strongly disagree) to 4 (strongly agree) their perception of their own technological pedagogical content knowledge in the categories of technological knowledge (TK), technological content knowledge (TCK), technological pedagogical knowledge (TPK), and technological pedagogical content knowledge (TPCK). Teachers were asked to rate

their instructional technology use and student instructional technology use on a scale of 0 not applicable, 1 infrequently, 2 sometimes, 3 weekly, or 4 daily to explore the impact of teachers perceptions n technology integration practices.

Technological Pedagogical Content Knowledge (TPACK)

This set of data collection and analysis addresses the second research question, "how do teachers' perceive their own technological pedagogical content knowledge and how does this perception affect classroom technological instructional decisions?" The descriptive statistics (Table 4.1) reveal that teachers rate themselves highest on technological content knowledge (M=3.17, S=0.64) followed by technological pedagogical knowledge (M=3.06, S=0.76), technological pedagogical content knowledge (M=3.00, S=0.71), and technology knowledge (M=2.95, S=0.71).

Comparing the data by school indicates confidence differs by department. Bring Your Own Device (BYOD) teachers rate themselves slightly lower than the average in TCK (M=3.09, S=0.69), TPK (M=2.84, S=0.87), TPCK (M=2.82, S=0.81) and their overall TPACK (M=2.89, S=0.81) score. Laptop teachers rate themselves highest in TPK (M=3.32, S=0.70), TPCK (M=3.18, S=0.64), and their overall TPACK (M=3.18, S=0.62) is higher than the average TPACK score. Tablet teachers have the overall highest TK (M=3.17, S=0.76), TCK (M=3.40, S=0.55) and TPACK score (M=3.26, S=0.37).

	Total Survey Result n= 39 Mean (SD)	*BYOD Results n=18 Mean (SD)*	*Laptop Results n=15 Mean (SD)*	*Tablet Results n=6 Mean (SD)*	*ANOVA F*	*P Value*
Technology Knowledge (TK)	2.95 (0.71)	2.96 (0.73)	2.94 (0.75)	3.17 (0.76)	0.225	0.800
Technological Content Knowledge (TCK)	3.17 (0.64)	3.09 (0.69)	3.18 (0.62)	3.40 (0.55)	0.905	0.414
Technological Pedagogical Knowledge (TPK)	3.06 (0.76)	2.84 (0.87)	3.32 (0.70)	3.00 (0.59)	0.328	0.722
Technological Pedagogical Content Knowledge (TPCK)	3.00 (0.71)	2.82 (0.81)	3.18 (0.64)	3.04 (0.62)	0.311	0.734
Combined score for TPACK	3.06 (0.69)	2.89 (0.81)	3.18 (0.62)	3.26 (0.37)	0.628	0.539

Table 4.1 *TPACK Scores by Device.*

An Analysis of Variance and dependent t-tests were used to examine the differences between TPACK scores, and individual TPACK categories When conducting an analysis of variance, the researcher assumes a homogeneity of variances, normal distribution of data, and each value is sampled independently. An analysis of variance between departments suggests there is no significant difference between TPACK scores and individual TPACK categories because the p values are greater than alpha, confirming the null hypothesis that teacher TPACK scores are equal across departments and across professional development opportunities (Table 4.1).

Dividing the total by educational degree indicates confidence may differ by degree (Table 4.2). Teachers with a doctorate degree (n=2) report the highest overall TPACK score (M=3.29, S=0.29), followed by teachers earning a masters degree (n=21) with an overall TPACK score of 3.22 (0.64), masters plus, 30 teachers (n=4) report a 2.96 TPACK score, and the teachers with bachelors degrees (n=12) report the lowest TPACK scores in all areas with an overall TPACK score of 2.72. An analysis of variance fails to reject the null hypothesis confirming that TPACK scores are equal among degrees earned.

	Bachelors Result n= 12 Mean (SD)	*Masters Results n=21 Mean (SD)*	*Masters +30 Results n=4 Mean (SD)*	*Doctorate Results n=2 Mean (SD)*	*ANOVA*	*P-Value*
Technology Knowledge (TK)	2.61 (0.24)	3.16 (0.70)	2.79 (0.92)	3.16 (0.70)	2.170	0.109
Technological Content Knowledge (TCK)	2.83 (0.71)	3.36 (0.69)	3.17 (0.58)	3.17 (0.23)	1.552	0.219
Technological Pedagogical Knowledge (TPK)	2.67 (0.71)	3.26 (0.74)	3.00 (0.82)	3.50 (0.71)	1.881	0.151
Technological Pedagogical Content Knowledge (TPCK)	2.72 (0.71)	3.12 (0.71)	3.00 (0.75)	3.50 (0.71)	1.141	0.346
Combined score for TPACK	2.78 (0.21)	3.22 (0.64)	2.96 (0.78)	3.29 (0.29)	1.790	0.167

Table 4.2 *TPACK Scores by Degree*

The data in Table 4.3 indicates confidence differs by years of teaching experience. The variance in the p-values indicates those differences in teachers' self reported TPCK (technological pedagogical content knowledge) and over all TPACK scores are statistically significant enough to argue that years teaching experience impacts teachers perception of technology integration. Teachers with more than 20 years teaching

experience (n=8) report higher TPACK (M=3.60, S=0.48) scores in all areas than their counterparts, followed by scores (M=3.17, S=0.56) reported by teachers with 11-15 years (n=12) experience. Teachers with 3-5 years teaching experience report the lowest TPACK (M=2.33, S=0.28) scores in all areas but those differences are not statistically significant.

	1-2 Years Results n=3 Mean (SD)	*3-5 Years Result n= 3 Mean (SD)*	*6-10 Years Results n=9 Mean (SD)*	*11-15 Years Results n=12 Mean (SD)*	*16-20 Years Results n=6 Mean (SD)*	*20+ Years Results n=8 Mean (SD)*	*ANOVA*	*P-Value*
TK	2.89(1.02)	2.33 (0.17)	2.93(0.60)	2.93 (0.81)	2.58 (0.42)	3.46 (0.66)	1.760	0.147
TCK	3.00 (1.00)	2.67 (0.33)	3.04 (0.66)	3.22 (0.56)	2.83 (0.69)	3.67 (0.47)	1.982	0.106
TPK	2.67(1.15)	2.41 (0.52)	2.83 (0.72)	3.19 (0.60)	3.00 (0.81)	3.59 (0.73)	1.786	0.141
TPCK	2.58 (1.23)	2.27 (0.23)	2.78 (0.70)	3.07 (0.55)	2.64 (0.44)	3.75 (0.41)	4.408	0.003
TPACK	2.72 (1.03)	2.33 (0.28)	2.88 (0.73)	3.17 (0.56)	2.86 (0.73)	3.60 (0.48)	2.429	0.054

Table 4.3 *TPACK Scores by Years Experience*

Defining Technology Integration

The data in this section represents the transcribed responses of 39 high school English teachers' responses to open-ended survey and interview questions and observation notes pertaining to the definition of technology integration. Teachers answered the open-ended survey questions at the end of a departmental meeting. Interviews and observations were scheduled the following month for participants with the highest, lowest, and median TPACK score for device implementation. A member check was conducted to ensure that each teacher's transcribed open-ended survey responses,

interviews, and observations reflected each teacher's lived experiences. The findings from the qualitative data collected revealed two overarching themes; teachers defined technology integration as having two components: student learning benefits and instructional benefits. These overarching themes are comprised of 5 sub-themes that teachers used to define technology integration: enhances learning, engages students, (Table 4.4) supports instruction, facilitates classroom practices, and enables students to demonstrate their learning provided in Table 4.5

Student learning benefits

The overarching theme student learning benefits is comprised of the sub-themes "engages students" and "enhances student learning." Teachers report students learning is enhanced when students are engaged with their devices because they are motivated to work. According to teacher responses, they believe one-to-one devices offer more opportunities to meet student interests through real world connections. Teachers responses suggest students have increased opportunities to collaborate and make connections to "bring literature alive'.

Overarching Theme • *Sub -Theme*	*Technology integration*	*Representative teacher responses from the open ended survey questions*
Student Learning Benefits • *Engages students*	• Students participate with their devices	• "students are engaged because they are always on their devices." (Laptop Teacher L, Survey, 17 February, 2014).
	• Motivates students to work	• "engages students and keeps them on task because they know what they need to complete to submit their assignments" (Tablet Teacher Helen, Survey, 21 February, 2014).
	• Meets their interests	• "students are more engaged and they share things from pop culture on our class website that support the themes we discuss in class" (Laptop Teacher D, Survey 17 February, 2014)
• *Enhances learning*	• Make real world connections	• "technology helps students connect our subject to what is going on in the real world (Tablet Teacher Helen, Survey, 21 February, 2014).
	• Increased collaboration	• "working together on assignments more often" (Laptop Teacher Alice, Survey, 17 February, 2014).
	• Brings literature alive	• "making literature relevant to them with pictures, videos, and music to help literature come alive" (BYOD Teacher E, Survey, 19, February, 2014).

Table 4.4 *Student Learning Benefits Overarching Subthemes*

Engages Students. Twenty-eight percent of responses used "engage" in their explanation of what technology integration means. Follow up questions, interviews, and field notes from observations provide examples of the theme of using technology as a means to engage students: "Technology integration allows for students to participate in

instruction;" (BYOD Teacher E, Survey, 19 February, 2014) "all students can actively participate as they follow along on their own device through presentations or class assignments;" (BYOD Teacher M, Survey, 19 February, 2014) or "using technology promotes rigor and student motivation in new ways." (Laptop Teacher T, Survey, 17 February 2014)

Fifty-eight percent of responses to the question, *how does technology impact your teaching or student learning* included descriptions of an increase in active participation as a result of one-to-one devices in the classroom. "Students cannot hide as easily because I can see what they are doing or what is missing more quickly" (BYOD Teacher A, Survey, 19 February, 2014) and "more students are raising their hand and sharing something they found in class" (Tablet Teacher C, Survey, 21 February, 2014) and "students that used to sit in the back of the classroom are now engaged and creating things I never expected" (Laptop Teacher G, Survey, 21 February, 2014). Eighteen percent of teachers noted every student participates through quizzes embedded in presentations or through opportunities to respond anonymously. One teacher noted all students are "prepared for class with one-to-one programs because their books, pencils, and paper are all a part of the laptop, making it easier to prepare for classes because I know everyone has access to their resources everyday." (BYOD Teacher K, Survey 19 February, 2014).

BYOD Teacher M, Davis, a veteran teacher with more than 20 years teaching experience, describes student engagement in a follow-up interview:

> I have been teaching a long time and I know the material that often trips students up. In the past, I would ask students if they knew what a 1929 Duesenberg was and they would nod and hope I would move on. Now with tablets, I have students find an example of the car and post it to our class webpage in two minutes… all students are actively engaged in the discussion as a result (Interview, 5 May, 2014).

Following an observation of Laptop Teacher M, Paula, a veteran teacher with more than 20 years teaching experience explains how student engagement has changed as a result of the one-to-one device implementation.

> The class you observed used to be a class I could expect students to put their head on their desks and sleep. They are not students who participate in class discussions or group work. Now they come into class and log onto their laptops to complete modules. Students do not sleep any more because they want to complete the module in class to avoid having homework (7 May, 2014).

Enhances Student Learning. Twenty-three percent of coded responses used a phrase similar to the phrase "technology enhances student learning." Follow up questions, interviews, and observation notes of teachers describe the ways technology enhances student learning: "students using technology to make connections with literature and apply the lessons of literature to real world examples" (BYOD Teacher F, Survey, 17 February, 2014); "technology brings literature alive. Students can watch interpretations of the literature to compare or contrast with their interpretations more

easily" (Laptop Teacher A, Survey, 19 February, 2014)"; or "bringing textual information into sharper focus by providing different mediums to expand student knowledge and understanding of material" (Laptop Teacher J, Survey, 19 February, 2014). Fifteen percent of statements revealed students make deeper connections than in previous years because they could search immediately rather than remembering to look up a detail for homework: "my class discussion are richer because students are pulling up information during class to ask questions or to help them participate in the discussion" (BYOD Teacher F, Survey, 19 February, 2014)" or "students continue the conversation beyond our classroom with other classes on our class blog or group chats or email (Laptop Teacher K, Survey, 21 February, 2014)." In the interview with Tablet Teacher, Sally, she referenced an activity to engage students to find an image of a 1929 Duesenberg to build background knowledge, she also depicts this activity as a means to enhance student learning:

> As students search for a 1929 Duesenberg online, they see the context of the cars with their owners and many students note there are few yellow Duesenberg cars among the images. This leads to a discussion about why Fitzgerald put Gatsby in a yellow car rather than the traditional black car. Students are making connections by searching for the image themselves versus me finding an image to show during my lecture as I have done in the past. In fact, (she laughs) I have a colored transparency of a yellow Gatsby car around here somewhere (5 May, 2014).

Paula at Laptop high school describes how she uses technology in her classroom to enhance student learning.

> There are Internet restrictions on websites at school, so I download video clips to a portable drive to show to my classes. For example, we read *Night* this year. I downloaded part of the Oprah video with Elie Weisel walking though the concentration camps a few years ago for students to see what the concentration camps look like today … I put pictures of concentrations camps in my PowerPoint for students to see what the people looked like in the camps. Oh, I also used part of the movie *The Boy in Striped Pajamas* so students could understand how the Germans did not know what was happening in the concentration camps (Interview, 7 May, 2014).

Instructional Benefits

The overarching theme of instructional benefits is comprised of coded subthemes supports instruction, facilitates classroom practices, and demonstrates learning. The significant statements within the subtheme "supports instruction" reveal teachers believe technology integration can expand the way students learn, can provide more opportunities for tutorials or practice sessions, and can diversify teaching to support all learning styles (Table 4.5). The significant statements grouped under the theme facilitates classroom practices reveals a belief that technology enables teachers and students automate tasks to make classroom management tasks like checking grades and attendance, submitting work, or reviewing notes more efficient. The significant statements align under

demonstrates learning reveal teachers believe technology integration supports student production of knowledge in diverse ways and students' production of work for an audience extending beyond the brick and mortar classrooms.

Overarching Theme • *Subtheme*	*Technology integration*	*Representative teacher responses from the 0pen-ended survey questions*
Instructional Benefits • *Supports instruction*	• Expands the way students can learn	• Students can find alternate explanations to support their learning if my presentation does not help (BYOD Teacher C, Survey, 19 February, 2014).
	• Tutorials / practice sessions	• "reinforcing skills for students and incorporating practice exercises when needed" (Laptop Teacher P, Survey, 17 February, 2014).
	• All learning styles	• "I provide links to support different learning styles on my webpage" (Laptop Teacher A, Survey, 17 February, 2014).
• *Facilitates classroom practices*	• A part of the daily routine	• "Students can access their grades and check attendance anytime" (Tablet Teacher E, Survey, 19 February, 2014).
	• Submit work online	• "more students turn in their assignments because they can just click a button to turn it in" (Laptop Teacher H, Survey 17 February, 2014).
	• Post notes, homework assignments and reminders for student on class website (replaced copies)	• "technology keeps students on track because they can access notes, assignments, and grades at anytime" (Tablet Teacher F, Survey, 21 February, 2014).
• *Demonstrates learning*	• Produce own interpretations	• "students collaborated to produce a video of the novel this semester" (BYOD Teacher K,

		Survey, 19 February, 2014).
	• Demonstrate knowledge and understanding in different ways.	• "I graded fewer papers and tests and spent more time grading presentations and projects" (Tablet Teacher C, Survey, 21 February, 2014).
	• Publish work for a global audience	• "students in China responded to our interpretation of a poem and we responded to theirs this semester" (Tablet Teacher A, Survey, 21 February, 2014).

Table 4.5 *Instructional Benefits Overarching Subthemes*

Supports Instruction. The theme, "supports instruction." emerged as twenty-one percent of the coded responses as teachers defined technology integration as students using technology as a tool to extend or continue learning. Teachers described technology integration as a vehicle to support student learning. One teacher noted that technology provided "…a means to provide kinesthetic, auditory, and visual opportunities to understand material" (BYOD Teacher L, Survey, 19 February, 2014); another teacher noted that "teaching with computers, videos, and audio clips supports student learning because they can watch tutorials over again and they can complete practice sessions for homework" (Laptop Teacher F, Survey, 17 February, 2014); a third noted that "technology expands the way students can learn" (BYOD Teacher O, Survey, 19 February, 2014). Follow up questions, interviews, and classroom observation field notes reinforce the subtheme categories as Laptop teacher, Paula, describes how integration impacts her teaching practices, she states "technology enables me to track student data to tailor assignments to individual student needs" (Interview, 7 May, 2014) and Tablet

Teacher, Sally states technology supports her instruction because now "students use drill links and online quizzes I create to prepare for my tests" (Interview, 9 May, 2014), and the survey response from Tablet Teacher A expresses how using a common platform supports her instructional practices because the use of "Edmodo supports students learning because they can access links, quizzes, and notes whenever they want" (Survey, 17 February, 2014).

BYOD Teacher M, in her first year of teaching reports success with students reinforcing parts of speech from playing games like *Grammar Pop* or *Grammar Up,* which are free apps for iPads and tablets. She says she often lets students play these games between classes or if they complete their assignments early. (Interview, 9 May, 2014). Tablet Teacher, Helen, says her students have downloaded free AP test prep apps on their tablets in preparation for the upcoming AP exams. She says students can share their progress with her in class and they can discuss points of concern (Interview, 5 May, 2014). November (2010) defines these examples of using technology as assimilation; in which technology is used to complete the same tasks in a different way. For example, the incorporation of quizlet as a preparation tool replicates study techniques previously employed by making flashcards to study.

Facilitates Classroom Practices. Twenty-one percent of the coded responses described technology integration as a means to facilitate existing classroom practices. Teachers described technology integration as a means "to type final grades" (Tablet Teacher D Survey, 21 February, 2014); "to access grades and homework assignments" (Laptop Teacher P, Survey, 17 February, 2014); and "to distribute class notes,

presentations, and assess students learning" (Laptop Teacher D, Survey, 17 February, 2014). Follow up questions, interview, and classroom observation data provided more examples of technology being used to facilitate classroom practices. Twenty-three percent of responses described technology integration as a means to be more efficient in instructional practices: "students have access to missed assignments" (Laptop Teacher, Claire, Interview, 7 May, 2014) and "a regular part of classroom process in terms of learning, communication, and management" (BYOD Teacher, Ella, Interview, 5 May, 2014) and "I can modify daily assignments for individual students without impacting the rest of the class" (Laptop Teacher K, Survey, 17 February, 2014).

Demonstrates learning. Ten percent of the coded responses define technology use as a means to demonstrate student learning. One-to-one technology in classrooms enable students to "produce their own interpretations" (Tablet Teacher A, Survey, 21 February, 2014); and "demonstrate learning with vlogs, digital posters, podcasts, or visual presentations" (Tablet Teacher C, Survey, 21 February, 2014). In the follow up questions, interview, and observation data, two teachers describe technology integration as providing "new ways to demonstrate mastery and express creativity" (BYOD Teacher Natasha, Interview, 5 May, 2014) and "more freedom to determine how they demonstrate their learning than in past years." (Tablet Teacher, Claire, Interview, 9 May, 2014).

Defining Technology by Device Implementation

To determine if teachers defined technology differently based on their one-to-one device experiences and the context of their schools, I quantified the occurrence of themes and sorted the coded data according to school to illustrate patterns of themes (Table 4.3).

Percentages are used rather than number of occurrences because departments varied in sample size; for example, the Tablet English department has only 6 participants while BYOD has 18. In the case of Tablet, if 3 of the of the coded responses expressed the "engages students" theme, 50% is noted on the table. In some cases, participants' statements include more than one theme, resulting in percentages not equaling one hundred percent.

Subtheme	*BYOD* *%*	*Laptop* *%*	*Tablet* *%*
Engages Students	22	38	44
• Define Technology Integration	28	33	33
• How technology impacts instruction	11	6	50
• How technology impacts student learning	28	20	50
Enhances Student Learning	13	18	33
• Define Technology Integration	22	20	50
• How technology impacts instruction	0	13	33
• How technology impacts student learning	17	20	17
Supports Instruction	20	17	17
• Define Technology Integration	22	20	33
• How technology impacts instruction	17	0	17
• How technology impacts student learning	22	13	0
Facilitates Classroom Practices	24	25	17
• Define Technology Integration	17	20	33
• How technology impacts instruction	22	13	17
• How technology impacts student learning	33	40	0
Demonstrates Student Learning	3	4	11
• Define Technology Integration	11	13	0
• How technology impacts Instruction	0	0	0
• How technology impacts student learning	0	0	33

Table 4.6 *Percentage of Coded Responses by Question and Case Study*

Technology integration as a means to engage students is the most predominant theme among the data coded; the least significant theme is technology as a means to demonstrate student learning.

Technology Use

Technology use by teachers can be interpreted in many ways. Teachers were provided a list of digital technology activities: accessing or creating podcasts, audio/ video production / editing, blogs or wikis, websites, drill and practice, email, image editing, integrated learning systems, interactive whiteboard systems, internet resources, library catalogs, online research databases, presentation software, tutorials, video conferencing, video streaming, visualization / graphic organizers, web portals, and websites to mark their frequency of use (daily, weekly, infrequently, or never) in their classroom. Teachers were also asked to mark the student frequency of technology use in their classroom to access class information online, access the internet for research, collaborate with other students, collaborate with audiences globally, participate in online projects, produce projects designed by the teacher, produce projects of their own design, and produce work intended for audiences beyond the classroom. The frequency of use was given a score of 1 if the teacher indicated they never used the digital resource listed, a score of 2 if they infrequently used the digital resource listed, 3 if they used the digital resource listed weekly, and a 4 if they used the digital resource listed daily.

	Total Survey n= 39 Mean (SD)	*BYOD n=18 Mean (SD)*	*Laptop n=15 Mean (SD)*	*Tablet n=6 Mean (SD)*	*ANOVA F*	*P*	*t-test %*
TPACK Scores	3.06 (0.69)	2.89 (0.81)	3.18 (0.62)	3.26 (0.37)	1.020	0.371	99
Teacher Use	2.41 (0.62)	2.40 (0.65)	1.70 (0.43)	2.68 (0.61)	9.051	0.001	56
Student Use	2.50 (0.53)	2.49 (0.54)	1.64 (0.32)	2.83 (0.55)	19.564	0.001	59

Table 4.7 *Correlations between TPACK and Technology Use*

Dependent t-tests were used to examine the impact of the TPACK score on reported teacher and student use based on the survey described above. The results of the t-tests suggest that TPACK scores significantly (99%) impact reported teacher use and student use. Correlation coefficient tests measure how closely two data sets are related to each other. In this case, using a t-test we measured the correlation between TPACK scores and teacher use to reveal a 56% positive relationship between the scores, and we measured the correlation between TPACK scores and student use to reveal a 59% positive correlation suggesting the scores are related and increase or decrease based on the departmental and individual TPACK scores. For example, if a teacher's TPACK survey response score indicates the teacher has a high inclination towards technology integration then their use and student use will be more frequent than a teacher that has a lower TPACK score.

Teacher Technology Use

Laptop teachers consistently reported less frequent technology use (M=1.70) than their counterparts while Tablet teachers report more frequent use (M=2.68) in most categories (Table 4.8). Email, Internet resources, and word processing scores suggest a majority of teachers participating in the survey use these tools daily (M=3.36). Accessing

or creating podcasts (M= 1.46) and videoconferencing (1.43) had the lowest frequency ratings. Tablet teachers rated frequency use higher than the average and their counterparts in 11 categories, while BYOD teachers (M=2.40) rated frequency of use higher than the average and their counterparts in the remaining 10 categories. The data for teacher technology use is divided by the Apple Classroom of Tomorrow descriptors of teacher technology integration pedagogy: entry, adoption, adaptation, and appropriation, and invention are combined.

Entry Phase. Teachers use technology to support lecture-based instruction such as using PowerPoint to support instruction, using the school content management system, email, and spreadsheets to maintain records. Table 4.8 indicates the reported use frequency of email, content management systems, presentations, and spreadsheet digital resources. The scores are on a scale from 1-4 in which 1 indicates the teacher never uses this technology tool to a 4 indicating the teacher reports using this technology tool daily in his or her instruction.

Entry Phase	*Average*	*BYOD*	*Laptop*	*Tablet*
Email	3.44	3.67	1.87	3.17
Content Management System	2.36	2.39	1.53	2.5
Presentation	3.15	3.22	2.4	2.84
Spreadsheets	2.0	1.5	1.6	2.67

Table 4.8 *Entry Phase: Teacher Reported Technology Use by Device*

BYOD teachers report the highest use frequency of use in email (M=3.67) and presentation software (M=3.22). A frequency use score of over 3.0 suggests a majority of BYOD teachers use email daily and the frequency of presentation software use is more than once a week. Tablet teachers report the highest use frequency in content management system (M=2.5) and spreadsheets (M=2.67). Scores between 2.0 and 3.0

suggests teachers are reporting use less frequently than weekly. Laptop teachers report the lowest scores in frequency of use of email (M=1.87), content management system (M=1.53), and presentation tools (M=2.4). Scores less than 2.0 suggests teachers are indicating teachers rarely use the digital resource listed.

Adoption Phase. ACOT describes the adoption phase of technology integration as teachers relying on traditional instructional practices such as test, textbooks, whiteboards with limited use of technology. Teachers may use the Internet to access documents. I included the use of whiteboards, word processing, drill and practice, Internet resources, database software, tutorials, and web portals into the adoption phase based on the descriptors provided by ACOT (Table 4.9). The frequency of use scale is a one to four-point scale.

Adoption Phase	*Average*	*BYOD*	*Laptop*	*Tablet*
Whiteboard	3.15	2.94	2.4	2.67
Word processing	3.36	3.28	2.47	3.27
Drill and Practice	2.41	1.28	1.73	3.17
Internet resources	3.44	3.39	2.4	3.5
Database software	2.0	2.06	1.47	2
Tutorial	2.38	2.5	1.67	2
Web Portals	2.49	2.56	1.4	2.83

Table 4.9: *Adoption Phase: Teacher Reported Technology Use by Device*

Table 4.9 indicate teachers report using Internet resources and word processing more frequently than other digital resources. The category Internet resources had the highest reported use by teachers' frequency in this category. Tablet teachers report the most frequent use of Internet resources (M=3.5) with BYOD being very close in use frequency with an average use of M=3.39. Tablet (M=3.27) and BYOD (M=3.28) teachers report using word processing more frequently than Laptop teachers (M=2.47). The mean score

of 3.27 and 3.28 suggests a majority of Tablet and BYOD teachers report using word processing digital resources on a daily basis while the Laptop teachers are reporting using word processing digital resources less often than weekly. The drill and practice category notes the biggest discrepancy in frequency of use with Tablet teachers reporting a M=3.17 frequency of use, BYOD teachers reporting a M=1.28 frequency of use and Laptop teachers reporting M=1.73 frequency of use. Tablet high school had six teachers participating in this study and one teacher required AP students to use an AP application to review and study comprehension questions on the app, potentially skewing the results of this survey.

Adaptation Phase. ACOT defines the adaptation phase as the transition stage where teachers begin using technology with their students in well-defined computer assignments. The technology is used to support traditional instructional methods. In Table 4.10, I included image editing, accessing or creating podcasts, online research databases, visualization or graphic organizers and using library catalogs in this selection because these descriptors would support traditional instructional methods in which the assignments may be well-defined by the teacher.

Adaption Phase	*Average*	*BYOD*	*Laptop*	*Tablet*
Image editing	1.9	1.89	1.4	2.67
Accessing or creating podcasts	1.46	1.72	1.13	1.5
Online research databases	2.56	2.72	1.6	2.84
Visualization / graphic organizers	2.9	2.89	2.0	2.67
Library catalogs	2.27	2.11	1.47	3.5

Table 4.10 *Adaptation Phase: Teacher Reported Technology Use by Device*

The frequency of use is reduced in comparison to other phases of technology integration as defined by the Apple Classrooms of Tomorrow phases of technology integration.

Tablet high school teachers report a significant difference in Library Catalog (M=3.5) use which may be attributed to three of the six teachers were in the middle of research paper projects when the survey was administered. Overall in this category on Table 4.10, the reported frequency of use by teachers becomes less frequent in which Tablet teachers report using image editing (M=2.67), online research databases (M=2.84), and library catalogs more frequently than BYOD teachers and Laptop teachers. BYOD teachers report creating podcasts (M=1.722) and graphic organizers (M=2.89) more frequently than Laptop and Tablet teachers. Laptop teachers consistently report the lowest use frequency in all categories with using graphic organizers as their highest use frequency (M=2.0) to accessing or creating podcasts as their least frequent use (M=1.13).

Appropriation Phase and Invention Phase. The ACOT appropriation phase and invention phase indicate a shift away from traditional instructional methods to a classroom in which students construct their own knowledge in a meaningful context or constructivist teaching methods. Technology is a tool used by students as a resource to extend their learning. Students are free to choose between methods to meet course objectives. Audio / video production editing, blogging, videoconferencing, video streaming, and using integrated learning systems shift away from traditional instructional methods because they incorporate using technology to perform tasks that were not as feasible prior to the integration one-to-one technology. Table 4.11 indicates a decrease in teacher use frequency.

Appropriation and Invention Phases	*Average*	*BYOD*	*Laptop*	*Tablet*
Audio / video production editing	1.82	1.61	1.73	3.83
Blog / Wiki	1.87	2.39	1.0	1.83
Videoconferencing	1.44	2.22	1.07	1.83
Video streaming	2.26	2.22	1.73	2.67
Integrated learning systems	1.9	2.0	1.67	2.5

Table 4.11 *Appropriation and Invention Phases: Teacher Reported Technology Use by Device*

The frequency of use is reduced in comparison to other phases of technology integration as defined by the Apple Classroom of Tomorrow. Tablet teachers report higher use frequency in audio and video production and editing (M=3.83), video streaming (M=2.67) and integrated learning systems (M=2.5) which may be skewed as a result of a students working with students in China on a literature project. BYOD teachers report the highest frequency of use with blogs and wikis (M=2.39) and videoconferencing (M=2.22). Laptop teachers consistently report less frequent use of technology in all categories with video production and video streaming being used most frequently (M=1.73) and they report using blogs (M=1.0) and videoconferencing (M=1.07) the least frequent among participants in this study.

Student Technology Use

The data for student technology use is divided based on the SAMR model for assessing teacher artifacts to help teachers design, develop, and infuse digital technologies to improve student achievement levels. The data is divided between the categories enhancement and transformation. Enhancement assignments use technology as a substitute for traditional teaching practices with no functional change towards student learning process. Transformation indicates technology is used to complete tasks that were

not possible prior to integrating technology. This data is the teachers' reported student use of digital technologies as a part of their instructional learning. I did not collect teacher artifacts to assess these scores, but the descriptors provided in the teachers' student use survey indicate how the teacher intended for the technology to be use. The survey prompts included on Table 4.12 for enhancement assignments include using digital tools to access class information online, access the Internet for research, and to produce projects designed by the teacher.

Enhancement Assignment	*Average*	*BYOD*	*Laptop*	*Tablet*
Access class information online	3.13	3.22	1.8	3.33
Access the Internet for research	2.97	2.89	1.93	3.33
Produce projects designed by the teacher	2.67	2.67	1.8	2.83

Table 4.12 *Enhancement Phase of Teacher Reported Student Technology Use*

The averages on Table 4.12 indicate Tablet teachers (M=2.83) reported student technology use higher than their counterparts in all categories, followed by BYOD teachers (M=2.49). Laptop teachers (M=1.64) following the trend of teacher technology use consistently score student technology use lower than the average and their counterparts. Accessing class information (M=3.33) and accessing the internet (M=3.33) rated the highest frequency of student use and collaborate with audiences globally rated the lowest frequency of reported student use (M=1.67).

Tablet teachers continue to report the higher use frequency in all categories indicating the majority of tablet teachers require students to access class information online and access the Internet for research weekly and for some students complete these

tasks daily. Laptop teachers indicate they infrequently require students to complete any of the assignments listed.

The SAMR model is divided between the enhancement phase and the transformation phase. Table 4.13 includes student use prompts that could be transformative from traditional teaching practices. The prompts include students using technology to collaborate with other students, collaborate with audiences globally, participate in online projects, produce projects of their own design, and to produce work intended for other audiences.

Transformation Assignment	*Average*	*BYOD*	*Laptop*	*Tablet*
Collaborate with other students	2.82	2.89	2.07	3.17
Collaborate with audiences globally	1.51	1.5	1.13	1.67
Participate in online projects	2.31	2.22	1.53	3.00
Produce projects of their own design	2.51	2.39	1.6	2.83
Produce work intended for audiences beyond the classroom	2.08	2.17	1.27	2.5

Table 4.13 *Transformation Phase of Teacher Reported Student Technology Use*

The average reported student use of technology in these assignments decreases in the transformation phase as indicated in Table 4.13. Tablet teachers continue to report the highest frequency of use in all categories. Teachers at Tablet high school were also participating in a collaborative project with students from China, which may influence their reported scores at the time of the survey. Laptop teachers reported the lowest student use frequency in all categories. Scores between 1.0 and 2.0 represent teachers reporting students use technology to collaborate or produce in the range of never and infrequently, scores between 2.0 and 3.0 represent teachers' responses to the prompt indicating their students use technology between infrequently and weekly, and scores

between 3.0 and 4.0 represent teachers' responses to the prompt indicating students use technology to collaborate and produce between weekly and daily.

Observation and Interview Data

I requested to observe and conduct a follow up interview with teachers in each school rating themselves as the teacher with the highest, lowest, or middle TPACK score to triangulate the data and determine if TPACK scores were indicators of classroom practices. During the observations, I took field notes as to how technology was used in the classroom and the assignments students were required to complete. No artifacts were collected from the teacher or students. In the follow up interview, I asked teachers predetermined questions and some specific questions targeted toward the lesson I observed.

Highest TPACK Score Teachers

The teachers in this category scored themselves highest in their department on their TPACK assessment. Table 4.14 also indicates their reported technology use and student technology use reported by them, their years experience teaching and level of education.

Highest TPACK Score	*TPACK Score*	*Teacher Use*	*Student Use*	*Years Exp.*	*Degree*
Natasha -BYOD	4.0	3.19	2.75	20+	Masters
Alice - Laptop	4.0	3.67	4.0	20+	Masters
Helen - Tablet	3.83	3.48	3.25	20+	Masters +30

Table 4.14 *Highest TPACK Score Teacher Results*

Highest BYOD TPACK Score. Natasha gave herself a perfect 4.0 on the TPACK assessment. The class I observed included opportunities for students to break into groups to find background information about the time period the next novel they were studying.

At least one student in each group had a smart device with enough data remaining in their plan to complete the exercise. Students sent Natasha links to share with the class, which she compiled on PowerPoint slides for their presentations. Students presented their findings after 15 minutes of research. The students were accustomed to this process and worked seamlessly through the assignment. Students complained about the speed of connections and some students had to sit by the window in hopes of getting an extra bar of service to speed up the process (Observation, 5 May, 2014).

In a follow up interview Natasha stated, "You saw how frustrated they get. I have all but given up using their devices in class because the Wi-Fi is unpredictable and so many of them use their data plans up before the end of the billing period and complain about the added expense of using their device in class (Interview, 5 May. 2014). She went on to say that she thinks one-to-one devices do provide different learning opportunities for students to learn in different ways, but the obstacles are difficult when every student has a different device, the data and connection are always a concern, and too often students leave them in their lockers since they cannot have them in other classes.

When asked about professional development opportunities or what motivated her to include technology in her classroom, she replied "I have several friends who teach in one-to-one schools and they are always sharing ideas with me. I was excited to give some of their ideas a try but the obstacles of individual technology have made implementing some of the things I think they would really enjoy impossible." (Interview, 5 May, 2014).

Highest Laptop TPACK Score. Alice also reported a perfect 4.0 on the TPACK assessment. Students entered the classroom before the bell rang, opened their laptops, and

began working on the module projected on the whiteboard. Three minutes after the bell rang High Laptop teacher posted a code on the projection screen for students to log their attendance. Students worked silently on their laptops for the majority of the period. The teacher would periodically call a student to her desk to discuss their performance of the previous learning module and were assigned supplemental work to address the areas of concern. When students had a question, they would ask a classmate what they got for that answer. When their classmate did not know the answer, the teacher would remind them if they asked her to watch the video link provided before asking her for an answer. In looking over students' shoulders, it looked like they were answering comprehension questions about a novel they are studying in class. In some cases, there were paragraphs from the novel asking them to identify different examples of literary terms (Observation, 7 May, 2014).

In the follow up interview, Alice was pleased with their work because a majority of them completed the module in class and would not have to complete it for homework. She stated: "Students in this type of class used to come in and put their heads on their desk because they were not prepared. They would not bring a pencil, paper, or book to class, now they just have to bring their laptop to be prepared. I am glad most of them finished the module in class because they won't finish it for homework" (Interview, 7 May, 2014). She discussed how individual MAP test scores have improved as a result of the learning modules which she attributed to her ability "to track data and target individual student weaknesses so that they will preform better on the end of course tests" (Interview, 7 May, 2014).

Highest TPACK Tablet Score. Helen rated her TPACK score as a 3.83. She started class demonstrating an illustrated text of Hemmingway's, "Cat in the Rain." She then had students select a passage containing figurative language from The Lord of the Flies to create their own illustrated text to reinforce their lesson on figurative language. Students were permitted to compose their illustrated text by any method they were comfortable but for students unsure of how to illustrate a text she had a handout of how to illustrate a text in PowerPoint and on their tablets. She also reminded them of links posted on the class website to refer to if they wanted to watch a tutorial on how to animate words or images. Students collaborated throughout the period showing each other how they were able to make something move and discussed how to make a sentence visual. High Tablet teacher circulated throughout the classroom supporting students as they created their assignments, answered questions, and would pause the class to share what another student learned or what she learned from a student (Observation, 9 May, 2014).

In the follow up interview, Helen said, "I love that we are all on the same page. We all have access to the same resources 24/7 which makes teaching with technology a lot easier" (Interview, 9 May, 2014). When asked how she came up with this lesson plan she said, "Another teacher in my department has done this assignment for years, but I never could book the computer lab for enough days to try it. I don't think it will take as long because the students are excited and will work on it at home which will cut down on the amount of class time it usually required her to incorporate this assignment. Did you hear how they were talking about figurative language? Wasn't that awesome?" (Interview, 9 May, 2014). When asked how she develops lesson plans to include

technology she said, “We are lucky, we have an English technology coordinator at this school, she eats lunch with us once a week and shares ideas with us and will come to our classes to help us implement anything we want to try. She is an excellent resource and is always willing to help us incorporate whatever we want when she can” (Interview, 9 May, 2014). She also stated they have several websites linked to their school teacher resources page with technology integration resources that she looks at periodically to see if anything appeals to her. When asked if she thinks using technology impacts student learning, she answered, “I know they are doing more thinking for themselves than they have in the past, I don’t know how that will show up in test scores, but I have been able to offer them lots more ways to prepare for tests than I have in the past. My students love creating and sharing quizlet to prepare for tests” (Interview, 9 May, 2014).

Mid-range TPACK Scores

Teachers scoring in the mid-range of their department TPACK spectrum varies in experience and degrees earned. Two teachers were in their initial year of teaching and the other has over twenty years teaching experience. Davis, from BYOD had the most years teaching experience and reported more frequent use of technology individually and by students. Caroline from Tablet High has a Bachelors degree and reported the least frequency of personal technology use but reported she requires students to use technology more frequently than Sally at Laptop High.

Mid-range TPACK Score	*TPACK Score*	*Teacher Use*	*Student Use*	*Years Exp.*	*Degree*
Davis - BYOD	3.08	2.91	2.88	20+	Doctorate
Sally - Laptop	3.63	2.61	2.0	1	Masters
Caroline - Tablet	2.95	1.86	2.38	1	BA

Table 4.15 *Mid-Range TPACK Score Teacher Results*

Mid-range TPACK BYOD score. Davis rated his TPACK score as a 3.08. The class I observed was the week before AP exams so the students were playing a review game in preparation for the AP English Language Exam. Davis created a game using an application students' could download on their device that would provide answers to questions displayed on the smart board. The students' scores depended on how quickly they responded to the question as well as if their response was accurate. Students played in teams because not every student had a smart device charged or with data available to use during English class. The game moved swiftly, but was paused for moments of clarification and discussion as to why an answer was the best answer versus being one of several correct answers (Observation, 5 May, 2014).

In the follow up interview, Davis apologized for having a review game as the lesson I observed, but reminded me that the AP Language exam requires them to know very specific vocabulary and to be able to identify this key terms quickly. As a result, using this particular app was perfect for preparing them for the upcoming exam. When asked how using individual devices were going, he responded, "there are a lot of kinks to work out and I would be surprised if we discontinue our BYOD policies permitting students to have their phones in class after this year. Students are not mature enough to have their phones in class and not be tempted to text someone really quickly or to play a game while the teacher is teaching. As a result, most of the teachers I talk to have banned BYOD in their classrooms. It was a good idea, we just aren't ready" (Interview, 5 May, 2014). When asked how he learned about this particular game, he said her students asked if they could play it. They used the app in science class throughout the year on review

days. He said it took a lot longer than she anticipated creating the game for the students to play and that he would weigh the benefit to the amount of time it took him before he would create another game for them to play (Interview,5 May, 2014).

Mid-range TPACK Laptop Scores. Caroline has the highest reported score among the mid range teachers with a TPACK score of 3.63 in her first year of teaching. Students worked on a grammar review module throughout the period in preparation for their end of course tests. Students came into class and were reminded of upcoming assignments. The first 20 minutes of class included students taking an online grammar assessment to determine individual areas of strengths and weaknesses. For every component the student missed, they were assigned a follow-up video link explaining the grammar rule and practice questions. Following the allotted 20-minute grammar assessment students put their laptops away and popcorn read a short story from textbooks stored under their desks for the remainder of the class period (Observation, 9 May, 2014).

I asked about the grammar assessment tool in a follow up interview because it was similar to a math program I am familiar with. She said, “I don’t know if it really works, but so much of EOC is grammar based so I feel like any way I can get grammar in front of them is worth it. This particular program has good videos that they like which makes it bearable for them to review grammar weaknesses” (Interview, 9 May, 2014). When asked how she found learned about this program, she said it was a free link she found over the weekend when trying to find a fun way to review grammar. When asked how technology impacts student learning she said, “it is a great way to reinforce the lesson of the day or to quiz students. It may take me more time to make a quiz on the

computer, but once it is done, they can complete the quiz and it is graded for me as soon as they hit submit. I have a lot more time to prepare for class now as a result" (Interview,9 May, 2014). In a follow up question, I asked if they use their laptops for anything other than assessment, she answered, "They can look up their grades and see what assignments they are missing which makes them more responsible for their work and they cannot blame me for losing the work because it is all electronic" (Interview, 9 May, 2014).

Mid-range TPACK Tablet Score. Sally, also in her first year of teaching reported the lowest TPACK score of this group with a 2.95. In the class I observed, students were reminded to check the class website for assignments and updated grades. Most students checked the website at that moment on their tablets and asked questions if they had any. After everyone had checked their grades and asked about an upcoming assignment, students opened their eBook to a certain page and listened as Sally read the passage to them from her desk copy, pausing to ask questions or to supplement the text with background information. Some students got old textbooks from the back of the room to read along with them in a printed version rather than an online version. At the conclusion of the reading, students were asked to respond to a series of questions available on Edmodo. Most students got a desk copy of the reading to complete the questions rather than referring to the text on their tablet. If they did not finish the questions in class, it was for homework. No one I saw completed the assignment. Most students were playing a game while the teacher read and during the work time (Observation, 9 May, 2014).

When asked how technology has impacted student learning in a follow up interview, she responded, “I can’t tell if it impacted their learning one way or the other. I have accepted that the textbook is now on a tablet rather than in their hands. I think some would rather use a textbook and that is why I have the old textbooks in the back of the room. You see how many used the textbook instead of their tablet to complete the assignment” (Interview, 9 May, 2014). I mentioned I noticed she used the teacher copy to read out of and she responded “I have never read a lot of this stuff before, so I use the information on the sides of the teacher textbook to help me ask questions or explain points that they may not know” (Interview, 9 May, 2014). When asked if she used the English technology coordinator to help her include the tablets in her classroom practices, she said, “I wish I did more. I am just trying to keep my head above water at this point. This is my first experience teaching on the block and I have a different prep for every class. It is all I can do to get the assignments to them, much less figure out how to use the tablets too” (Interview, 9 May, 2014).

Lowest TPACK Scores

Teachers included in this data set reported the lowest TPACK score for their English department. Their reported use of technology and reported student use of technology were not among the lowest scores in the department. Tablet teacher, Claire’s score was just .02 points lower than Mid-range Tablet teacher, Sally, and is a full point higher than the other lowest reported TPACK scores.

Low TPACK Score	*TPACK Score*	*Teacher Use*	*Student Use*	*Years Exp.*	*Degree*
Ella -BYOD	1.43	1.38	1.25	6	BA
Paula - Laptop	1.88	2.05	1.75	16	Masters
Claire - Tablet	2.93	2.05	3.13	6	Masters

Table 4.16 *Lowest TPACK Score Teacher Results*

Lowest TPACK BYOD Score. Ella reported the lowest TPACK score of all the participants in the study. In the class I observed, the teacher nor the students used technology for instructional purposes. One student used the teacher computer to submit the class attendance for the teacher. In this class, students continued working on body collages of a character from the novel they were reading as a class. Students cut images from magazines and glued them to the printed body image to symbolize some aspect of the character's personality or beliefs (Observation, 5 May, 2014).

When asked how students use technology in her class, she said "we go to the computer lab to type final drafts of papers" (Interview, 5 May, 2014). When asked what do you think about BYOD in your school, she said, "It doesn't work for me. I worry too much about the students who do not have a phone or a tablet to use in class and I don't want to embarrass them. A lot of students cannot afford these devices and they shouldn't be embarrassed about it at school" (Interview, 5 May, 2014).

Lowest TPACK Laptop Score. Paula reported a TPACK score of 1.88. In the class I observed, students were able to open her PowerPoint presentation on their laptops. She would pause after each slide and say, now click on the notes sections and write what she dictated to them. She walked around the room as she discussed the topic and would remind students to stay on the same slide she was on, to not get behind. She would wait for all students to finish typing the dictated notes before progressing to the next slide. At

the end of the slide presentation, students opened up their ebooks to read an excerpt of a novel. What was not completed in class, would be completed for homework (Observation, 7 May, 2014).

When asked how technology impacts student learning, she responded, "It is a distraction. They are texting throughout class and they are picking out wallpaper for their background instead of taking notes" (Interview, 7 May, 2014). When asked how it has impacted the way she teaches she stated: "there are excellent video clips available to use in class, unfortunately the filters on our laptops will not let me access them. So I have to download them at home on my computer and then bring them in on a flash drive to use during my class lectures. It is much more complicated than it needs to be" (Interview, 7 May, 2014).

Lowest TPACK Tablet Score. Claire has the highest TPACK score among the Low Device teachers 2.93 and she reports a higher student technology use frequency than the other two teachers reporting the lowest TPACK score. The class I observed was a writing workshop. Directions for the peer-editing workshop were projected on the whiteboard. Before peer-editing began, students edited a sample student paper together as a class. Students exchanged tablets for peer editing and worked in groups of three to provide feedback on each person's paper. Students talked and read passages aloud to group members throughout the class period to discuss strengths and weaknesses. One group elected to record their peer-editing sessions on their device as a voice memo so they could remember the comments. Claire moved their group into the hallway to avoid too much background noise (Observation, 9 May, 2014).

When asked how technology has impacted student learning, Claire responded, "I can provide more opportunities for them to collaborate and work together on assignments. I am not in front of the classroom as much as I used to be because students are taking more responsibility in acquiring information. I didn't realize how much I did before until I started letting students take on some of the research for background information in literature. They are doing the thinking now instead of me" (Interview, 9 May, 2014). In response to how has technology impacted your teaching, she answered, "I have had to give up control over what information they get and trust they can draw the conclusions I want them to draw. It is hard to let go of that control and to not know if they are getting it" (Interview, 9 May, 2014).

Summary

Through the analysis of teacher survey responses, interviews, and observation field notes, five themes emerged to define what technology integration means from the perspective of teachers teaching in a one-to-one device environment. Themes that emerged included student engagement, which addresses student motivation and participation as it pertains to the accessibility of digital technologies in the classroom; enhanced student learning, which addresses the potential for digital technologies to enable students to build knowledge and make real world connections to content; instructional support, in which digital technologies as a means to support instruction through drill and practice activities and tutorials; classroom efficiency, which includes submitting work, communicating, and accessing grades, notes, and assignments; and demonstration of student learning, in which students demonstrate their learning by

producing their own interpretations or understandings in varied ways and may publish work for a global audience. Through an analysis of the TPACK survey and technology use survey, a correlation between teacher TPACK scores and technology use by teachers and teacher reported student use of technology was demonstrated.

CHAPTER FIVE

DISCUSSION

Summary of the Study

More schools are adopting one-to-one device programs as a means to prepare students for the 21st century. The Partnership for 21st Century Skills (2009) argues students need to be prepared as "critical thinkers, problem solvers, communicators, collaborators, information and technology literate, flexible and adaptable, innovative and creative, globally competent, and financially literate" (p. 2) requiring teachers to adapt their curriculums and adopt digital technology practices to meet these 21st century demands. The purpose of this study was to investigate teacher beliefs and how these beliefs may impact technology use in the initial year of a one-to-one device program.

Teachers are an essential component to digital technology integration and the success of one-to-one device programs (Ertmer, 2005; November, 2010). If a teacher does not believe the device or using digital technology will improve student learning outcomes or prepare students for high stakes tests, the teacher will not adhere to an expectation to integrate technology or a device into their classroom instructional practices (Ertmer, 2005; Miller, 2007; Sortz & Hoffman, 2013). It is important to understand the teachers' perspective and experiences in the initial year of one-to-one device implementation to improve the effectiveness and success of future one-to-one device implementations. This study reviewed three separate high schools with differing one-to-one device implementation programs to ascertain if teacher beliefs influence their instructional decisions.

The following discussion describes the results from the procedures used to answer the research questions. For one-to-one programs to be successful and for digital technologies to be integrated into instructional practices effectively, research addressing teacher belief and the impact it may have on technology integration practices are essential. Assessing teacher beliefs and their connection to implementation practices may inform professional development and implementation programs for future one-to-one device initiatives.

Major Findings and Implications

Defining Technology Integration

RQ1: How do high school English teachers define technology integration?

In order to gain a more comprehensive understanding of how teachers defined technology integration, three open-ended questions asking teachers to define technology integration, describe technology integration, and the impact of technology integration on their instructional practices were included in the data collected. The overarching themes from this study indicate that teachers largely define technology integration as a way to benefit student learning and to benefit instruction. Teachers acknowledged that technology integration as means to engage students, enhance student learning, support instruction, facilitate classroom practices, and demonstrate student learning. Teachers' responses reveal a trend in which technology use motivates students to complete tasks because they are interacting with their device, they have educational platforms holding them accountable for completing tasks in class or in a timely manner, and teachers enjoy the ability to differentiate instruction. The themes presented in this study are parallel to

Hew and Brush's (2007) definition of technology integration as the use of technological devices for instructional purposes but do not parallel Ertmer's (2005) definition of technology integration as bringing qualitative changes to education.

The changes teachers expressed in their surveys, interviews, and observations suggest students use technology as a substitution for activities completed prior to one-to-one devices. For example, students' complete worksheets digitally rather than with pen and paper and they submit those assignments digitally rather than in a basket at the front of the classroom. For the majority of the participants in this study the changes associated with technology integration during the initial year of implementation are a means to automate tasks previously completed; rather than, technology integration as a means to transform teaching practices and student learning outcomes so much so that students are able to express their learning in ways that were inconceivable before one-to-one devices.

RQ 2: How teachers' perceive their own technological pedagogical content knowledge, as well as how this perception affects classroom instruction?

Professional Development and Device Implementation

Participants did not emphasize professional development as an indicator for successful technology integration practices, in part, because I was not aware of the varied professional development opportunities until the end of the research study. I went back to teachers within each cohort to confirm professional development opportunities to ascertain the preparation opportunities offered to teachers to support them in their endeavor to integrate digital technologies in a one-to-one device environment. Teachers

at Tablet High school afforded ten days of professional development to support their technology integration cited professional development as a key factor in successful integration of digital technologies. This supports the importance of professional development when inservice teachers are faced with adapting their instructional practices (Doering et al, 2014). Mouza (2008) supports the need for professional development to provide confidence among teachers working in one-to-one environments to be successful in using digital technologies as a tool to extend and enhance student learning as evidenced by the data collected in this study. Doering, et al (2014) supports the impact of professional development on teachers' technological pedagogical knowledge and technological pedagogical content knowledge so that digital learning tools "become increasingly authentic" (p.235) allowing for students to become completely engaged in the learning process. During the initial year of a one-to-one device implementation, teachers are not there; however, Doering, et al (2014) continues to support the potential for digital resources to transform student learning. That process is slow and a total transformation of a teacher's technological pedagogy may take much longer than programs are willing wait; which may lead to programs being cancelled before the teachers or students have a chance to recognize the potential of digital resources into their learning.

The participants in this survey were teachers actively engaged in the implementation of differing one-to-one device initiatives. The implementation of these devices ranged from ten days of professional development over the summer, five of which were content specific professional development days, to a few after school

professional development opportunities throughout the school year, to no professional development offered to support device implementation. Teachers at Tablet high school, with ten days of professional development, reported the highest overall TPACK scores, and the highest TK and TCK scores among the surveyed teachers. Teachers with the lowest TPACK scores in all areas were the BYOD teachers who experienced no professional development opportunities indicating professional development did impact teacher perception of personal technological pedagogical content knowledge.

Professional development may impact a teacher's perception of the usefulness of digital tools and it may impact the perceived ease of use (Stols, 2008) influencing teachers' decisions to use technology in their instructional practices. In the case of the Tablet teachers, they were provided ample opportunities to incorporate the technology into their instructional practices with workshops over the summer, a technology integration specialist on site to support just the English department, and a community of teachers that share their experiences with one another daily; whereas teachers teaching at the other two schools did not have the support from content specific professional development, a designated technology integration specialist on site for their department, or the community of learners dedicated to incorporating technology into their instructional practices.

Reported technology use is inconsistent with TPACK scores across devices. Tablet high school teachers consistently rate their frequency of use by teachers and students more highly than the other departments, but laptop high school rates themselves at the lowest frequency of use for teacher use and student use. This is an unexpected

outcome. Laptop teachers and students have guaranteed access to technology everyday, while BYOD teachers have elected to incorporate personal devices or have elected not to incorporate personal devices into their instructional practices. I would expect perceived ease of use would be better for laptop teachers than it would be for BYOD teachers combating data plans and student device availability at the particular time teachers intend to ask students to use their personal devices in class. Stols (2008) posits that this inconsistency is the result of a lack of perceived usefulness of technology integration. Despite the ease of use, teachers at laptop high school may not have been convinced through professional development or peer interactions that technology improves test scores or student learning outcomes; as a result, teachers may resist incorporating laptops into their instructional practices.

The difference between device implementation settings suggests that professional development may have impacted teacher technology integration practices. The BYOD teachers had not preparations or professional development for one-to-one device opportunities in their classroom. The data collected from BYOD teachers suggests that individual preference or dispositions also impact technology integration practices; for teachers' determined to integrate student devices into their instructional practice provided opportunities for students to use technology as a tool to extend and enhance their learning The challenge BYOD teachers faced is that they could not integrate technology completely into their teaching practices due to inconsistencies in availability, hardware, and software which impacts their reported technology use in the survey.

The reported integration of technology in this study is consistent with November's (2013) and Puentedura's (2006) concerns that digital tools are being used to enhance instruction rather than transform instruction. Teachers in this study reported being comfortable in what Apple Classrooms of Tomorrow (ACOT) define as the entry and adoption phases of technology integration in which teachers use email, presentations, word processing, Internet resources, and drill and practice more frequently than in the other phases of technology adaptation. When teachers' report technology integration in the adaption or appropriation and invention phases (for example, using a tool to access and create podcasts or to use digital media tools to create and produce during their instructional day) the reported frequency of use declines to infrequently or never incorporating technology resources to transform their teaching practices. November and Peuntedura would argue the reported technology use by teachers and students would not be defined as technology integration because the one-to-one devices are not transforming the way teachers teach or the way students are permitted to construct meaning or demonstrate their learning.

The data collected indicate teachers' in this study value the potential digital tools offer for student engagement, but may not recognize the transformative potential for digital tools in student learning. These results reflect existing literature that suggests technology integration is less significant in transforming student learning if it is integrated to automate existing classroom tasks (Hutchinson &Reinking, 2011). This study suggests that English teachers in the initial year of implementation were working to incorporate digital resources into their instructional practice and this incorporation largely

involved automating existing task and structures; rather than rethinking instruction in significant ways.

The data collected supports November (2013) assertion that technology tools used to assimilate activities already present in classrooms may fail to transform student learning to the degree administrators, students, and parents expect resulting is school systems reconsidering the impact of one-to-one devices in the classroom (Storz & Hoffman, 2013). Across schools, the use of devices in the classroom was either reconsidered to eliminated. BYOD High School reconsidered their implementation of BYOD as a one-to-one device program and elected to invest in more computer labs and tablet carts rather than continue with their BYOD program. Natasha, the teacher reporting the highest TPACK score at BYOD, said teachers quit trying to incorporate technology by the end of the year due to the challenges they presented with data plans, wireless connections, and student abuse of having access to their phones throughout the school day (Interview, 5 May, 2014). Storz and Hoffman's (2013) research indicates this is not an uncommon practice with BYOD one-to-one programs; schools investing in devices are not are likely to abandon one-to-one devices than BYOD programs.

Tablet High School teachers reported challenges associated with their tablets to the degree that over a half of tablets had to be replaced by midyear and all tablets had to be replaced by the end of the second year of implementation; however, the school intends to contract with another distributor at the end of this contract because teachers, students, and administrators believe the impact of one-to-one devices in instructional practices and the potential for transforming student learning, as teachers become more accustom to

using tablets in their instruction, far outweighs the hardware challenges presented during the initial implementation years. Laptop? What happened here? Report for consistency.

IMPLICATIONS? What does this mean for schools? What should schools do to avoid these issues, based on your data collection?

Technological Pedagogical Content Knowledge and Instructional Practices

Research Question 2: How do teachers perceive their own technological pedagogical content knowledge and how does this perception affect classroom instruction?

The majority of teachers reporting in the TPACK survey responded that they felt most confident in technological content knowledge (TCK). Technological content knowledge is being aware of digital technologies to support content instruction. Respondents were confident in their ability to use email, presentation tools, word processors, and internet research. However, when presented with technology tools that enable teachers to deviate from traditional instructional practices, their reported use declined. This decline supports the idea that there may be a threshold to teacher technological content knowledge not addressed in this research project. Tablet teachers report a higher score in the TPACK assessment tool, which may be interpreted to mean Tablet teachers access to resources in the spring semester prior to the one-to-one device implementation year and professional development opportunities throughout the summer prior to the implementation may impact their confidence on the TPACK assessment survey that was administered once the one-to-one device year was underway.

In an effort to discern if environment impacted teachers' perceptions of their technological pedagogical content knowledge I looked at different variables to determine

if there was a significant difference between teachers based on school, experience, and education. Teachers' rated themselves lowest on technological knowledge when data was compared by device implementation (school) and degree, but when the data was divided by years experience, the data indicated that teaching experience did impact their TPACK scores. Teachers with 1-10 years teaching experience rate their technological pedagogical content knowledge lower than their technological knowledge, teachers with 16-20 years teaching experience were more confident in technological pedagogical knowledge (TPK) and teachers with 20+ years of teaching experience reported the highest level of confidence in their technological pedagogical content knowledge (TPCK). This data suggests years experience may influence technology integration practices more than professional development opportunities, or how the device was introduced to the students and teachers, or how much education they have. This finding is consistent with research that suggests that as teachers become more confident with their content knowledge they are more confident in permitting students to use technology during instruction (Kadjer, 2004; Miller, 2007). For example, an English teacher with experience teaching his or her content has a deeper understanding of his or her content and he or she is aware of what students need to make connections; as a result, he or she is willing to incorporate digital tools to facilitate students' understanding. If incorporating digital tools to create and collaborate during the learning process fails to demonstrate student learning of content knowledge, teachers have their traditional teaching practices to rely on making the risk of incorporating technology into their teaching less significant than that of new teachers. New teachers, learning and teaching content for the first, second, or third time are still

determining what student need to know and how they should teach it. These new teachers are reluctant to rely on students to construct the required content knowledge using digital resources for fear of student performance on high stakes tests; if they provide the information, they know the student has been exposed to the information which impacts their decisions to incorporate digital tools into their instruction. (Miller, 2007; November 2013).

Limitations of the Study

Although this study adds to the literature surrounding technology integration and teacher perception of TPACK, specifically in the secondary English classroom, the results have limitations. The data collected is a snapshot of secondary English teachers nearing the end of their initial year of a one-to-one device program. This study provides one TPACK score midway through the implementation year to compare to the other data collected. If I could do this study over again, I would have administered the TPACK tool prior to the distribution of devices and then again at the end of the first year of implementation to determine if experience with a device would impact teacher perceptions of their technological pedagogical content knowledge.

Much of this study is based on self-reported data, which has known limitations (Linn & Miller, 2005). For example, if I administered the survey after a teacher had a particularly successful day integrating technology, her TPACK score would be higher than if I administered the survey after a difficult day of technology integration. This survey instrument cannot account for the experiences the participants had prior to completing the survey. Self-report measures the attitude of an individual on any given

day and other factors may influence their perceptions. For example, two of the teachers reporting the highest TPACK scores for the study, demonstrated technology integration practices that are consistent with what Wilkerson and Lang (2007) define as characterizing. Characterizing is when content and pedagogy are compromised for the use of the resource. An example, Alice a veteran teacher and the winner of her district teacher of the year scored herself as perfect 4.0 on the TPACK survey. When I observed her class, she demonstrated characterizing behaviors in which her pedagogy was impacted by the integration of laptops into her instructional practices. She did not interact with students during the lesson I observed because they were all working on learning modules that she was monitored through her device. Students worked at their own pace on individual handouts on their laptops, they were not collaborating or creating or using technology as a means to transform student learning (November, 2013). When asked how one-to-one devices have impacted her teaching practices she said students were submitting more work than in previous years and that she lectured less than she had in previous years. (Interview and Observation, 7 May, 2014). This response demonstrates a discrepancy between the TPACK scores and observation data collected. Alice rated herself the highest TPACK score possible for this study, yet her practices are inconsistent with the definition of technology integration as a means to transform education. In Alice's classroom on the observation day the technology was impacting teaching practice and student outcomes rather than the teaching practice and student outcomes impacting technology integration.

An additional limitation of this student is the sample size was small and varied. One department was very small and had six of the seven teachers respond to the surveys making their beliefs more pronounced than teachers in larger departments. The size of departments limited the ability to draw any statistically significant conclusions for the data collected.

Conclusions

The definition of technology integration and what constitutes technology integration in classrooms continually evolves as new technologies become available and one-to-one devices become more prominent in classrooms around the world. Effective technology integration can transform student learning opportunities; however, transformation through technology is dependent upon individual teacher beliefs. If a teacher does not believe the technology to be useful or perceive using technology to be easy, they may elect to abstain from integration practices. If a teacher is not confident in content knowledge due to lack of experience with that particular content knowledge he or she may elect to refrain from incorporating technology (Hew & Brush, 2007). The importance of teacher confidence and experience is supported in the evidence collected indicating a need to continue to work with inservice teachers. The TPACK Assessment tool is a proven reliable measure of teacher dispositions towards technology integration but as evidenced in their study it should be used with multiple data sources to provide a more complete and accurate assessment of how teachers' TPACK influence teaching practices.

The teachers in this study define technology integration as a way to benefit student learning and benefit instruction. How that tool is incorporated into instruction is less certain. Inservice teachers would benefit from research in which content specific experts in technology integration are a part of their integration process. Professional development opportunities in which teachers are supported from the planning phase all the way through to the integration of technology into the classroom would be most beneficial for inservice teachers working to integrate technology. The TPACK assessment tool would assist teachers and professional development teams in assessing teacher dispositions toward technology to inform their practice in support inservice teachers as they discover new ways to teach through the integration of technology (Colins & Halverson, 2009; Hicks, 2009; Kadjer, 2006).

APPENDICES

Appendix A

Definitions of Key Terminology

Bring-Your-Own-Device (BYOD) BYOD refers to technology models where students bring a personally owned device (smartphone, tablet, laptop, mp3 player, etc.) to school to use throughout the school day for learning purposes.

Constructed-response method. Constructed-response method participants self-report information without predetermined choices. Constructed-responses include short answer questionnaires (Wolf, 1988); interviews (Miller & Connell, 1982), and focus groups (Flores & Alonso, 1995).

Constructivist learning. Individual learners construct their own knowledge based on their own understanding. Students are active learners rather than passive receptors of information.

Digital technology or Digital tools. The use of digital resources such as Web 2.0 tools, digital media tools, applications, and software programs to analyze, evaluate, use, communicate, and create information (NCATE, 2002).

Dispositions . NCATE (2002) defines dispositions as "the values, commitments, and professional ethics that influence behaviors toward students, families, colleagues, and communities and affect student learning, motivation, and development as well as the educator's own professional growth"

Laptop. Small portable computers that can run on battery power in which the keyboard and screen areis combined into a single unit.

One-to-one computing. Inserra and Sort (2012) define one-to-one computing as every teacher and student having access to a laptop, Internet service, printers, and computer software within a school system to use anytime and anywhere.

Selected-response Method. Wilkerson and Lang (2007) propose that a selected-response method provides "self-reported information that is based on a selection of predetermined responses for each item" (26). The selected-response method limits opportunity for participant guessing (Wilkerson & Lang, 2007), the participants indicate a level of agreement to specific characteristics on a scale, which is an important method for measuring dispositions (Anderson, 1988).

Tablet – A wireless touch screen personal computer that is larger than a smart phone but smaller than a personal computer or laptop (Technopedia, 2015).

Technological Content Knowledge (TCK). Schmidt, Baran, Thompson, Mishra, Koehler, & Shin (2009) define TCK as "the knowledge of how technology can create new representations for specific content. It suggests that teachers understand that, by using specific technology they can change the learners practice and understand concepts" (p. 125).

Technological Knowledge (TK). Schmidt, Baran, Thompson, Mishra, Koehler, & Shin (2009) define TK as "knowledge about various, technologies, ranging from low-tech technologies such as pencil and paper to digital technologies such as the Internet, digital video, interactive whiteboards, and software programs" (p. 125).

Technological Pedagogical Content Knowledge (TPACK). Schmidt, Baran, Thompson, Mishra, Koehler, & Shin (2009) define TPACK as "knowledge required by teachers for

integrating technology into their teaching in any content area. Teachers have an intuitive understanding of the complex interplay between the three basic components of knowledge (CK, PK, TK) by teaching content using appropriate pedagogical methods and technologies" (p. 125).

Technological Pedagogical Knowledge (TPK). Schmidt, Baran, Thompson, Mishra, Koehler, & Shin (2009) define TPK as "knowledge of how various, technologies can be used in teaching and to understanding that using technology may change the way teachers teach" (p. 125).

Technology integration. The International Society of Technology in Education (ISTE) states, "effective teachers model and apply the NETS·S as they design, implement, and assess learning experiences to engage students and improve learning; enrich professional practice; and provide positive models for students, colleagues, and the community" (NETS –T, 2008, p.3). This definition requires teachers to adhere to the National Educational Technology Standards for Students (2008), "today's students need to be able to use technology to analyze, learn, and explore" (NETS-S, 2008, p2).

Appendix B

Open-Ended Question Survey

Pseudonym	
What does Technology integration mean?	
Describe the use of technology in your classroom	
Do you think technology impacts student learning? Please explain your answer?	
Do you think one-to-one technology impacts student learning? Explain your answer please.	
Do you think one-to-one technology initiatives affect the way you teach? Please explain.	

Appendix C

TPACK and Technology Use Survey

Pseudonym	
Years Teaching Experience	
Highest Level of Education	
Years teaching this content	
Other Certifications	
What best describes the technology available at your school	○ Bring Your Own Device ○ Laptop (every student issued a device) ○ Tablet (every students issued a device)
Do you feel the technology tools you have available allow you to complete your work both efficiently and effectively?	○ Yes ○ No
Do you feel the technology tools your students have available allow them to complete their work both efficiently and effectively?	○ Yes ○ No

Rate the relevance of the following factors in your decision to use technology in instruction. ***(Mark only one box per line)***				
	Very Relevant	Relevant	Somewhat Relevant	Not a Consideration
Implementing the Common Core State Standards				
Implementing ISTE Technology Standards				
Observing my colleagues using technology to teach a concept				
Using technology that has been proven to improve student learning				
Motivating and engaging learners				
Creating a more learner-centered classroom with students exploring their own questions and building their own knowledge				

Choose the statement that best describes the research process in your teaching. ***Please choose ONLY ONE of the following.***	
	I don't assign research projects.
	I ask my students to report information on a topic I assign.
	I ask my students to find information of a selected topic. Information is organized and presented based on an outline I define.
	I ask my students to develop a research question, locate quality information, and organize information to support their conclusions..

Choose the statement that best describes the use of electronic searching in your teaching. ***Please choose ONLY ONE of the following***	
	I don't ask my students to search for information electronically.
	I ask my students to find information on approved Internet sources.
	I provide instruction on search engines and how to evaluate sources to find information.
	I introduce advanced search techniques used in specific databases including limiting results by dates, availability, publication type, etc.

Choose the statement that best describes your level of technology skills. ***Please choose ONLY ONE of the following***	
	I do not consider myself a technology user. I get someone else to do technology based tasks for me.
	I consider myself a novice user. I accomplish assigned tasks, but I am more efficient when I don't use technology to do a job.
	I consider myself about average. I have enough skills to complete the management and communication tasks expected of me and occasionally will choose to use technology to accomplish something I choose.
	My skills are very good. I use a variety of technology tools and use them efficiently for all aspects of my job.
	I am a technology leader. I use technology efficiently, effectively, and in creative ways to accomplish my job. I often teach others to use technology resources.

What best describes your current practice of using technology in instruction. ***Please choose only one of the following*****.**	
	I seldom use technology to deliver instruction.
	I almost exclusively use whole group presentation style either using an interactive whiteboard, PowerPoint or other instructional software to explain or demonstrate a concept of instruction.
	I often use whole group presentation style, but sometimes facilitate students in their learning through the use of a variety of information resources and hands-on activities
	I almost always facilitate student learning by encouraging students to use information resources and hands-on activities.

Please mark the following statements as strongly agree, agree, disagree, or strongly disagree.				
	Strongly Disagree	**Agree**	**Disagree**	**Strongly Disagree**
I know how to solve my own technical problems.				
I can learn technology easily.				
I keep up with important new technologies to use in instruction.				
I frequently play around with new technologies to use in instruction.				
I know about a lot of different technologies to use in instruction.				
I have the technological skills I need to use instructional technology.				

Please mark the following statements as strongly agree, agree, disagree, or strongly disagree.				
	Strongly Disagree	**Agree**	**Disagree**	**Strongly Disagree**
I use technology for understanding and analysis of literature.				
I use technology for understanding and composing essays.				
I use technology for understanding and grammar practice.				

Please mark the following statements as strongly agree, agree, disagree, or strongly disagree.				
	Strongly Disagree	**Agree**	**Disagree**	**Strongly Disagree**
I choose technology to enhance teaching approaches for a lesson.				
I choose technology to enhance student learning for a lesson.				
Professional development has taught me about different technologies I use to influence my teaching approaches in my classroom.				
I adapt technologies for different learning activities.				

Please mark the following statements as strongly agree, agree, disagree, or strongly disagree.				
	Strongly Disagree	**Agree**	**Disagree**	**Strongly Disagree**
I teach lessons that appropriately combine literacy, technology, and teaching approaches.				
I select technologies to use in my classroom that enhance what I teach, how I teach and what students learn.				
I use strategies to combine content, technology, and teaching approaches that I learned about in professional development in my classroom.				
I provide leadership in helping others to coordinate the use of content, technology, and teaching approaches in my school.				
I choose technology to enhance the content for a lesson.				

How often do students use technology to: *Please choose the appropriate response for each item.*					
	Daily	Weekly	Infreq.	Never	NA
Access class information online					
Access the Internet for research					
Collaborate with other students					
Collaborate with audiences globally					
Participate in online projects					
Produce products designed by the teacher					
Produce products by their own design					
Produce work intended for audiences beyond the classroom					

How often are the following technology tools integrated into your class? *Please choose the appropriate response for each item.*					
	Daily	Weekly	Infreq.	Never	NA
Accessing and creating podcasts					
Audio/video production editing					
Blog / Wikis					
Content Management systems / Websites					
Database Software					
Drill and Practice					
Email					
Image (Photo) editing					
Integrated Learning Systems					
Interactive Whiteboard					
Internet Resources					
Library Catalogs					
Online research databases					
Presentation software					
Spreadsheets					
Tutorials					
Videoconferencing					
Video streaming					
Visual / graphic organizers					
Web portals					
Word processing					

Appendix D

Interview Questions

1. What is it about you and they way you teach that makes you effective with this age group?
2. What was your reaction when you learned your district is providing every student with a laptop / tablet / BYOD? Why?
3. What do you think about it now? Why?
4. What have been some positive experiences with the computers you have encountered so far?
5. Please expand on your definition of technology integration. In your survey you said ____
6. Do you think the computers impact student learning? Explain.
7. Do you think the computers impact student behavior? Explain.
8. Do you think the computers affect how you teach? Explain.
9. How well do you think you were prepared for the integration of one-to-one devices into your classroom?
10. Is there additional professional development that would be helpful to you in using the technology in your teaching?
11. Is there anything else you would like to say about technology in the classroom?

REFERENCES

Abbitt, J. (2011). An investigation of the relationship between self-efficacy beliefs and technology integration and technological pedagogical content knowledge (TPACK) among preservice teachers. *Journal of Digital Learning in Teacher Education.* 27(4). 134-142.

Ajzezn, I (1991). The theory of planned behavior. *Organizational and Behavior and Human Decisions Processes,* 50, 179-211.

Al-Awidi, H. M., & Alghazo, I. M. (2012). The effect of student teaching experience o preservice elementary teachers' self-efficacy beliefs for technology integration in the computer use among teacher education students. *Journal of Technology and Teacher Education,* 93(3), 321-347.

Albion, PR (2001). Some factors in the development of self-efficacy beliefs for computer use among teachers and students. *Journal of Technology and Teacher Education,* 9, 321-347.

Alvermann, D.E., Moon, J.S., & Hagood, M.C. (1999). Popular culture in the classroom: Teaching and researching critical media literacy. Newark, DE: *International Reading Association.*

Anderson, L.W. (1988). Attitudes and their measurement. In J.P. Keeves (Ed.) *Educational research, methodology, and measurement: An international handbook,* Oxford, England: Pergamon, 421-426.

Apple Computer, Inc. (1995). Changing the conversation about teaching, learning, and technology: A report on 10 years of ACOT research. Cupertino, CA: *Apple Computer, Inc.*

Applebee, A. N., (1996). *Curriculum as Conversation.* Chicago: University of Chicago Press.

Archambault, L., & Crippen, K. (2009). Examining TPACK among K-12 online distance educators in the United States. *Contemporary Issues in Technology and Teacher Education.* 9(1), 71-88.

Bagozzi, RP, Davis, FD, & Warshaw, PR (1992). Development and test of a theory of technology learning and usage. *Human Relations,* 45, 660-686.

Bailey, N. M. (2009, April). It makes it more real: Teaching new literacies in a secondary English classroom. *English Education, 41*(3), 207-234. Retrieved from National Council of Teachers of English database.

Bandura, A. (1986). The explanatory and predictive score of self-efficacy theory. *Journal of Clinical and Social Psychology,* 4, 359-373.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York: W.H. Freedman and Company.

Barrell, B. (1999, April). Technology and change in Atlantic Canada's new secondary English language arts curriculum. *English Education, 31*(3), 231-247.

Barron, AE, Kemker, K, Harmes, C, & Kalaydjian, K (2003). Large scale research study on technology in K-12 schools: Technology integration as it relations to national

teaching standards. *Journal of Research on Technology in Education,* 35(4), 489-507.

Bebell, D. (2005) Technology promoting student excellence: An investigation the first year of 1:1 computing in New Hampshire middle school. Boston, MA: *Technology Assessment Study Collaborative*. Boston College.

Bebell, D., & Kay, R. (2010). One to one computing: A summary of the quantitative results from Berkshire Wireless Learning Initiative. *The Journal of Technology, Learning, and Assessment,* 9(2). 5-59.

Bebell, D., Russell, M., & O'Dwyer, LM. (2004). Measuring teachers' technology uses: Why multiple measures are more revealing. *Journal of Research and Technology in Education,* 37(1), 45-63.

Berman, I & Biancarosa, G. (2005). *Reading to achieve: A Governors' guide to adolescent literacy.* Washington, DC: National Governor's Association.

Biancarosa, G. & Snow, CE. (2006). *Reading next: A vision for action and research in middle and high school literacy. A report to Carnegie Corporation, New York.*(2nd Edition). Washington, DC: Alliance for Excellence in Education

Bielefeldt, T. (2001). Information technology in teacher education: A closer look. *Journal of Computing in Teacher Education.*17(4), 4-15.

Bitner, N & Bitner, J (2002). Integrating technology into the classroom: Eight keys to success. *Journal of Technology in Teacher Education,* 10(1), 95-100.

Bloom, B.S., & Krathwohl, D. R. (1956). *Taxonomy of education objectives: The classification of educational goals, by a committee of college and university examiners.* New York: Longman, Green.

Bogdan, R.C. & Biklen, S.K. (2007). *Qualitative research for education: An introduction to theories and methods* (5th ed.). Needham Heights, MA: Allyn & Backon.

Bos, B. (2011). Professional development for elementary teachers using TPACK. Contemporary Issues in Technology and Teacher Education, 11(2), 167-183.

Boyd, F. B., Ariail, M., Williams, R., Jocson, K., Sachs, G. T., McNeal, K., . . . Fisher, M. (2006, July). Real teaching for real diversity: Preparing English language arts teachers for 21st-century classrooms. *English Education, 38*(4), 329-350.

Bransford, JD, Brown, AL & Cocking, PR. (2000). *How people learn: Brain, mind, experience, and school.* Washington, DC: National Academy Press.

Brauer, L. K. (2006). *Contemporary construction of English texts: A departmental case study of secondary English domains* (Doctoral dissertation, The Ohio State University, Columbus, Ohio). Retrieved from ProQuest Dissertations and Theses database.

Brinkerhoff, J. (2006) Effects of a long-duration, professional development academy on technology skills, computer self-efficacy, and technology integration beliefs and practices. *Journal of Research on Technology in Education*. 39(1), 22-43.

Bruce, B. and Hogan, M. (1998). The disappearance of technology: Toward an ecological model of Literacies in Reinking, D, McKenna, M, Labbo, L, & Keifer, R. (eds).

Handbook of Literacy and Technology: Transformations in a Post typographic World. Mahwah: NJ: Lawrence Earlbalm Associates, 269-281.

Bruce, B. & Levin, J. (2001). Roles for new technologies in language arts: Inquiry, communication, construction, and expression. In Jenson, J, Flood, J, Lapp, D & squire, J. (eds) *The Handbook of Research for Teaching Language* Arts. New York: MacMillan.

Brush, T., & Saye, J. (2009). Strategies for preparing preservice social studies teachers to integrate technology effectively: Models and practices. *Contemporary Issues in Technology and Teacher Education, 9*(1).

Butin, D. (2004). The foundations of preparing teachers: Are education schools really "intellectually barren" and ideological? *Teachers College Record Online.*

Chai, C.S. Koh. J. H-L., & Tsai, C-C. (2013). A review of technological pedagogical content knowledge. *Educational Technology & Society,* 16(2), 31-51.

Chitiyo, R., & Harmon, S. W. (2009, September 23). An analysis of the integration of instructional technology in pre-service teacher education in Zimbabwe. *Education Tech Research Dev, 57*, 807-830.

Choy, D., Wong, A. F. L., & Gao, P. (2009-10, Winter). Student teachers' intentions and actions on integrating technology into their classrooms during student teaching: A Singapore study. *Journal of Research on Technology in Education, 42*(2), 175-195.

Clark, CM., and Peterson, PL, (1986). Teachers' thought processes. In MC Wittrock (Ed). *Handbook of Research in Teaching (*3rd ed.). New York: MacMillan, 255-296.

Coley, R., Cradler, J., & Engle, P. (1997). Computers and Classrooms: the status, of technology in U.S, schools. Princeton, NJ: *Educational Testing Services.*

Considine, D.M., & Hayley, G.E. (1999). *Visual Messages: Integrating Imagery into Instruction. A Media literacy Resource for Teachers.* Second Edition. Englewood: Teacher Ideas Press.

Coonan, E., & Secker, J. (2013). *Rethinking Information Literacy: A Practical Framework for Supporting Learning.* London: Facet Publishing.

Creswell, JW. (2003). *Research design: Qualitative, Quantitative, and Mixed Methods Approach.* (2nd ed.). Thousand Oaks, CA: Sage.

Creswell, J.W. (2007). *Qualitative inquiry and research design: Choosing among five approaches.* Thousand Oaks, CA: Sage.

Cuban, L. (1998). How schools change reform: Redefining reform success and failure. *Teachers College Record,* 99(3), 453-477.

Cuban, L. (2001). *Oversold and underused: Computers in the classroom.* Cambridge, MA: Harvard University Press.

Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal, 38*(4), 813-834.

Curts, J., Tanguma, J., & Pena, C.M. (2008) Predictors of Hispanic school teachers self-efficacy in pedagogical uses of technology. *Computers in the School,* 25(1-2), 48-63.

Daniel, T.D. (2012). Educational technology and high stakes testing. *Digital Commons.*

Darling-Hammond, L. (2000). Teacher quality and student achievement: a review of state policy evidence. *Education Policy analysis Archives,* 8 (1), 1-50

Dede, C. (2000). Emerging influences of information technology on school curriculum. *Journal of Curriculum Studies*. 32, 281-303.

Doering, A., Beach, R., & O'Brien, D. (2007, October). Infusing multimodal tools and digital literacies into an English education program, *English Education, 40*(1), 41-59.

Doering, A., Koseoglu, S., Scharber, C, Hendrickson, J. & Lanegran, D. (2014). Technology integration in K-12 geography education using TPACK as a conceptual model. *Journal of Geography.* 113 (6), 223-237, DOI: 10.1080/00221341.896393.

Doering, A., Veletsianos, G., Scharber, C., & Miller, C. (2009). Using the technological, pedagogical, and content knowledge framework to design online learning environments and professional development. *Journal of Educational Computing Research,* 41(3), 319-346.

Drayton, B., Falk, J., Stroud, R., Hobbs, K., & Hammerman, J. (2010). After installation: Ubiquitous computing and high school science in three experienced, high technology schools. *Journal of Technology, Learning and Assessment,* 9(3), 4-56.

Elannani, H. (2013). Evaluation of teachers for the 21st century training project. *International Education Studies*, 6(3), 48-54.

Ertmer, (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research and Development,* 47(4), 47-61.

Flores, J.G. & Alonso, G.C. (1995). Using focus groups in educational research: Exploring teachers' perspectives on educational change. *Evaluation Review,* 19, 84-101.

Fouger, T. S., Burke, D., Williams, M. K., Waker, M.l., Hansen, R., & Slykhuis, D.A. (2013). Innovators in teacher education: Diffusing mobile technologies in teacher preparation curriculum. *Journal of Digital Learning in Teacher Education.* 30(1), 21029.

Foulger, T.S., & Slykhuis, D.A. (2013). TPACK as a tool for teacher professional learning. *Learning and Leading with Technology. 20-22.*

Frank, K., Zhao, Y., & Borman, K. (2004). Social capital and the diffusion of innovations within organizations: The case of computer technology in schools. *Sociology of Education, 77*, 141-171.

Fullan, M. (2007). *The New Meaning of Educational Change.* (4th ed.). New York: Teachers College Press.

Gardner, H. (2008). *Five Minds for the Future.* Boston, MA: Harvard Business Press.

Gaudelli, W. (2009, Winter). Interpreting democratic images: Secondary students' reading visual texts. *Teacher Education Quarterly*, 111-130

Giorgi, A. (1994). A phenomenological perspective on certain qualitative research methods. *Journal of Phenomenology Psychology,* 25, 190-220.

Giroux, H. & Simon, R. (1989). *Popular Culture, Schooling, and Everyday Life*. Granby, Massachusetts: Bergin & Garvey.

Graham, C.R. (2011). Theoretical considerations for understanding technological pedagogical content knowledge (TPACK). *Computers in Education,* 57(3). 1953-1969.

Groff, J., & Mouza, C. (2008). A framework for addressing challenges to classroom technology use. *Association for the Advancement of Computing in Education Journal, 16*(1), 21-46.

Gronseth, S., Brush, T., Ottenbriet-Leftwich, A., Strycker, J., Abaci, S. Easterling, W., … van Leusen, P. (2010). Equipping the next generation of teachers: Technology preparation and practice. *Journal of Digital Learning and Teachers Education.* 27(1), 30-36.

Halverson R., & Smith, A. (2009). How new technologies have (and have not) changed teaching and learning in schools. *Journal of Computing in Teacher Education,* 26(2), 49-55.

Harris, J., Grandgenett, N., & Hofer, M. (2010). Testing a TPACK-based technology integration assessment rubric. In D. Gibson & B. Dodge (Eds.), Proceedings of Society for Information Technology & Teacher Education International Conference 2010 (pp.3833-3840). Chesapeake, VA: AACE.

Harris, J., Mishra, P., & Koehler, M. (2009, Summer). Teachers' technological content knowledge and learning activity types: Curriculum-based technology integration reframed. *Journal of Research on Technology in Education, 41*(4), 393-416.

Hattie, J. (2009). *Visible Learning: A Synthesis of over 800 meta-analysis relating to achievement.* London and New York: Routledge.

Hennessy, Ruthven & Bridley (2005). Teacher perspectives on integrating ICT into subject teaching: Commitment, constraints, caution, and change. *Journal of Curriculum Studies,* 37(2), 155-192.

Hew, K., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development, 55*(3), 223-252.

Hinchman, K.A., Alvermann, D.E., Boyd, F.B., Brozo, W.G., & Vacca, R.T. (2004). Supporting older students in and out of school literacies. *Journal of Adolescent and Adult Literacy,* 47(4), 304-310.

Hobbs, R. (2005). Strengthening media education in the twenty-first century: Opportunities for the State of Pennsylvania. *Arts Education Policy Review* 106(4), 13-45.

Hobbs, R. (2007). *Reading the media: Media literacy in high school English.* New York: Teachers College Press.

Hogue, D., Nellen, T., Patterson, N. G., & Schulze, P. (2004, November). CyberEnglish. *English Journal, 94*(2), 70-75.

Holcomb, L.B. (2009). Results and lessons learned from 1:1 laptop initiatives: A collective review. *TechTrends,* 53(6), 49-53.

Holden, H. & Rada, R. (2011) Understanding the influence of perceived usability and technology self-efficacy on teachers' technology acceptance. *Journal of Research on Technology in Education.* 43(4), 343.

Hull. G. & Schultz, K. (2002). Connecting schools with out-of-school worlds: Insights from rescent research on literacy in non-school settings. In G. Hull & K. Schultz (Eds.) *Schools Out!: Bridging out-of –school literacies with classroom practices.* (pp. 32-57). New York: NY: Teachers College Press.

Hughes, J. (2005). The role of teacher knowledge and learning experiences in forming technology integrated pedagogy. *Journal of Technology and Teacher Education,* 13(2), 277-302.

Husserl, E. (1931). *Ideas. General introduction to pure phenomenology* (D. Carr, Trans.) Evanston, IL: Northwestern University Press.

Hutchinson, A., & Reinking, D. (2010). A national survey of barriers to integrating information and communication technologies into literacy instruction. *Reading Research Quarterly,* 46(4), 312-333.

Inserra, A. & Short, T. (2012). An analysis of high school math, social studies, English & Foreign language teachers' implementation of one to one computing and their pedagogical practices. *Journal of Educational Technology Systems,* 41(2). 145-169.

International Reading Association and National Council for Teachers of English. (2001). *National Council for the Teachers of English Standards.*

Interstate New Teacher Assessment and Support Consortium (INTASC). (1991). *Model standards for beginning teacher licensing and development.* Washington, DC: Council of Chief State School Officers.

International Society for Technology in Education (ISTE). (2000). *National Educational Technology Standards.* Eugene or Author.

Jaeger, (2012). Is a picture worth $2,500? It takes a deep understanding to synthesize and summarize facts visually. *School Library Journal, 58*(8), 17-20.

Jenkins, H., Clinton, K., Purushotma, R., Robinson, A., & Weigel, M. (2007) *Confronting the challenges of participatory culture: Media education for the 21st century.* MacArthur Foundation.

Jerald, C.D. (2009) Defining a 21st century education. *Center for Public Education.*

Jewitt, C., Bezemer, J., Jones, K., & Kress, G. (2009, December). Changing English? The impact of technology and policy on a school subject in the 21st century. *English Teaching Practice and Critique, 8*(3), 8-20.

Johnson, D., Maddoux, C. & Liu, L (2000). *Integration of technology into the classroom: Case studies.* Binghamton, NY: the Haworth Press.

Judson, E. (2006). How teachers integrate technology and their beliefs about learning: Is there a connection? *Journal of Technology and Teacher Education,* 14(3), 581-597.

Kadjer, S.B. (2007). Unleashing potential with emerging technologies. In K. Beers, R.E. Probst, and L. Reid (eds.), *Adolescent Literacy: Turning Promise into Practice,* Portsmouth, NH: Heinemann, 213-229.

Kadjer, S. B. (2007, Fall). "Not quite teaching for real:" Preservice secondary English teachers' use of technology in the field following the completion of an instructional technology methods course. *Journal of Computing in Teacher Education, 22*(1), 15-21.

Kajder, S. B. (2004, January). Enter here: Personal narrative and digital storytelling. *English Journal, 93*(3), 64-68.

Katz, L.G. & Raths, J.D. (1985). Dispositions as goals for teacher education. *Teaching and Teacher Education,* 1(4), 301-307.

Kereluik, K., Mishra, P., Fahnoe, C., & Terry, L. (2013). What knowledge is most worth: Teacher knowledge for the 21st century learning. *Journal of Digital Learning in Teacher Education.* 29(4). 127-139.

Kimmons, R. (2014) Social networking sites, literacy, and the authentic identity problem. *TechTrends, 58(2).* 93-97.

Kinchin, I.M. (2012). Avoiding technology-enhanced non learning. *British Journal of Educational Technology,* 43(2), 43-48.

Kleiner, B., Thomas, N., & Lewis, L. (2007). *Educational technology in teacher education programs for initial licensure*. Washington, DC: National Center for Education Statistics, Institute for Educational Sciences, U.S. Department of Education.

Kliebard, H.M. (2004). *The Struggle for the American Curriculum: 1893-1958.* New York: Routledge.

Knezek, D. (2008). National educational teaching standards - teachers. In *National educational technology standards*. Retrieved from International Society for Technology in Education website: http://www.iste.org/Libraries/PDFs/NETS-T_Standards.sflb.ashx

Knobel, M., & Lankshear, C. (2008) *Digital Literacies.* Peter Lang Publishing.

Kocakaya, A.P.D.S., & Gohen, S. (2010). The effects of computer-assisted instruction design according to 7e model of constructivist teaching on physics student teachers' achievement, concept learning, self-efficacy perception and attitudes. *The Turkish Online Journal of Distance Education.* 11(3), 206-224.

Koehler, M.J., Mishra, P. (2005). Teachers learning technology by design. *Journal of Computing in Teacher Education,* 21(3) 94-102.

Koehler, M.J., Mishra, P., Yahya, K. (2007). Tracing the development of teacher knowledge in a design seminar: Integrating content, pedagogy, & technology. *Computers and Education,* 49(3), 740-762.

Kopcha, T.J. & Alger, G. (2011). The impact of technology –enhanced student teacher supervision on student teacher knowledge, performance, and self-efficacy during field experiences. *Journal of Educational Computing Research.* 45(1), 49-73.

Krathwohl, D. R., Bloom, B.S., & Maisia, B.B. (1964). *Taxonomy of educational objectives. Handbook II:Affective domain.* New York: Longman.

Kriek, J. & Stols, G. (2010). Teachers beliefs and their intention to use interactive simulations in their classrooms. *South African Journal of Education,* 30(3).

Kress, G. (2003) *Literacy in the new media age.* New York: Routledge.

Kruger, E., & Christel, M.T. (2001). *Seeing is believing: How to teach media literacy in the English classroom.* Portsmouth, NH: Boynton / Cook Publishers- Heinemann.

Labbo, L. D., & Reinking, D. (1999, October/November). Negotiating the multiple realities of technology in literacy research and instruction. *Reading Research Quarterly, 34*(4), 478-492.

Lands, D. & Legters, N. (2002). The extent and consequences of risk in the U.S. education. In S. Stringfield and D. Lands (eds.). *Education at Risk Students,* Chicago: University of Chicago Press.

Langer, J. A. (2001, Winter). Beating the odds: Teaching middle and high school students to read and write well. *American Educational Research Association, 38*(4), 837-880.

Laverty, S.M. (2003). Hermeneutic phenomenology and phenomenology: A comparison of historical and methodological considerations. *International Journal of Qualitative Methods,* 2(3).

Lawless, K. A., & Pellegrino, J. (2007, December). Professional development in integrating technology into teaching and learning: Knowns, unknowns, and was to pursue better questions and answers. *Review of Educational Research, 77*(4), 575-614. Retrieved from http://www.jstor.org/stable/4624911.

Levin & Wadmany, (2006) Teachers' beliefs and practices in technology-based

classrooms: a developmental view. *Journal of Research on Technology in Education,* 39. 157-181.

Leu, D.J., Kinzer, C.K., Coiro, J.L., & Cammack, D.W. (2006). Toward a theory of new literacies emerging from the internet and other information and communication technologies. IN R.B. Ruddell & Unrau (Eds.). *Theoretical Models of Process of Reading* (fifth ed.). Newark, DE: International Reading Association. 1570-1613.

Lowther, D. L., Inan, F. A., Ross, S. M., & Strahl, J. D. (2012). Do one-to-one initiatives bridge the way to 21stcentury knowledge and skills? *Journal of Educational Computing Research*, 46(1), 1-30.

Lux, N., Bangert, AW. & Whittier, D. (2011). The development of an instrument to assess preservice teachers' technological pedagogical content knowledge. *Journal of Educational Computing and Research,* 45(4). 415-431.

MacDonald, R. J. (2008). Professional development for information communication technology integration: Identifying and supporting a community of practice through design-based research. *Journal of Research on Technology in Education*, 40(4), 429-445.

Matherson, L. H. (2012). A Case Study of How and If a Professional Development Program Builds Teachers' TPACK Model of Instruction. *Proquest.*

Martin, S. R. (2003, July/August). Close the book. It's time to read. *Clearing House, 76*(6), 289-291. Retrieved from Academic Search Premier database. (11853021).

Mazzella, N. (2011). What are we learning about technology integration and professional development? *Educator's Voice,* 4, 42-49.

McCarthy. K. & Ondaatje, E. (2002). *A Portrait of the Visual Arts: Meeting the Challenges of a New Era.* Arlington, VA: Rand Publishing.

McLuhan, M. (1967). *The Medium is the Massage*: *An Inventory of Effects.* New York: Random House.

Means, B. (2010). Technology and education change: Focus, on student learning. *Journal of Research on Technology in Education*, 42(3), 285-307.

Milbrath, Y.c.L. & Kinzie, M.B. (2000). Computer technology training for prospective teachers: Computer attitudes and perceived self efficacy. *Journal of Technology and Teacher Education.* 8(4), 373-396.

Miller, S. M. (2007, October). English teacher learning for new times: Digital video composing as multimodal literacy practice. *English Education, 40*(1), 61-83.

Miller, P.V., & Cannell, C.F. (1982). A study for experimental techniques for telephone interviewing. *Public Opinion Quarterly, 46,* 250-269.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teacher College Record, 108*(6), 1017-1054.

Molenda, M., & Bichelmeyer, B., (2005). Issues and trends in instructional technology: Slow growth as economy recovers. In O.M. McClendon, & V.J. Branch (Eds.). *Educational Media and Technology Yearbook 2005,* 30. Englewood, CO: Libraries Unlimited. 3-28.

Morris, D. (2012). E-confidence or incompetence: Are teachers ready to teach in the 21st century? *World Journal on Educational Technology*, 2(2), 142-155.

Morphew, C. (2009). Conceptualizing change in the institutional diversity of U.S, colleges and universities. *Journal of Higher Education,* 80(3), 243-269.

Moustakas, C. (1994). *Phenomenological Research Methods.* Thousand Oaks, CA: Sage.

Mouza, C. (2009). Does research-based professional development make a difference: A longitudinal investigation of teacher learning in technology integration. *Teachers College Record*, 111(5), 1195-1241.

Mouza, C. (2011). Promoting urban teachers' understanding of technology, content, and pedagogy in the context of case development. *Journal of Research on Technology in Education.* 44(1), 1-29.

National Governors Association Center for Best Practices & Council of Chief State School Officers. (2010). *Common Core State Standards*, Washington, DC. Authors.

National Center for Education and Statistics (2010). Public school teachers' use of computers and the Internet. *U.S, Department of Education*, Washington, DC.

No Child Left Behind Act (2001). *U.S, Department of Education*, Washington, DC.

National Council for Accreditation of Teacher Education. (2002). *Professional standards for the accreditation of schools, colleges, and departments of education.* Washington, DC. Author.

National Council for Teachers of English (1996). NCTE /IRA Standards for English language arts. *International Reading Association.*

Nesbitt, B. (2007, November 28). *A vision of K-12 students today* [video]. Retrieved January 29, 2010, from YouTube website: http://www.youtube.com/watch?v=_A-ZVCjfWf8

Niess. M. L. (2010). *Using classroom artifacts to judge teacher knowledge of reform based instructional practices that integrate technology in mathematics and science classrooms.* Paper presented at the annual meeting of the American Educational Research Association, Denver, CO.

November, A. (2010). *Empowering students with technology* (2nd ed.). California: Corwin.

Nyaumwe, L., (2006). Investigating Zimbabwean mathematics teachers' dispositions on the "O" level calculator syllabus, 4028. *South African Journal of Education,* 26, 39-47.

O'Brien, D., Stewart, R., & Beach, R. (2009). Proficient reading in schools. In L. Christenbury, R. Bomar, & P. Smagorinsky (Eds.), *Handbook of Adolescent Literacy and Research* (pp. 80-97). New York: Guilford Press.

O'Brien, D.G., Stewart, R., & Moje, E.B. (1995). Why content literacy is difficult to infuse into the secondary curriculum: Strategies, goals, and classroom realities. *Reading Research Quarterly,* 30, 442-463.

Ottenbreit – Leftwich, A. Glazewski, K., Newby, T., & Ertmer, P. (2010). Teacher value beliefs associated with using technology addressing professional and student needs. *Computer and Education,* 55, 1321-1335.

Overbaugh, R., & Lu, R. (2009). The impact of a federally funded grant on a professional development program: Teachers' stages of concern toward technology integration. *Journal of Computing in Teacher Education,* 25(2), 45-55.

Pajares, M.F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research,* 62(3), 307-332.

Paraskeva, F., Bouta, H., & Papaganni, A. (2008) Individual characteristics and computer self-efficacy in secondary education teachers to integrate technology in education practices. *Computer and Education,* 50(3), 1084-1091.

Patton, M.Q. (2002). *Qualitative Research & Evaluation Methods.* Thousand Oakes: Sage Publishing.

Pea, R.D. (1985). Beyond amplification: Using the computer to reorganize mental functioning. *Educational Psychologist,* 20(4), 167-182.

Penuel, W.R. (2006). Implementation and effects of one-to-one computing initiatives: A research synthesis. *Journal of Research on Technology in Education,* 38(3).

Pierson (2001). Technology integration practice as a function of pedagogical expertise. *Journal of Research on Technology in Education,* 33(4), 413-430.

Polly, D., Mims, C., Shepherd, C.E., & Inan, F. (2010). Evidence of impact: Transforming teacher education with preparing tomorrow's teachers to teach with technology (PT3) grants. *Teaching and Teacher Education,* 26, 863-870.

Pope, M., Hare, R.D., & Howard, E. (2002). Technology integration: Closing the gap between what teacher candidates are taught to do and what they can do. *Journal of Technology and Teacher Education,* 10(2), 191-203.

Prensky, M. (2001, December). Digital natives, digital immigrants, part II: Do they really think differently? *On the Horizon,* 9(6).

Prestridge, S. (2012). The beliefs behind the teacher that influences their ICT practices. *Computers and Education,* 58(1), 449-458.

Price, G.P., Wright, V. H., & Rice, M. (2014). Determining the impact of an integrated triadic model on TPACK development in preservice teachers. *Journal of Digital Learning in Teacher Education.* 30(4), 139-149.

Purchell, K., Buchanan, J., & Friedrich, L. (2013). The impact of digital tools on student writing and how writing is taught in the schools. *Pew Research Center Internet and American Life Project.* Washington, DC.

Purchell, K., Heaps, A., Buchana, J., & Friedrich, L. (2013). Part III: Bringing technology into the classroom. *Pew Research Center Internet and American Life Project.* Washington, DC.

Reiser, R.A. (1987). Instructional technology: A history. In R.M. Gange (Ed.). *Instructional Technology: Foundations,* Hillsdale, NJ: Lawrence Erlbaum Associates, 11-48.

Reiser, R.A. (2002). A history of instructional design and technology. In R.A. Reiser & J.V. Dempsey (Eds.), *Trends and issues in instructional design and technology.* Upper Saddle River, NJ: Merrill Prentice Hall, 26-53.

Reigeluth, C. & Joseph, R. (2002). Beyond technology integration: The case for technology transformation". *Educational Technology,* 42(4). 9-16.

Roberts, K., Shedd, M., & Norman, R. (2012). The common core standards of technology: a shift in focus for states. *The New England Reading Association Journal,* 48(1). 56-65.

Robertson, M. & Al-Zahrani, A. (2012). Self-efficacy and ICT integration into initial teacher education in Saudi Arabia: Matching policy with practice. *Australian Journal of Education Technology.* 28(7), 1136-1151.

Rockman, S. (1998). *Powerful Tools for Schooling: Second Year Study of the Laptop Programs*. San Fransico, CA: Author.

Roehrig, G.H., & Luft, J.A. (2004). Inquiry teaching in high school chemistry classrooms: The role of knowledge and beliefs. *Journal of Chemical Education,* 81(10), 1510-1516.

Rogers, E. (2003).*Diffusions of Innovations.* New York: Free Press.

Rowe, C. (2014). *Teacher behavior in the digital age: A case study of secondary teachers' pedagogical transformation to a one-to-one environment.* (Doctoral Disertation). Retrieved from ProQuest Database. 3582610.

Russell, M., Bebell, I.D., & O'Dwyer, L.M.(2003). An overview of the USEIT study and the participating districts. Boston MA: Technology Assessment Study Collaborative, Boston College.

Sandy, L. D. (2010). Social capital, empowerment, and educational change: A scenario of permeation of one-to-one technology in schools. *Journal of Computer Assisted Learning,* 26(4), 284-295.

Schmidt, D.A, Baran, E. , Thompson, A.D., Mishra, P., Koehler, M.J. and Shin. , T.S. (2009). Technological Pedagogical Content Knowledge (TPACK): The development and validation of an assessment instrument for preservice teachers. *Journal for Research on Technology in Education,* 42(2). 123-149.

Schneider, W., & Lockl, K. (2004). Procedural metacognition in children: Evidence for developmental trends. In J. Dunlosky & R. A. Bjork (Eds.), *A Handbook of Metamemory and Memory.* Mahwah, NJ: Erlbaum.

Seels, B. & Glasgow, Z. (1990). *Exercises in Instructional Technology*. Columbus, OH: Merrill Publishing Co. 28.

Selwyn, N. (2010). Looking beyond learning: Notes towards the critical study of educational technology, *Journal of Computer Assisted Learning,* 26(1), 65-73.

Shapley, K.S., Sheehan, D., Sturges, K. Caranikas-Walker, F., Huntsberger, B., & Maloney, C. (2010). Evaluating the fidelity of technology immersion and its relationship with student achievement. *Journal of Technology, Learning, and Assessment,* 9(4). .

Shulman, L.S. (1986). Those who understand: Knowledge growth in teaching. *Educational Research,* 15(2), 4-14.

Spires, H.A., Oliver, K., & Corn, J. (2011). The new learning ecology of one-to-one computing environments: Preparing teachers for shifting dynamics and relationships. *Journal of Digital Learning in Teacher Education,* 28(2). 63-72.

Storz, M., & Hoffman, A. (2013). Examining response to a one-to-one computer initiative: Student and teacher voices. *Research in Middle Level Education* Online, 36(6), 1–18.

Strohter, D.L., (2013) Understanding the lived experiences of secondary teachers instructing in one-to-one computing classrooms. Dissertation.

Su, B. (2009). Effective technology integration: Old topic, new thoughts. *International Journal of Education and Development Using Information and Communication Technology.* 5(2). 161-171.

Teo, T. (2011). Factors influencing teachers' intention to use technology: Model development and test. *Computers and Education,* 57, 2432-2440.

Thoman, E., & Jolls, T. (2005). Media literacy education: Lessons from the center of media literacy. In G. Schwartz & P.U. Brown (Eds.), *Media Literacy: Transforming Curriculum and Teaching,* 104, 180-250.

Tondeur, J., van Braak, J., Sang, G., Voogt, J., Fisser, P., & Ottenbreit-Leftwicg, A. (2012). Preparing preservice teachers to integrate technology in education: A synthesis of qualitative evidence. *Computers and Education,* 59, 134-144.

Towndrow, P.A. & Vaishi, V. (2009). Wireless laptops in English classrooms: A SWOT analysis from Singapore. *Educational Media International,* 46(3), 207-221.

U.S, Department of Education Office of Educational Technology. (2010). *Transforming American Education: Learning Powered by Technology.*

Voogt, J., Fisser, P., Parela Roblin, N., Tondeur, J., & van Brakk, J. (2013) Technological pedagogical content knowledge: A review of literature. *Journal of Computer Assisted Learning.* 29, 109-121.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Walsh, J.J. (1988). Projective testing techniques. In J.P. Keeves (Ed.), *Educational research, methodology, and measurement: An international handbook* (pp.432-436). Oxford, England: Pergamum.

Warscheaur, M. & Ames, M. (2010). Can 1 laptop save the worlds poor? *Journal of International Affairs,* 64(1), 33-50.

Werner, W. (2002). Reading visual texts. *Theory and Research in Social Education,* 30(3), 401-428.

Weston, M.E., Bain, A. (2010). The end of techno-critique: The naked truth about one-to-one laptop initiatives and educational change. *The Journal of Technology, Learning, and Assessment,* 9(6).

Wetzel, K., Buss, R., Foulger, R., & Lindsey, L. (2014)infusing educational technology in teaching methods courses: Successes and dilemmas. *Journal of Digital Learning in Teachers Education.* 30(3). 89-103.

Wilkerson, J. R. & Lang, W.S. (2007). *Assessing teacher dispositions: Five standards-based steps to valid measurement using the DAATS model.* Thousand Oaks, California: Corwin Press.

Williams, M.K., Fougler, T.S., & Wetzel,K. (2009). Preparing preservice teachers for 21st century classrooms: Transforming attitudes and behaviors about innovative practices with technology. *Journal of Technology and Teacher Education,* 17(3), 393-418.

Windschitl, M., & Sahl, K. (2002, Spring). Tracing teachers' use of technology in a laptop computer school: the interplay of teacher beliefs, social dynamics, and institutional culture. *American Educational Research Journal, 39*(1), 165-205.

Wolf, R.M. (1988) Questionnaires. . In J.P. Keeves (Ed.), *Educational research, methodology, and measurement: An international handbook* (pp.4996-500). Oxford, England: Pergamum.

Woolf, B.P. (2010). Roadmap for education technology. *National Science Foundation.*

Zhao, Y. & Cziko, G. A. (2001). Teacher adoption of technology: A perceptual control theory perspective. *Journal of Technology and Teacher Education,* 9(1), 5-30.

Zhao, Y., & Frank, K. (2003, Winter). Factors affecting technology uses in schools: An ecological perspective. *American Educational Research Journal, 40*(4), 807-840.