PACK, JULIE A., Ed. D. The Impact of a Middle School 1:1 Laptop Initiative on the Quality of Instruction, Teacher Engagement, and Digital Equity. (2013) Directed by Dr. Carl Lashley, 165 pp.

In 2011, a small school district invested in a middle school 1:1 laptop initiative as part of its mission to educate all students to be globally competitive graduates. This study investigated the program's potential to raise the quality of instruction, to increase levels of teacher engagement, and to provide equity of access to enriched learning experiences for students within the district's two middle schools. Through utilizing a mixed method design, data were collected from an online teacher survey as well as teacher and support personnel interviews. The online survey asked a random sample of middle school teachers to respond. Teachers who participated in the survey volunteered to be interviewed because they perceived themselves to be proficient with classroom technology. Support personnel interviewed included administrators, technology facilitators, and media specialists at both schools.

The goal of the study was to explore if the technology impacted the decisions teachers made concerning classroom instruction, their planning and professional learning processes, and the types of learning experiences to which teachers exposed students. Analysis of the findings is organized through the study's conceptual framework, which utilizes the TPACK model, and the study's central themes of (a) quality of instruction, (b) teacher engagement, and (c) equity.

The results of this study provide insight for middle schools implementing a 1:1 laptop initiative. A strong culture of support and professional development, helping teachers to engage with technology personally and professionally, seeing the broader issues of digital equity, and understanding how quality instruction is enhanced but not dependent on technology integration can impact teacher perceptions and practice. The study concludes with recommendations, including the use of standard protocols for selecting digital content and ongoing, relevant professional development with a specific recommendation for professional development on handling negative student laptop behaviors, and a recommendation for administrative leadership to play a continual, active, and visible role in the technology implementation of the school. Finally, an updated conceptual framework that could potentially help teachers plan instruction with technology is introduced.

THE IMPACT OF A MIDDLE SCHOOL 1:1 LAPTOP INITIATIVE

ON THE QUALITY OF INSTRUCTION, TEACHER

ENGAGEMENT, AND DIGITAL EQUITY

by

Julie A. Pack

A Dissertation Submitted to
the Faculty of The Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

Greensboro
2013

Approved by

_____
Committee Chair

APPROVAL PAGE

This dissertation written by Julie A. Pack has been approved by the following committee of the Faculty of The Graduate School at the University of North Carolina at Greensboro.

Committee Chair _____

Committee Members _____

_____

_____

_____
Date of Acceptance by Committee

_____
Date of Final Oral Examination

ACKNOWLEDGMENTS

I would like to thank Dr. Carl Lashley for his support, encouragement, and mentorship throughout the years.

I would also like to thank Dr. Ann Davis for her support and encouragement throughout the writing process. I am also grateful to all my committee members who have inspired me to think deeper and write better.

I would not have made it to where I am today or through this process without the encouragement and continued support of my family. I am eternally grateful for my parents, who have encouraged me to dream big, inspired me with their own passions, and loved me relentlessly; and I am indebted to my sister, who has been both my coach and my biggest cheerleader.   Finally, I wish to thank my loving husband, who believed in me when I sometimes found it hard to believe in myself, and wonderful sons, whose love and dedication inspired me to achieve this dream. I dedicate this dissertation in honor of my family.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

An undeniable urgency exists for students to be globally competitive and prepared for the challenges they will face in a highly dynamic and digital world (Mouza, 2008; OECD, 2010). It is imperative that the schools develop educational programs to ensure students graduate equipped with the skills and knowledge to succeed (*Transforming American Education: Learning Powered by Technology*, 2010). Comprehensive technology integration is pivotal to helping young people remain competitive, yet according to the U.S. Department of Commerce, education as an entity is the lowest among 55 of the nation's industry sectors in regards to being technology-intensive (Partnership for 21st Century Skills, n.d.). To achieve the knowledge and skills they need in a technology intensive environment, students must be in classrooms where they use their technology and knowledge to analyze, communicate, collaborate, reflect, innovate, solve problems, think critically, and create authentic work products (National Science Foundation, 2008; Mouza, 2008).

The U. S. Department of Education has adopted a National Educational Technology Plan (NETP). Through clearly defined outcomes, intentional collaboration to redesign processes and structures, frequent monitoring of

performance, and accountability measures, the NETP seeks to revolutionize the American educational system.

> Just as technology is at the core of virtually every aspect of our daily lives and work, we must leverage it to provide engaging and powerful learning experiences, content, and resources and assessments that measure student achievement in more complete, authentic, and meaningful ways. Technology-based learning and assessment systems will be pivotal in improving student learning and generating data that can be used to continuously improve the education system at all levels. Technology will help us execute collaborative teaching strategies combined with professional learning that better prepare and enhance educators' competencies and expertise over the course of their careers. (*U.S. Department of Education*, 2010, p. v)

Many educators feel that ubiquitous computing is the solution to meeting the students' urgent needs to gain 21st century skills and the way to leverage technology in the way the U.S. D.O.E. has envisioned. The late Mark Weiser is credited for coining the term *ubiquitous computing* in 1993, when he wrote, "ubiquitous computing enhances computer use by making many computers available throughout the physical environment, while making them effectively invisible to the user" (Weiser, 1993, p. 75). Although Weiser's dream has not been fully realized, computers (or some type of multimedia device) are in fact, an ubiquitous part of everyday life (Livingston, 2009). According to a Kaiser Family Foundation Study, young people ages eight to eighteen spend seven hours and thirty-eight minutes a day (almost an average adult work day) on media use. In addition, during that time, they pack in ten hours and forty-five minutes of media

content, utilizing more than one media at a time (Kaiser Family Foundation, 2009). Therefore, the challenge for schools is designing instructional programs that leverage the technology and content to create relevant and engaging learning experiences for all students while allowing them to utilize the skills they use in their daily lives and will use in their futures (*U.S. Department of Education*, 2010).

A study conducted by the National Center for Educational Statistics (NCES) in 2005 indicated that nearly every public school in the United States had Internet access, and the ratio of students to computers was 3.8 to 1, which was down from 12.1 to 1 in 1998 (Wells & Lewis, 2006). With the emphasis on technology infused learning both on the national and state level, one would hope that the data trend would continue to reduce the ratio.   However, despite the positive nature of the overall ratio, the NCES reported that schools with higher percentages of minority enrollments and highest percentage of students eligible for free or reduced-priced lunch had more students per computer (Wells & Lewis, 2006).

In addition to potentially having difficulty accessing technology at school, students who live with grandparent(s) as guardian, parents without a high school education, and/or low-household incomes are least likely to have Internet access at home (Zickuhr & Smith, 2012). These data are correlated with another study by the Pew Internet & American Life Report that showed that 14% of adults fell into a category of "Off the Network" where they neither possessed cell phones

nor had online access, and members of this group tended to be older and low-income, a large percentage of which were African-American (Horrigan, 2009, p.95).

Rationale for the Study

In an effort to address the call for 21st century education, a small, urban school district located in the southeast region of the United States made digital access a priority within its schools. The district serves a high poverty area, steadily increasing from a 54.74% free and reduced lunch rate in 2008-2009 to a 71.37% rate in 2012-2013. With help from two state funded grants and federal monies, the district purchased and outfitted its eight schools with interactive whiteboards, document cameras, laptop carts, and laptops for teachers completely by 2010. For the school year 2011-2012, the system's high school and middle schools were equipped with enough student laptops for every student and teacher. Only the high school students check their laptops out on a full-time basis. A lead technology teacher for the district was responsible for making sure teachers receive the necessary professional development for equipment use, and each school has a technology facilitator to meet the individual needs of the students and teachers within the school.

In addition, a technology committee was formed to provide feedback and evaluation for technology decisions for the district. The technology committee was made up of the district Technology Director, Lead Technology teacher, administrators, district personnel, and the Superintendent. It is important to note

that the administrative teams that participated in the initial decision making concerning the technology implementation for each middle school are no longer the same administrative teams in place at each school. Both principals were new to their schools after the implementation of the 1:1 model, and West's assistant principal was new in the second year of implementation.

I chose to conduct a study in the above mentioned district in both middle schools due to the different models the schools adopted within the one district. At one of the middle schools (East), students receive their laptop each morning in their first core/homeroom and return their laptop back to their homeroom at the end of the day for charging and safe storage. The students are issued special bags to carry their laptops in during the day for damage control and ease of use. The other middle school (West) utilizes a model where core teachers have the laptops in their rooms in carts. Students pick up a different laptop in each core class. This implementation model does not allow for students to use the laptops in elective classes except for when teachers have access to a shared mobile cart.

Teachers at both middle schools received professional development in utilizing the interactive boards as well as integrating technology into their lessons. Much of the professional development is delivered by the "experts" within the building who are utilizing the technology successfully already.

This study's findings are important for the overall understanding of the impact of 1:1 laptop initiatives at the middle school level on the quality of

instruction, teacher engagement, and equity of access to learning experiences. In addition, this study was beneficial to the school district and schools who participated in the study as they continued to refine the 1:1 model. It is my hope that the research findings will also benefit the existing literature on middle school ubiquitous computing.

Problem Statement

The objective of this study was to investigate the instructional implementation of a district-wide middle school 1:1 laptop program, and its potential to raise the quality of instruction, to increase levels of teacher engagement, and to provide equity of access to enriched learning experiences. Through the investigation of these issues, I intended to determine the overall impact of the program on the schools as well as examine more closely teachers' perceptions of the role technology has played in the three areas being studied. I chose not to look at student performance data for several reasons:

1. The schools I have selected for study are in the early stages of implementation.

2. I hope to conclude data collection prior to the end of the school year, which is typically when summative testing data is collected.

3. New standards have been adopted by the district and state where the district is located causing new assessments to be administered and normed. Due to the length of time needed by

6

the state to re-norm and score the tests, results from these

assessments will not be available until after the research

window for this project has closed.

4. To get a true and more accurate measure of the impact of a

laptop program on student performance, a study should follow

students longitudinally for several years, which is a limitation of

this study and most conventional methods of student

performance data.

Descriptions of Key Terms

The intention of this study was to understand how the middle school is

affected through the implementation of a 1:1 laptop program. Throughout this

study, I refer to the terms *1:1, one-to-one, and ubiquitous computing*

interchangeably as defined in Manniger & Holden (2009) to mean a program

instituted in the school where

> students (and teachers) had (a) access to their own portable laptop
> computer loaded with contemporary productivity software (word
> processing & spreadsheet); (b) access to a wireless Internet
> network at school; and (c) use of the laptops to complete academic
> tasks, replacing most textbooks and decreasing paper usage. (p. 9)

In looking at the quality of instruction in the classroom, the term *21st*

century skills is used to encompass the creativity and innovation skills, critical

thinking and problem solving skills, and communication and collaborative skills

that students must utilize in their core subjects while understanding 21st century

themes (global awareness, civic literacy, health literacy, and financial, economic, business, and entrepreneurial literacy) (Partnership for 21st Century Skills, n.d.).

Another concept integral to this study is *teacher engagement*. For the purposes of this research, teacher engagement refers to the teacher's conscious awareness in the learning process, both planning and implementation stages. It is important to distinguish between teacher engagement in the learning process and teacher engagement in the subject matter. Effective teachers intentionally work to become completely engaged in the learning process and are confident in their abilities to improve and adapt over time (Kennedy, 1998).

Important to this study are also the issues of *equity of access* and *digital equity*. In many places, digital access has been taken at its literal and physical value. Providing equipment and network access is only the first step in providing equity of access for students. We must dig deeper and address issues of pedagogy in the educational design process if we want to truly provide equity and close the digital divide for students regardless of their social-cultural background. Both Gorski (2009) and Hardaker, Dockery, and Sabki (2010) reference Solomon, Allen, and Resta (2003) in stating that digital equity is more than just ensuring every student has a computer, it is about ensuring that every learner is immersed in the technologies that encourage critical analysis, construction of ideas and concepts, and inquiry. Too often teachers of predominantly students of color tend to use digital technologies for low level activities like word

processing while their counterparts in classrooms with predominantly white

students tend to use digital technologies for higher level activities (Gorski, 2009).

The literature on equity speaks to *culturally responsive* and/or *culturally relevant* content and instruction. For the purposes of this research and reader

understanding, Gay (2010), defines culturally responsive teaching as the

> cultural knowledge, prior experiences, frames of reference, and
> performance styles of ethnically diverse students to make learning
> encounters more relevant to and effective for them. It teaches *to
> and through* the strengths of these students…They include seeing
> cultural differences as assets; creating caring learning communities
> where culturally different individuals and heritages are valued;
> using cultural knowledge of ethnically diverse cultures, families, and
> communities to guide curriculum development, classroom climates,
> instructional strategies, and relationships with students; challenging
> racial and cultural stereotypes, prejudices, racism, and other forms
> of intolerance, injustice, and oppression; being change agents for
> social justice and academic equity; mediating power imbalances in
> classrooms based on race, culture, ethnicity, and class; and
> accepting cultural responsiveness as endemic to education
> effectiveness in all areas of learning for students from all ethnic
> groups (p.31).

Teachers must have a "sociocultural consciousness" that extends their

worldview beyond their own personal experiences to help them make sense of

and predict students' choices (Villegas & Lucas, 2007). Beyond physical access,

students need access to "meaningful, high-quality, culturally responsive content

that provides participatory functionality" to truly experience equity of access with

digital technologies (Hardaker et al., 2010, p. 785).

So if I, as a teacher intend to use computers and the Internet in my teaching, I must understand these dynamics of culture and hostility—of privilege and power—in techno-space to the same extent that I understand them in my classroom (Gorski, 2009, p. 358).

Summary

As stated previously, the purpose of this study was to understand the implementation of a 1:1 laptop initiative in a small, urban school district. I looked specifically at the initiative's effect on the quality of instruction in relation to the use of the computers in the classroom as a tool for learning. I also sought to understand if the initiative has had any effect on the levels of teacher engagement in the learning process and lesson planning. Lastly, I was very interested to study the school's use of the laptops in addressing digital equity in providing access in both equipment and learning experiences.

In the next section, I will give a review of the literature as it pertains to one-to-computing and its effect on the quality of instruction, teacher engagement, and/or equity of access.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

In 1930, educational reformer John Dewey wrote "the most immediate human problem of our age is to effect a transformation of the immense resources the new technology has put in our hands into positive instruments of human being" (as cited in Levin, 1956, p. 125). Understanding the urgency that technology was bringing upon us as nation, society, and human race, Dewey recognized early that technology would revolutionize the world we live in and the way we would approach schooling.

At the turn of the 20th Century, in his commentary on schooling and society, Dewey reacted to the transformations around him, "It is radical conditions which have changed," he wrote, "and only a radical change in education suffices…Knowledge is no longer an immobile solid; it has been liquefied" (Dewey, 1980, p. 17). For a large portion of the 20th Century, learning in the United States was focused on the "acquisition of skills or transmission of information" (Thomas & Brown, 2009, p.1).   In their 1983 report, *A Nation at Risk,* a special panel convened to assess the educational system in the U. S., warned that the nation's schools were so unexceptional as to endanger the nation's future economic and political health (The National Commission on

Excellence in Education, 1983). In reaction to the report, the national leaders, President G. W. Bush and all state governors, announced educational goals aimed at ranking above first in the world in science and math by the year 2000 (Darling-Hammond, 2010). However, the overwhelming pace in which knowledge is rapidly changing is problematic for current educational practices. "It is estimated that five exabytes of new information (500,000 times the volume of the Library of Congress print collection) was generated in 2002, more than three times as much as in 1999" (Darling-Hammond, 2010, p.4).

As of the 2009 PISA international student assessment, which is a profile of knowledge and skills among 15 year olds, the United States ranked 14th in relation to other measured countries in Reading (average), 17th in Science (average), and 25th in Math (below average) (OECD, 2010). The Organisation for Economic Co-Operation and Development (OECD) cited Canada, China, Finland, Japan, and Singapore as high-performing models and Brazil and Germany as rapidly improving models in regards to educational success stories. The indicators for success involved the countries':

- Learning outcomes
- Equity in the distribution of learning opportunities
- Spending on education
- Economic context of the country (OECD, 2009, p. 16)

The United States is still lagging behind in education. "The industrial model of schooling, a model of progress a century earlier," is no longer useful for the

American Education System (*The Intellectual and Policy Foundations of the 21st Century Skills Framework*, 2007, p. 5).

Technology in Education

To confront this challenge, in 2010 the Obama administration called for a transformation in American education through the use of technology to close the achievement gap and raise the proportion of college graduates by 2020 (*Transforming American Education: Learning Powered by Technology*, 2010). If technology integration in schools is the answer to transforming the nation's schools, then ubiquitous computing should be on the top of every state and school district's funding priorities. However, funding alone is not enough. Using technology in education ultimately depends on the pedagogical knowledge and skill of the classroom teachers, who determine how and when the tools will be used in their lessons. In their 2005 study with thirty teachers identified as proficient with technology, Bauer and Kenton found that factors prohibiting regular integration of technology as a teaching and learning tool included needing extra time for planning technology lessons and students not having enough time with computers. In addition, other causes for concern involved students' skill levels, outdated hardware, technical issues, and lack of access to appropriate software (Bauer & Kenton, 2005).

The ongoing challenge with advancements in technology is to move past the early adapters and enthusiasts to extensive, widespread use. In his look at achieving high quality technology implementation, Hall (2010) names the lack of

understanding about what is needed to help all teachers fully implement

technological tools and integrate their uses in the classroom as "Technology's

Achilles Heel" (p. 232).

> There is often insufficient appreciation of how complex the
> implementation processes can be. This is the metaphorical
> equivalent of asking implementers to back up, take a running start,
> and attempt to leap across the chasm from past practice to full use
> of a new way. That chasm can be deep, and the distance from one
> side to the other can be very long…Instead of expecting teachers
> and schools to make giant leaps across the chasm, providing an
> implementation bridge will result in more frequent and higher-
> quality use. (Hall, 2010, p. 234-235)

Hall's implementation bridge includes helping teachers to navigate the

stages of concern, the configuration of the innovation, and levels of use in

regards to the technologies. However, he points out that the most significant

factor affecting success in technology implementation is the leadership in the

building. Additionally, the findings suggest that the main causes of technology

innovation failures have been related to underappreciating and failing to manage

the challenges of implementation rather than the technology itself.

In correlation to Hall's findings, the National Center for Education

Statistic's brief on Internet Access in U.S. Public Schools in Classrooms from

1994-2005 reported that only one-third of teachers felt well or very well prepared

to use the Internet and computers for classroom learning (Wells & Lewis, 2006).

However, this same report indicated a high percentage of public schools

described themselves utilizing the Internet in various ways for teaching and

learning purposes. As indicated in a study by Wells and Lewis (2006), eighty-nine percent of public schools reported using the Internet to provide data to inform instructional planning. Eighty-seven percent of public schools reported using the Internet to provide high-quality digital content and access assessment data results to customize instruction.

Defining 1:1 Computing

As technology and the Internet have emerged as ways to positively affect the quality of instruction in today's schools, one model described in the research is known as 1:1 computing.   On www.g1on1.org, a worldwide initiative to promote technology enhanced learning (TEL), 1:1 computing is defined as

> every learner has a personal computing device that is mobile, wirelessly connected, and enables multimedia input and output. The ubiquitous wireless access and network bridge classrooms, homes and workplaces to allow learners to access digital resources at anytime and provide deeper opportunities for fieldwork, museum visits, and community projects. The 1:1 scenarios include learning individually, with another student or teacher, a small group, or a large online community, with possible involvement of teachers, mentors, parents, librarians, workplace professionals, and members of other supportive communities, at places such as classroom, campus, workplace, home, zoo, park, forest, and so forth. With 1:1 technology, the definition of a classroom is extended to include various learning scenarios with respect to people and space, enabling a learner to switch from one scenario to another scenario easily and instantly, that is, to learn seamlessly among these scenarios ("About | G1:1 – G1on1.org," n.d., p.1).

An example of this seamless integration of classroom scenarios appears in a 2008 Education Week article describing student journalists from a New York high school who interacted with Discovery Shuttle commander Pam Melroy during its

two-week mission to the International Space Station to create audio, video, and blog reports to send to local and national media, all while continuing to interact with their own class assignments and teachers during the time they were in Houston for the launch and landing (Livingston, 2008). Because today's youth are more aware of the digital world and prefer the Internet as their source of information, where they can acquire a wealth of up-to-date information rapidly (Gorder, 2007), K-12 schools are initiating one-to-one laptop programs throughout the country ("One-to-One Laptop Initiatives: Providing Tools for 21st Century Learners," 2004).

The research on 1:1 implementations has mixed conclusions (Muir, 2007). While a Texas study showed middle school students engaged in technology in the class showed a decline in behavior problems and increased level of proficiency in technology skills (Shapley, Sheehan, Maloney, & Caranikas-Walker, 2009) and a statewide initiative in Maine saw increases in attendance, student engagement, and student writing scores (Holcomb, 2009), other studies have indicated no gains in academic improvement (Matt Dunleavy & Heinecke, 2008; Fried, 2008) and infrequency of teacher and student use of the technology despite the availability of the technology (Cuban, Kirkpatrick, & Peck, 2001). Why are districts continuing to move forward with the 1:1 learning model when the research has shown mixed findings on the impact on student learning? Research suggests that successful laptop programs appear to be dependent on the effectiveness on the schools or districts that adopt them (M. Dunleavy,

Dexter, & Heinecke, 2007; Goodwin, 2011; B. B. Levin & Schrum, 2013; Muir, 2007). "It is clear that when researchers try to evaluate the educational uses of technology, what they are really evaluating are the broader pedagogical practices being used" (Muir, 2007).

The district of study initiated the 1:1 laptop program as an element of their district vision and mission where "every student" in the multi-ethnic, financially diverse community "graduates and is globally competitive for careers, college, and citizenship" and to support the "high quality learning opportunities for all students." This study seeks to investigate the impact of a 1:1 laptop implementation and its potential to raise the quality of instruction, to increase teacher engagement, and to provide equity of access to learning opportunities for students within the district's two middle schools. The following sections connect the body of research to the three major prongs of this study.

Teacher Engagement

To deeply engage their students, educators need to be engaged in the learning process themselves through knowing about their students' needs and learning goals in addition to having the knowledge of what learning resources can best help students. "Educators are no longer limited by where they teach or where they lead, nor are they required to deliver teaching as solo practitioners" (*Transforming American Education: Learning Powered by Technology*, 2010, p. 42). Although technology is a dynamic facilitator of 21st century learning, educators must still teach.

They must support their students' engagement with technology resources for learning, highlighting the important subject matter content, pressing students for explanations and higher-order thinking, tracking their students' progress, and encouraging their students to take more responsibility for learning. This requires deep transformations of teaching practices. (*Transforming American Education: Learning Powered by Technology*, 2010, p. 44)

Transformation of teaching practices appears to be a result of developing feelings of comfort and self-efficacy according to a study by Burns and Polman (2006). The study showed teachers became "experts" at using technology through consistent and frequent use and began to develop confidence in their ability to affect change, as demonstrated by their increased willingness to share with their colleagues. In addition, studies showed that teachers comfort with computers through their personal use is related to their successful use of computers for instruction (Mueller, Wood, Willoughby, Ross, & Specht, 2008; O'Dwyer, Russell, & Bebell, 2005; Wozney, Venkatesh, & Abrami, 2006).

How do administrators get teachers to learn new teaching practices involving technology? A research brief on motivation and adult learning suggested that tech educators first concentrate on teaching what the teachers are comfortable learning. Also, administrators must understand that teachers will not be motivated to consider changing their teaching practices if they see the change negatively impacting them more than positively (Gom, 2009). In a more recent article from the journal, *Adult Learning* (Lenoue, Hall, & Eighmy, 2011), the authors explain that for adults, learning is most often a way to meet the need

for connection, interaction, and dialogue. The implication from these researchers is that learning situations for teachers should be dynamic and individualized, much like the classrooms we expect for our students, if we expect teachers' practices to change.

In a national study involving nine sites using technology to improve classroom instruction specifically through project based learning, as opposed to technology for its own sake, Means and Olsen (1995) found that the technology use had effects on teachers in addition to students. The authors of the study found that teachers who implemented technology in their classrooms in a way that provided challenging, authentic activities for students increased their pedagogical and technological skills, had more collaboration within their own school, had contact and collaboration with educational reform and research organizations outside of their school, and were involved in professional development both on-site and through professional conferences. In addition, teachers often view their computer as a gateway to a variety of resources and tools that extend their reach and freedom beyond the school campus for both them and their students (Parr & Ward, 2011).

In correlation with Means and Olsen, Rosen and Beck-Hill (2012) also found a positive relationship between instructional practice and a one-to-one laptop program. Their study found that the laptop program promoted differentiated teaching and learning practices as well as higher one-to-one teacher-student interactions. These two studies are indications that teachers

must be engaged at deeper levels to instructionally incorporate technology into lessons in meaningful ways.

A 2009 study conducted on a middle school one-to-one laptop initiative sought to find technology's observed effect on teaching and learning. Through surveys and interviews, teachers indicated their own improvements in student assessment and classroom management. They also reported students exhibited increased engagement in both collaborative and independent assignments and students showed improvements in problem solving, understanding work value, and self-efficacy. Finally, teachers in this study understood that they were the determining factor in their own technological journey and were "vigilant in self-improvement of their practice using the technology" (Maninger & Holden, 2009).

In response to the questions raised through the literature on teacher engagement, Table 1 (below) illustrates questions that were used in my research in the teacher engagement area.

Table 1. Teacher Engagement Research Questions

Literature Review: Questions Raised	Questions To Ask in My Research
How are teachers utilizing technology?	How are you using the technology? How do you know if students are engaged in the technology? How do you know if students are learning the desired outcomes?
How much integration of technology is taking place?	How often are you using the technology? How long does it take you to plan a lesson integrating technology? Without technology?
What supports/professional development was in place?	What kinds of supports are available to you?

	How often do you need each type of support (Technical support, instructional support, help in the classroom)? What is the quality of the support you receive? What type of professional development do you most prefer? Has the professional development offered for the implementation of the technology met your personal needs?
Why do some teachers make progress with technology and others do not?	How successful do you feel with implementing the technology in your classroom? What factors have contributed to success? What factors have inhibited implementation?
How did the laptop initiative change teacher behavior?	How has the 1:1 initiative changed what you do in the classroom instructionally? How has the 1:1 initiative changed what you do beyond the classroom? How has the 1:1 initiative changed your perception of yourself as a teacher?

Digital Equity

Access to instructional technology in the United States in public elementary and secondary schools has increased over the last decade.

In 2008, the average public school contained 189 instructional computers, compared to 110 in 2000…Most of these computers (98 percent) had Internet access in 2008, up from 77 percent in 2000. There were 3 students per computer with Internet access in 2008, compared to 7 students per computer with Internet access in 2000. (National Center for Education Statistics, 2012, p. 4)

While not every student has access to the Internet at school, issues of access are clearly on the way to being resolved. However, other issues remain: the quality and durability of the hardware and connections; what students can and will do with the technology; what their teachers know and can do, and reaching

marginalized students (Solomon, 2002). In a study by Kim and Bagaka (2005), researchers found that even when equal access to computers was provided for all students by the schools, a "digital divide in student usage of technology tools" continued as a result of the different home environments students in which students lived (p.327). In addition, much of the Internet is still inaccessible to individuals with a variety of disabilities, such as those with sight impairments (Gorski, 2009).

Data from an Educational Testing Services (ETS) study of 8th graders revealed that students in low socio-economic homes were more likely to use computers for lower-order skill activities such as drill and practice, which can negatively influence student achievement. Students in non-economically disadvantaged homes were more often using technology for higher-order activities, which are linked to higher student achievement (Kim & Bagaka, 2005; Solomon, 2002).

Another group at risk of exclusion through digital access is users of assistive technologies. "Rather than digital data fulfilling its potential to be inclusive, access is being restricted through a combination of obstacles such as the cost of assistive technologies, the need for specialist support, and the exclusive way in which digital data is designed" (Watling & Crawford, 2010, p. 209)

In addition to individuals with adaptive needs, the access to the Internet continues to be an issue outside of the school. According to a 2010 Pew

22

Research Center study, Latinos and African Americans are more apt to be

wireless Internet users than the white population, while a significant amount of

the low-income group are more apt to be wireless Internet (cellphone) only. With

schools emphasis on the creation of information versus the access of

information, cellphones are not an equal substitute for full engagement with the

digital world (Modarres, 2011).

Access to the Internet is important for learning. Milton Chen, author of

Education Nation, uses the analogy of students as "knowledge workers" who

need to acquire knowledge beyond school hours.

> None of our hopes for education—for closing the achievement gap,
> for getting all students to college, for educating a modern workforce
> of teachers—will be realized until every student, teacher, and
> administrator has a computer and access to the Internet. One-to-
> one access is now the digital civil right of every student to fully
> participate in his or her own education. (Chen, 2010, p.88)

Access to technologies can change *how* and *what* students learn, *within*

as well as *outside* of school (Mouza, 2008). All the finest equipment and

connection will make little difference to student learning without the direction of

knowledgeable and confident educators. Teachers must reflect as critically

about the substance of computer software and websites as they do about other

lesson materials. "Research shows that even when disenfranchised groups do

gain physical access to these technologies, they often struggle to find affirming

and non-hostile content" (Gorski, 2009, p. 358). Females are likely to find gender

stereotypes perpetuated in digital content through online advertising as well as a large majority of educational software that is largely based around competitive games and created from the male frame of reference (Cooper, 2006; Gorski, 2009; Sheldon, 2004). When it comes to finding content on the Internet, "we must ask ourselves how the things we want to share are found, and how the things we find have surfaced" (Noble, 2012).

Therefore, "state and local public education institutions must ensure equitable access to learning experiences for all students and especially students in underserved populations – low-income and minority students, students with disabilities, English language learners, preschool-aged children, and others" (*Transforming American Education: Learning Powered by Technology*, 2010, p. 6). As educators we must use the technologies to empower people to participate more fully and equitably in society (Gorski, 2009).

In response to the issues raised regarding equity of instruction, I refined and narrowed research questions for use in interviews and surveys. The questions are in Table 2 below.

Table 2. Digital Equity Research Questions

Literature Review: Questions Raised	Questions To Ask in My Research
Is the issue of access resolved for all students?	Do all students have access to laptops in the school (including students with disabilities)? What exceptions are made for students with impairments (such as blindness)? How many students have access to the Internet beyond the school day?

Are all students given access to challenging assignments?	What kinds of activities are students asked to do on computers in your class? How do you differentiate using technology?
Is culturally responsive and sensitive software and content being utilized?	How do you decide which software, website, or digital content to utilize? How do ensure that digital content is culturally responsive and meets diverse learners' needs?

Quality of Instruction

Today's students stimulate their brains through television, instant Internet communication, television/movies, cellphones, and video games. "One of the common causes of boredom in the classroom is students' perception that the methods of how the curriculum is delivered to them are irrelevant to how they learn" (Jacobs, 2010). The teachers' challenge in today's classrooms is to make a standardized curriculum relevant to students to many of whom have instant access to learn anything they want to on their own (Chen, 2010; Coppola, 2004).

The current body of research suggests that the incorporation of laptops into classroom instruction will likely generate supportive school atmospheres that can nurture student responsibility, aptitude, and independence with respect to technology and learning thus leading to greater motivation and increased academic goals (Mouza, 2008). In their study on using laptops in middle school science learning, Berry and Wintle (2009) found that students who were assigned a technology-rich project demonstrated greater comprehension levels, greater retention of information, and greater levels of engagement with their work. Many

of the students interviewed responded they found the project to more fun and engaging although they also found it to be more time consuming and challenging.

In her look at what made some one-to-one programs successful, McLester (2011) cited three programs: Coleman Junior High in Texas, Mooresville Graded School District in North Carolina, and Science Leadership Academy in Philadelphia. After four years of ubiquitous computing, Coleman had raised its proficiency scores in all core subjects with a great deal of professional development, a supportive administration, and teachers who were agreeable to learn. Mooresville was credited for their year-round professional development push, including a summer institute for teachers. The SLA serves inner city students with a 96% graduation rate and 90% college enrollment rate. The school uses the laptops as part of their problem-based learning emphasis on solving real-world problems. In *Education Nation*, Chen highlights the state of Maine as an early adopter of technology in classrooms. Susan Gendron, Maine's chief state school officer stated, "Our most successful implementations are in classrooms where we have significantly changed teacher behavior through the integration of technology and the rich digital resources available to them" (Chen, 2010, p. 90).

In her study on a laptop initiative, Mouza (2008) found that fourth graders with laptops had increased positive attitudes toward school than their non-laptop peers. They also appeared to be more driven, showed greater engagement in their academics, and went beyond what was required in their assignments.

In a study conducted on the use of digital technologies in the classroom that looked at the effectiveness of teacher and student use of technology in the college classroom, the researchers found that students and teachers have different preferences between the digital tools they see beneficial and useful in classes. Generally, students appreciate and want to use technologies in academics more eagerly than teachers require. More importantly, the researchers found a positive correlation between instructional technology use and engagement and outcomes in the learning process (Buzzard, Crittenden, Crittenden, & McCarty, 2011).

While research shows that used appropriately in the classroom, technology can benefit the quality of instruction, a study by the U. S. Department of Education evaluating the technology component of NCLB found that between 2005 to 2007 there was an increase in the number of teachers who reported using technology frequently whereas during the same period, teacher reports of student use in the classroom remained the same. According to the report, if the full potential of educational technology in the classroom is to be realized, then educational policy must continue to encourage robust student uses of technology (Bakia, Means, Gallagher, Chen, & Jones, 2009). "Integrating technology into classroom…is no longer an option. It's part of classroom life" (Ash, 2010).

In response to the issues raised regarding quality of instruction, I refined and narrowed research questions for use in interviews and surveys. The questions are in Table 3 below.

Table 3. Quality of Instruction Research Questions

Literature Review: Questions Raised	Questions To Ask in My Research
If technology is integrated into instruction, will there be greater student outcomes?	How do students use technology in your class for learning? How do you know if students are learning the desired outcomes?
Are student engagement, retention, and comprehension affected by quality instruction involving laptop computers?	When you utilize technology, how does student engagement differ in your classroom? When you utilize technology, how does student retention of information differ with your students? When you utilize technology, how does student comprehension differ on assessments?
Does student classroom behavior change as a result of quality instruction involving laptop computers?	Do you perceive a difference in the quality of your lessons when utilizing technology? Do you perceive a difference in the behaviors of your students when utilizing technology in classroom learning? (i.e. engagement, self-efficacy, independence, motivation, etc.)
Is there a correlation between technology integration and positive student outcomes?	Do you perceive that your students do better with technology integration? How do your students perform academically when technology is integrated in the lesson? How do your students perform emotionally and socially when technology is integrated in the lesson?

Conceptual Framework

The goal of the conducted research was to better understand teachers'

perceptions of the impact of the implementation of a one-to-one laptop model in

two middle schools on their quality of instruction, their engagement in the

teaching and learning process, and their understanding of and support of the

equity of learning opportunities (and pitfalls) associated with ubiquitous computer usage.

When researching teacher engagement, it is hard to separate out quality instruction, for quality instruction comes from engaged and motivated teachers. A pair of meta-analyses examining the research on the factors that influence student achievement found that the most important variable is the quality of instruction that students get in the classroom. In addition, teachers who are engaged and motivated to plan for quality instruction ensure that their students have sufficient and responsive content to provide meaningful and challenging experiences to foster achievement (Dufour & Marzano, 2011).

Understanding that quality of instruction with technology integration looks different than quality of instruction that does not involve technology, the TPACK (Technological Pedagogical Content Knowledge) model is one model that helps educators understand the unique knowledge and skills teachers must utilize when integrating technology in various contexts. At the center of effective teaching with technology lie three central components and the relationships among them: content, pedagogy, and technology.

> TPACK is the basis of effective teaching with technology, requiring an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students' prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing

> knowledge to develop new epistemologies or strengthen old ones
> (Koehler & Mishra, 2009, p. 66)

Therefore to have quality instruction with technology, teachers must not only integrate technology into their planning and activities but they must do so effectively with students and content in mind. The TPACK model was my working conceptual framework for this study.

Figure 1. TPACK Model Illustration. (reproduced by permission of the publisher, © 2012 by tpack.org)
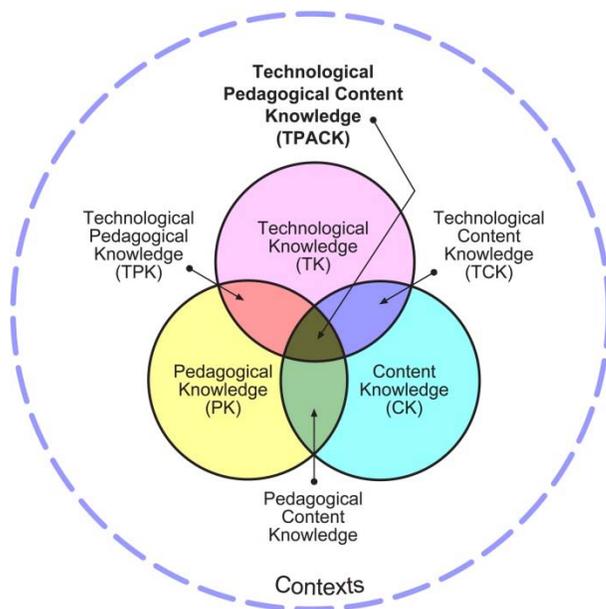
Summary

The literature is clear that technology in schools is becoming more abundant and available to teachers and students to apply in their learning activities. One theme that is clear through all the research cited is that

technology is a powerful tool that can produce both positive and negative

outcomes based on its application. Schools and teachers continue to struggle

with determining if the technology is providing quality support for instruction in

their classrooms. The next chapter explains the research process and

procedures as well as introducing the research sites and participants for the

reader. This background information will be helpful when reading the research

results in Chapter IV.

CHAPTER III

RESEARCH METHODOLOGY

Introduction

During my time as both a teacher and an administrator, I have seen technology expand its potential for both teacher and student learning. As a technology learner myself, I was interested in learning more about how laptops are being used to improve the quality of learning. The purpose of this study was to understand the impact of implementing a 1:1 laptop instructional model in a middle school environment during the second year of implementation. Since teachers and students had the initiative in place for one year and had time to adjust the logistical issues (i.e. moving with the computers, when to check in/out, how to handle hardware/software issues, etc.), it was an ideal time to see how the initiative was affecting the instructional aspects of the school: quality of instruction, teacher engagement, and equitable opportunities for student learning.

Research Questions

This study is guided by the following questions:

1. How does the implementation of a 1:1 laptop initiative impact instruction for teachers in the district?

2. How do teachers and students utilize the technology?

3. What is the technology's observed effect on teacher engagement in the learning process?

4. How do teachers leverage technology to provide equity of access to students and extend learning opportunities to all students?

Teachers are faced with making wise instructional decisions every day. Finding the answers to these questions would help to reveal the impact of technology on those instructional decisions and whether technology is helping or hurting teachers' confidence and competence to enhance the learning process. It was my intention that this case study help inform other implementation models and to make recommendations on possible ways to support teachers integrating laptops in their classrooms.

Research Design

The research from which the study was conducted took place in a school district in the Southeastern region of the United States. The schools involved were given fictitious names of East Middle School and West Middle School. After the school district gave their official approval, an IRB application was submitted and approved to conduct the research (See Appendix A), and all data were collected and maintained in accordance with the IRB application.

To examine the impact of implementing a 1:1 instructional model in a middle school environment on the quality of instruction, teacher engagement, and equitable opportunities for student learning, I designed a study utilizing a

mixed methods format while conducting a case study of the two middle schools in the selected school district. Mixed methods research is simply defined as combining both qualitative and quantitative research and methods in a research study (Creswell, 2009). Integrating research methods "involves the intentional collection of both quantitative and qualitative data and the combination of the strengths of each to answer research questions" (Klassen, Creswell, Plano Clark, Smith, & Meissner, 2012). In her article on mixed methods, Mason (2006) explains the value of mixed methods studies "is that social experience and lived realities are multi-dimensional and that our understandings are impoverished and may be inadequate if we view these phenomena along a single dimension" (p. 10). Drawing on these strengths, I hoped to capture and portray the full complexity of the available data and provide more insight by combining both forms rather than relying solely on one form of research or the other.

The mixing of both qualitative and quantitative data would provide two different viewpoints or pictures of the story of the implementation within the district to provide an overall "composite assessment" of the case study (Creswell, 2009, p. 214). Utilizing this approach, I used three key methods to collect data from the schools: (a) teacher survey, (b) teacher interviews, and (c) leadership and support staff interviews. My research explored the use of classroom observations, but the classroom observation data was not suitable for this study. Therefore, I have used the other three data sets to support my findings in Chapter V.

The advantage to this methodology design was the ability to collect

multiple types of data during a single data collection phase, which helped me

keep the project flowing and moving forward as a full-time employee and student.

The clear format made reporting results clear and more aligned with research

questions and methods. The limitations of this type of approach is the difficulty in

transforming the data during the analysis phase of the research in order for the

two different types of data to be integrated and compared appropriately. To

minimize these limitations, the questions in the survey and the questions in the

in-depth interviews were purposefully aligned to allow for integration and

comparison and to balance the analysis results.

Research Phases

During the first phase of the research study, all middle school teachers at

East and West Middle Schools were emailed to request their participation in the

research study. This was repeated once a week for three weeks. Forty teachers

out of 81 in the two schools responded to the survey, which took them

approximately 20 minutes to complete a variety of Likert scaled, open ended, and

other scaled responses. Response on each question was optional, and average

response rate on the questions was 29. Teachers were also given an

opportunity to volunteer for the in-depth interview through the survey process.

The volunteer process was connected to the survey in such a way that I could

not connect their volunteer notification to their survey response as all survey

responses were anonymous.

Concurrently with the survey, I conducted 15 interviews. I interviewed the leadership at each school, a principal and assistant principal, as well as the technology support personnel, the technology facilitator and the media specialist. I also interviewed seven teachers, four from East and three from West, for the in-depth teacher interviews. One of the teachers from East serves in an AIG consultant role and teaches only part-time in the classroom. While this study focuses primarily on teachers' use of technology, in her capacity, this teacher helps teachers to enhance and improve the overall quality of their lessons, including teaching model lessons and co-teaching with them; therefore, this teacher's insights and perspective were valuable to the overall findings. Protocols for the interviews were developed for the two different types of interviews (See Appendices B and C).

The teacher participants for the interviews were selected based on their willingness to volunteer due to their own perception that they were advanced or comfortable with utilizing technology in their classroom. Ideally, I would have preferred more teachers volunteer to be interviewed. The teacher interview participants were asked series of 30 questions using an interview protocol (see Appendix B) regarding the use of technology as it relates to the quality of their instruction, their own personal engagement, and the equity of access to learning opportunities for students in their classroom and school. All teachers were asked each of the questions throughout the course of the interview, and the interviews were digitally recorded and transcribed for accuracy. The interviews took place

in their classrooms after school or during their planning periods at a time they selected. Each of the interviews was approximately 45 minutes in length and was recorded on a digital recorder in order to be transcribed at a later date.

Support personnel participants (school leadership, technology facilitators, and media specialists) were selected based on their roles. They were sent a request email, and they all agreed to participate. The support person interview participants were asked a series of 26 questions using an interview protocol (see Appendix C) in regards to supporting teachers implementing laptops into their instruction, supporting teachers using laptops in their professional practice, and supporting equitable learning experiences for all students. The support personnel consisted of the technology facilitator, media specialist, assistant principal, and principal from each middle school. The support personnel interviews were completed in pairs, with technology facilitators and media specialists together and assistant principals and principals together. The interviews lasted approximately 45 to 50 minutes and took place either in their office or media center during a time that was convenient for them. The support personnel interviews were also digitally recorded in order to be transcribed at a later date.

My initial proposal was to compare classroom observations and teacher perceptions from the surveys because I felt it would be an important outcome of the classroom observation data. I also felt that classroom observations would provide opportunities to gather data on the implementation of the laptops in the

classroom and their impact on the elements measured in the study: quality of instruction, teacher engagement, and access to extended learning opportunities. However, this procedure proved to be ineffective in gathering the type of data that was effective for this study due to several reasons: (a) the data collection period began at the beginning of the month of May and teachers had begun a season of "test preparation" and less use of technology and were reluctant to let me observe their classroom or were willing but would tell me that I would not see any technology; (b) In the two observations that I was able to conduct, I was not interacting with students or the teacher, and it was clear the information that I was observing was not aligning with my research questions. I was only able to gauge whether the students were on their laptops or not and what type of program they were using. Therefore upon advisement of my dissertation chair, this procedure was eliminated from my study in lieu of the in-depth interviews.

The second phase of the data collection occurred after reviewing the interview transcripts. I followed up with the teachers regarding their initial interview. None of the participants had anything they wanted to add personally, but the participants at West did want me to know that their leadership team had decided to have all students carry their laptops from class to class (same as East) for the next school year; however, at a later check back date, the school was unable to implement this change due to a lack of funding for laptop carrying bags for all students.

Research Setting

East Middle School and West Middle School are the only middle schools in a small school district in the Southeastern region of the United States. The school district serves just over 4,700 students, and at the time of the study had 1,153 students in grades six through eight. The school district has a total of nine schools: one Pre-K, five elementary schools (grades kindergarten through fifth), two middle schools (grades six through eight), and one high school (grades nine through 12).

East Middle School has 42 classroom teachers and West has 39. Both schools have two administrators, one technology facilitator, and one media specialist. East is the slightly larger middle school serving 621 students, while West serves 532 students. Situated in the largest city of the county in which the school district resides, the schools serve a diverse population of students including a wide range of socio-economic backgrounds. Both middle schools serve students of poverty with West having an 80% free and reduced lunch rate and East having 57%. The figure below shows the demographic makeup of the school district in 2012-2013 based on the 1st PMR (Principals' Monthly Report) (see Figure 4 below).

Figure 2. 2012-2013 District Demographic Representation Based on the 1st PMR

2012-13 Percent of Total Membership

- Indian
- Asian
- Black
- Hispanic
- White
- Multi

3.8 0.3 1.6

15.2

40.4

38.7
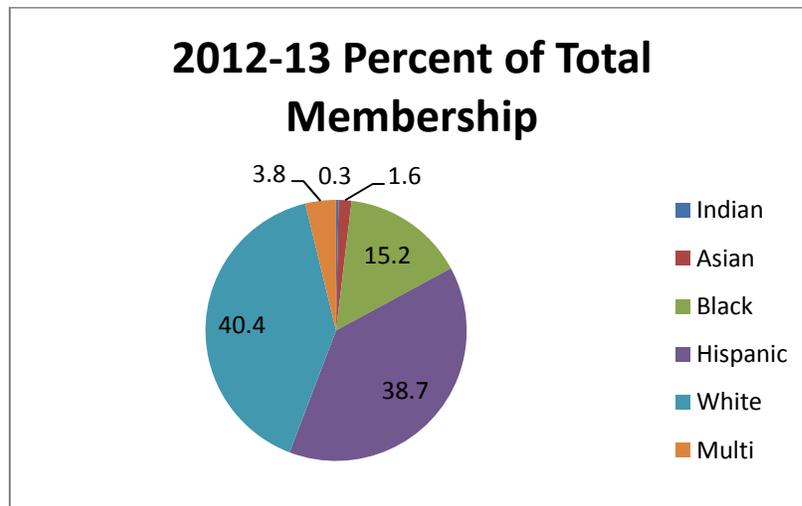
East Middle School is situated in the center of the city near its matriculating high school while West Middle School is located five miles away from the high school and close to the city limit. The administrative teams at both middle schools are either new to middle school administration or new to the school. West's principal completed his first year as principal and the assistant principal completed his second year at the school in 2012-2013. Though not a new principal, the principal at East completed her second year as a middle school principal and the assistant principal completed his first year as an assistant principal in 2012-2013.

While the school buildings themselves are over twenty years old, each classroom has been updated to include an interactive white board and a document camera. Infrastructure has been upgraded at all schools to allow for Internet connection and computer usage by all students simultaneously. The

teachers are all provided a laptop for professional use, and in some cases, they

have access to a desktop computer in their classroom as well. At both middle

schools, each student has access to a laptop computer throughout the day, but

each school has differing procedures as to how students access and acquire the

laptops each day. The district technology committee determined that middle

school students would not be allowed to take home the laptops.

At East Middle School, students obtain the laptop that is specifically

assigned to them each morning in their first core class from the charging carts

and carry them throughout the day in special laptop carrying cases to each class.

Students at West Middle School do not carry the computers from class to class.

Instead, each core teacher has a cart in their room, and students pick up a

different laptop in each core class. Only core content teachers were given laptop

carts to keep in their room for student use.   Elective teachers have to request

use of unused carts or mobile carts for laptop use in their classes.

Research Participants

As noted earlier, two types of data were collected. The quantitative data,

which was the survey information, asked teachers to supply their years of

experience and their subject area, and the following tables provide these figures.

This information will help the reader have understanding of the teacher

perspectives provided in the survey data (See Table 4 and Table 5).

Table 4. Online Survey Participants' Teaching Experience

Years Of Teaching Experience	Frequency of Response	% of Total Respondents
0-3	4	13%
4-6	7	23%
7-10	3	10%
11-15	8	26%
16-25	5	16%
26 or more	4	13%
Total	**31**	**100%**

Table 5. Online Survey Participants' Subject Area Taught

Subject Area Taught	Frequency of Response	% of Total Respondents
English/Language Arts	13	46%
Math	9	32%
Social Studies	4	14%
Science	5	18%
Career & Technical Education	1	4%
World Languages	2	7%
Band/Chorus/Performing Arts	1	4%
Visual Arts	0	0%
Exceptional Children	6	21%
English as a Second Language	0	0%

As noted earlier, the qualitative portion of the study involved interviews with seven teachers and eight support personnel. The teacher interviews as well as the support personnel interviews were a "purposeful sampling" (Creswell, 2007, p.217). These individuals were selected because they had specific characteristics: (a) teachers—perception they were advanced with technology and (b) support personnel—support/leadership roles with technology in the school.

Each person was interviewed using the same interview protocol (See Appendices B and C), and their individual comments and stories speak to both the negative and positive impacts of the ubiquitous computing program on the quality of instruction, teacher engagement, and the equity of learning experiences for students.   The teachers and support personnel have been given fictitious names to protect their identity, and to provide information and perspective for the reader, I have included a background information chart on each of the participants (See Table 6).

Table 6. Interview Participants—Teacher and Support Personal Background Information

Name	Subject Taught/Role	Years In Education	Years At East/West
Ann Curtis	Science	6	East-5
Marie Corridon	Math	10	East-4
Thelma Kalama	Social Studies	15	East-15
Brenda Helser	AIG Teacher	9	East-9

Vicki Draves	Media Specialist	14	East-3
Craig Dixon	Technology Facilitator	15	East-5
Bob Roberts	Principal	8	East-1
Herbert Douglas	Assistant Principal	7	East-2
Floyd Simmons	English/Language Arts	7	West-2
Alice Coachman	Science	6	West-3
Sammy Lee	Social Studies	7	West-7
George Worth	Technology Facilitator	34	West-13
Patsy Elsener	Media Specialist	22	West-8
Suzanne Zimmerman	Principal	22	West-2
George Stanich	Assistant Principal	15	West-1

Data Analysis

The purpose of the data collection and analysis in this study is to answer the questions outlined above. From the implementation of the study, the survey and interview questions were designed to tie directly to the research questions and literature to ensure a systematic and thorough approach to understanding the research problem. By using a mixed methods model, I was also able to examine the problem at multiple levels simultaneously (Creswell, 2009; Mason, 2006). While conducting a system-wide survey at both middle schools for all teachers, I explored the phenomenon specifically with individual teachers who

identified themselves as advanced in using technology and the support personnel at each school.

Because this was a mixed methods study, either the qualitative or the quantitative data had to be transformed in order for the data to be compared (Creswell, 2009). I chose to both qualify the quantitative data, where I created categories or themes that could then be compared to the qualitative data, and to quantify the qualitative data, count the number of times a theme appears in the interview data (Creswell, 2009). By doing so, I was able to make comparisons at times that both indicate the amount of teachers who feel a particular way and give the voiced reasons for why.

The survey participants were asked a series of 23 questions about the use of technology in their planning and classroom, the support available to them in their buildings, and their perceptions regarding the use of technology by their students and themselves in their professional work. There were six different types of questions on the survey: (1) Yes/No—4; (2) Choose One Answer—2; (3) 5 point Likert Scale Response—4; (4) Slider Scale Response—4; (5) Check List (any that apply)—5; and (6) Open Ended Response—4. Response on each question was optional except for the first question, which participants indicated they were voluntarily consenting to participation in the study. After the first question with 40 responses, there was some attrition from the survey. However, the remaining questions had an average response rate of 29. Questions two and three on the survey asked teachers to provide background information such as

years of experience and content area of licensure. The remaining 20 questions

addressed one of the three major components of the study.

By using the Qualitrics survey system, I was able to design, deliver, and

retrieve the online survey through one program. The system also provided

analytical graphs and statistical data with each question such as the number of

respondents, the percentage or frequency on each response, and the average

value. Results from the closed questions on the survey were analyzed using

descriptive statistics. The results from the open ended questions were organized

into frequency tables and then analyzed using descriptive statistics. These data

were then open coded into categories for analysis with the interview data.

Both the individual teacher interviews and the support personnel

interviews were transcribed from the audio recordings for data analysis. During

this process, interview participant names and other identifying information were

removed from the transcriptions and pseudonyms were assigned and used. The

original recordings were destroyed after transcriptions were checked for errors.

In qualitative data, the researcher is "interested in understanding how

people interpret their experiences, how they construct their worlds, and what

meaning they attribute to their experiences" (Merriam, 2009, p.5). As the

researcher, I was interested in how the teachers in my study made meaning of

their experience with the technology and how they perceived their experiences.

After all interview data were collected and transcribed, I began organizing the

words and thoughts into chunks and sections. In this approach, known as open

coding, the researcher organizes the data into major categories of information (Creswell, 2007). As Miles, Huberman, and Saldaña (2013) explain, we are by nature, pattern-finding people, and we naturally organize things in our life to give order and comfort to our surroundings. As researchers, we try "to understand a phenomenon better by grouping and then conceptualizing objects that have similar patterns or characteristics" (p. 297). My codes were based on the actual language of the participants. Utilizing frequently used phrases and ideas, I was able to systematically group together or "chunk" the text into categories. These codes were manually placed along the transcribed data.

Once this was completed, I then was able to look for relationships between the categories that emerged and my conceptual framework. Through a process using axial coding, the newer, broader categories and themes that emerged related to and spoke to my research questions (Creswell, 2007). Morse and Field explain thematic analysis as cited in DeSantis and Ugarriza (2000),

> Thematic analysis involves the search for and identification of common threads that extend throughout an entire interview or set of interviews. Themes are usually quite abstract and therefore difficult to identify. Often the theme does not immediately "jump out" of the interview but may be more apparent if the researcher steps back and considers. "What are these folks trying to tell me?" The theme may be beneath the surface of the interviews but, once identified, appears obvious. Frequently, these themes are concepts indicated by the data rather than concrete entities directly described by the participants.... Once identified, the themes appear to be significant concepts that link substantial portions of the interviews together (p. 354).

Using the newly emerged larger themes, I constructed a matrix with Excel to both organize the information and help make connections between the themes. In addition, the matrix helped me to identify outliers or unintentional finding. I also looked for comparisons between what was said in the individual interviews and what was reported in the online survey.

Transparency

Researcher subjectivity is an important variable in the investigation process. "The availability of information on potential bias helps the reader judge whether or not participants' perceptions in the research are a result of actual perceptions or the biased beliefs of the researcher" (Sampson, 2012, p.41). To be transparent in potential bias, it is necessary to disclose that my primary job is to work with teachers and administrators to ensure that the curriculum in secondary schools is being implemented to fidelity. As a teacher, I was considered an early adapter to technology and was given access to one of the first generation interactive white boards. As an assistant principal and district administrator, I have participated in implementing a 1:1 laptop initiative.

It is my intention to pay close attention to the positionality and subjectivity that I bring to this research project. My position as an educational administrator may influence the type of responses teachers, support personnel, and administrators are willing to provide during the interviews if I am not attentive to the purpose of the study and my role as a researcher. It is important to note that I am not in a role that evaluates the teachers, support personnel, or

administrators that participated in this study. However, I do currently work in a district that utilizes a 1:1 implementation model.

It is also important to note that I am known as a strong proponent for using technology for learning and a proficient user of technology myself. It is my contention that using technology, while an excellent tool for learning, is not necessarily equivalent to or synonymous with quality, researched-based teaching practices. I do believe that our students today are part of a generation that both are developing along with the technologies and will need the technology skill to be successful beyond school; therefore, I feel it is essential to integrate technology into learning as much as possible. To help eliminate my personal biases from my questions, I had external reviewers evaluate the survey and interview protocol. I also asked a neutral party, the school information officer, to email the survey to the teachers.

Summary

This chapter has outlined the method of study for research within a small school district. This study explored how the teachers and support personnel of East and West Middle Schools viewed the instructional implementation of the 1:1 laptop implementation through both in-depth interviews and an anonymous on-line survey. To conduct the research, four research questions were used to guide the development and implementation of an online survey and individual teacher and support personnel interviews. The data collected provide a picture of the impact the technology is having on instruction and teacher behavior. The

next chapter offers the emergent insights that developed through working in a ubiquitous computing environment from the voices of those participating in the initiative.

CHAPTER IV

PRESENTATION OF THE DATA

Introduction

This study examined the impact of implementing a 1:1 laptop initiative in a middle school environment on the quality of instruction, teacher engagement, and equitable opportunities for student learning. This chapter will present and discuss the data that were collected through the online teacher survey as well as the teacher and support personnel interviews.

Four questions guided this investigation. The first two questions focused on identifying the ways in which the 1:1 laptop initiative impacted the classroom instruction for the teachers at East and West Middle Schools and the ways in which the teachers chose to use the technology. Next, I was interested to find out if teachers' own engagement was impacted by the integration of technology into their professional practice. Finally, I was curious to know if teachers were able to use the technology to provide equitable learning experiences for each student. Through conducting individual teacher and support personnel interviews as well as an online teacher survey, I was able to look at the data in response to these questions.

Research Findings

The next section of this chapter will provide the reader with the data collected from the participants at East and West Middle Schools. Data were collected in three ways: (a) online teacher survey, (b) teacher interviews, and (c) support personnel interviews.

To organize the data presented in the next sections, I have organized them around the central categories of the study questions: (a) quality of instruction, (b) teacher engagement, and (c) equity of student learning opportunities. Based on the information shared in the interviews, I am able to share data points and example quotes to help the reader develop an understanding of the teachers' and support personnel's viewpoint regarding the impact of the 1:1 initiative in their schools. Due to the nature and amount of qualitative data collected, it is necessary to limit the number of illustrations presented per category.

Online Survey. The following section is a review of the online survey data. The online survey was completed in some part by 40 district staff members. The sampling was random as the invitation to participate in the survey was sent to all teachers who were employed at East and West Middle Schools. The teachers had equal opportunity to participate.

Technology's impact on quality of instruction. Understanding that the primary role teachers have is to provide for the learning of their students, the

main focus of this study was on the impact of the laptop integration on the quality

of instruction students are receiving in the classroom. Five questions specifically

addressed quality of instruction on the online teacher survey. Teachers were

asked how often they used technology to plan, instruct, and in the classroom

overall. Most teachers surveyed indicated that they use technology every day

(see Table 7). A minimal amount of teachers indicated that they "sometimes"

used technology in planning, instructing, and in the classroom. It is important to

note that at West Middle School, elective teachers and specialists do not have

access to laptops to use with students on a daily basis due to the implementation

model that was chosen by the school.

Table 7. Teachers' Use of Technology.

Survey Question	Every Day	Weekly	Often	Sometimes	Not At All	Total Responses
How often do you utilize technology when planning instruction?	25	4	0	2	0	31
How often do you utilize technology when implementing instruction?	20	9	1	1	0	31
How often are you utilizing technology in the classroom?	19	9	2	1	0	31

Interested to see if teachers observed any correlations between the technology use in their classroom and their students' performance as found in the research (Berry & Wintle, 2009; Mouza, 2008), the survey asked teachers to rate on a Likert scale statements concerning technology and student engagement, student retention of information, student comprehension, and student academic performance. Of the 29 teachers who responded to the question, 24 agreed or strongly agreed that technology improved student engagement. Twenty-one agreed or strongly agreed that technology improved student retention of information, and twenty-two agreed or strongly agreed that students perform better academically. However, only 17 (58%) felt positively that student comprehension was improved on assessments with the use of technology. Overall the teachers who participated in the survey saw a positive correlation between the use of technology in their classroom and student engagement, retention of information, and academic performance.

The survey also asked teachers to reflect on their own perceptions of how technology affects the quality of their lessons and how students interact with the technology in the classroom. All respondents indicated that their students enjoyed learning with technology, while all but one responded that they perceived their students preferred learning with technology. Additionally, most respondents (27 out of 29) indicated they perceived a difference in the quality of their lessons when utilizing technology. Appendix D contains detailed tables from the survey data. (See Appendix D for Teacher Perceptions of Technology.)

Based on a study by Mouza (2008), teachers were asked which student behaviors they perceived a difference in when utilizing technology in classroom learning. Eighty-nine percent of the teachers indicated student engagement, 86% motivation, 75% independence, 69% discipline problems, and 46% self-efficacy. Teachers were encouraged to note all behaviors that applied.

In correlation with the research questions, teachers were asked on the survey to indicate the types of activities they ask students to do on the computers in their classrooms. Mostly, students are watching online videos, word processing, completing research, reading texts, and using an online management system (See Appendix D for Student Classroom Laptop Activities). Based on teacher survey responses, the 1:1 laptop initiative has impacted the daily instruction in the classroom. In Chapter V, I will discuss the results of these survey findings with the teacher and support personnel interviews to create the larger picture of the impact on the quality of instruction at East and West Middle Schools.

Technology's impact on teacher engagement. In order to support deep student learning and engagement in the classroom, teachers must engage in learning and planning themselves. To understand the extent in which the technology has impacted the desire and drive to be involved in the planning process, twelve questions were asked on the survey regarding teacher engagement. Teachers were asked to demonstrate on a sliding scale how much time it takes to plan a lesson integrating technology versus planning a lesson

without integrating technology. Based on the responses, it takes teachers longer on average (6.48 hours) to plan a lesson integrating technology than without (5.67 hours).

In correlation with the research (Gom, 2009; Lenoue et al., 2011; Means & Olson, 1995; Rosen & Beck-Hill, 2012) that demonstrates teachers improve classroom instruction with technology when supported, a series of questions was developed to examine how teachers felt about the support provided for them at their respective schools. When asked how satisfied teachers were with the quality of support at their schools, 83% of the respondents answered that they were either satisfied or extremely satisfied, with one respondent (3%) expressing dissatisfaction (See Appendix D for Satisfaction of Teachers with Support of Technology).

Teachers were also asked what types of supports for technology were available to them at their schools, with more than one answer choice available. The following supports were indicated by the respondents: technology facilitator (94%); online resources (71%); relevant professional development (61%); leadership support (48%); peer coaching (45%); time for planning with technology experts (35%); and other (10%) with other being listed as assistive technology support, media coordinator, and everyone has a laptop. When asked if the professional development offered at their school for the implementation of the technology met their personal needs, 83% of the respondents answered yes and 17% answered no.

In reference to the study by Burns and Polman (2006), questions were developed for the survey that measured the survey participants feelings of comfort with the technology and self-efficacy. When asked how successful they felt implementing the technology into their classroom, 83% felt successful or very successful. The remaining 17% felt either somewhat (7%) or slightly (10%) successful. Teachers were asked to respond freely to what factors have contributed to their success in the classroom and what factors have inhibited their ability to implement technology in the classroom. Their answers were categorized and tabulated based on the frequency of response because some teachers' responses indicated different factors in one response. Teachers noted most frequently that on-site support and access to the technology resources contributed to their success while negative student behaviors and lack of time where most frequently cited as factors inhibiting successful implementation. Frequency tables and full responses can be found in the survey data found in Appendix D.

Also in correlation with Burns and Polman (2006), teachers were asked if they considered themselves advanced in integrating technology into their instruction. Of the 29 respondents who answered this question, 41% responded yes and 59% responded no. Teachers were also asked to indicate their level of comfort with integrating technology effectively into their instruction with a unique slider scale. The majority of the respondents indicated a positive feeling of comfort (see Table 8).

Table 8. Teachers' Comfort Level in Integrating Technology Effectively into Instruction.

Answer	%	Answer	%
🙂⎺	26%	🙁⎽	0%
🙂⎸	67%	🙁⎸	0%
🙂⎽	7%		

In alignment with Maninger and Holden's (2009) research, teachers were asked a series of questions regarding their understanding of themselves as a determining factor in their own technological success as well as their students. Using a slider scale teachers are very familiar with—the grading scale from F to A+--teachers were asked to indicate their confidence level in (a) creating quality lessons involving laptop technology and (b) their ability to improve and adapt over time in utilizing laptops for quality instruction. The responses ranged from C- to A+ with more teachers showing confidence in their ability to improve over time than strong confidence (A) in their current evaluation of themselves (see Table 9).

Table 9. Teachers' Evaluation of Their Confidence Levels for Creating Quality Lessons with Technology

Answer	Confidence in Creating Quality Lessons	Confidence to Improve over Time
A+	12%	5%
A	24%	50%
A-	12%	5%
B+	24%	15%
B	8%	10%
B-	4%	10%
C+	4%	5%
C	0%	0%
C-	12%	0%
D+, D, D-, F	0%	0%

Finally, teachers were asked to openly respond to how integrating laptops into their instruction affects their willingness or ability to improve their practice. While I attempted to compile the answers into categories, it was difficult because I feel that some respondents misread the question. One teacher wrote, "For my students to have access to the same information that I have and ability to check on how they're using it." I am unclear how this teacher meant for me to see how this affects his or her willingness to improve professional practice. Another ambiguous comment was "it gives good feedback."

However, there were three teachers who indicated that laptops were not the factor that drove them to improve their practice. One of these responders

wrote, "Integrating technology is NOT the single factor or even a large factor in my willingness or ability to improve my practice." In contrast, there were some teachers who indicated that technology played a large role in their professional improvement. One of these teachers wrote, "I am more on my toes, especially to make sure my students are doing what they should be doing and going to the appropriate sites." Another wrote, "I am much more willing and able to do project-based learning and diff. instruction for my different levels and types of learners because of technology." A third teacher wrote, "Greatly…it is SOOOO much fun using technology and laptops." Overall, the comments were positive in nature and indicated that integrating technology into instruction had a positive correlation with teachers' willingness to improve their practice (see Appendix D for full responses).

Based on the survey responses, there are clearly positive and negative thoughts regarding the support for and use of technology in teaching. It is also clear that technology has impacted teachers' professional practice. In the next chapter, I will discuss how these results correlate with the interview data to create a larger understanding of the impact of the 1:1 initiative on teacher engagement at the two middle schools.

Technology's impact on digital equity. At the core of the 1:1 laptop initiative is the drive to equip every child with the same digital technologies and access to the Internet. In correlation with research that looks at deeper issues of digital equity such as what students are asked to do with the technology both in

school and at home, what accommodations are made for students with impairments, and the content to which students are exposed (Gorski, 2009; Solomon, 2002), teachers were asked three questions regarding digital equity issues on the survey.

To find out if technology is helping teachers to give access for all students to challenging and rigorous course work (Gorski, 2009; Hardaker et al., 2010), the survey asked teachers to describe how they differentiated for their students using technology. Teachers most frequently responded they used technology to give students different assignments (9) followed by providing access to various resources (5) and using flexible grouping for students (5). Teachers also indicated that they used technology to give independent or self-paced learning opportunities to students (4) and to give choice options to students (4). A frequency table "Differentiating with Technology" of the categories of the teachers' responses is located in Appendix D.

Also in relation to Gorski (2009) and the 2010 National Educational Technology Plan (*Transforming American Education: Learning Powered by Technology*, 2010), questions were asked to determine how teachers were ensuring equitable learning opportunities for all students through the digital content to which students were being exposed. Teachers were asked how they decided which software, website or digital content to utilize and how they ensured that the digital content they utilized was culturally responsive and met diverse learners' need. They were supplied answer choices and given the option

to provide their own responses. Most frequently, teachers determine which digital content to use and ensure it is culturally responsive based on their current need, followed by referral of a colleague, Google search, and use of a rubric. A table representing the comparison between the two questions and teachers' responses can be found in Appendix D (Evaluating Digital Content). In Chapter V, I will discuss how the results of these survey findings correlate with the teacher and support personnel interviews to create the larger picture of the impact of the laptop initiative on equity of learning opportunities for students at East and West Middle Schools.

This concludes the quantitative, online teacher survey discussion. While this mixed methods study uses both quantitative and qualitative data, the concurrent nature of the study allows for the reporting of the two different types of data in separate sections. However, in the next chapter of analysis and interpretation, I will combine the two forms of data to seek relationships among the results, as according to Creswell (2007) the "structure of this type of mixed methods study does not make a clear distinction between the quantitative and qualitative phases" (p.220).

Teacher Interviews. Teacher interviews were conducted with seven teachers who volunteered to participate through the online survey. To help the reader better understand the teachers' perspectives in regards to the three major prongs of the study, I utilize the teachers' words and ideas to express the major categories that emerged through the data collection.

Technology's impact on quality of instruction. At the heart of

understanding how teachers use technology in their instruction is uncovering

their perceptions about the role of technology in education. To start the

conversations, each teacher was asked how they viewed the role of technology

in education. Since technology is at the heart of this research study, it is

important for each teacher's response to be represented (See Table 10). All

teachers felt that technology was an important aspect of the educational

environment.

Table 10. Teacher Interview Participants' View of Technology's Role in
Education.

Teacher	Response
Alice	I think it's essential in any classroom environment. Day to day, week to week, I like having easy access. It's an integral part of the classroom environment.
Sammy	I see it as a great facilitator; especially of instruction…Also, I think it's that good engagement piece. Technology helps engage the students to create. I think with technology, they can interact and create more than construction paper or even a notebook or something. I just think that's the key to it.
Marie	Vital, especially for the 21st Century, and I have learned with my students a lot. For us to move forward, they need it.
Thelma	I think technology can be a very useful tool, but I also think it can be a babysitter. And I see those aspects even right here in this building. I think if it is used in a manner to enhance whatever you're doing in a lesson, then it's a great tool. If it's used to Google answers or show a movie or something of that nature, it's not as effective.
Ann	I view the role of technology as essential. It's hugely important to [students].
Floyd	I think it's a must. I mean as a society, as a civilization we're evolving in technology. I think you have to have it. I think give it about 20 years and the pen won't even be a thing anymore. I don't think the pencil will be a

	tool anymore. I think with changing times you have to evolve. I mean education has been evolving I think since I was a kid until now and it's got some good things about it, but it's also got some negative things about it…I think technology is not a magic wand. I think it's a tool. It's not going to fix everything. Smart boards aren't going to fix everything. It's a tool. It depends on how you use it.
Brenda	I think it's essential. I think it's the next step in education, I really see a lot of what we've done traditionally becoming obsolete because of the technology implementing that we're doing.

Through both the wording of the teacher responses and the questions raised, six categories emerged representing the study prong and research question of "quality of instruction." These categories are explored in this section: (1) technology as a tool; (2) student engagement in learning; (3) quality teaching practices with technology; (4) student laptop behaviors; (5) monitoring; and (6) challenges.

Technology as a tool.   Just as in Thelma's statement above, most every teacher expressed heavy sentiment that technology was just one of the many tools at their disposal to create quality lessons. For example, Alice talked about how she used the technology in her planning and instruction, but her lessons were built around the standards and clarifying objectives rather than the technology itself: "If they were able to master [the standards], if they successfully completed all of it, well obviously they have a pretty good understanding…" In talking about the successful use of technology in the classroom, Sammy said, "The teacher is a big piece of it." While, Floyd framed it up in these terms:

> I think technology is great as I said at the beginning, but a lot of
> times I think seeing SmartBoards, wow, that's cool, but after a while
> to the kids, it's just a big television. What are you going to do with
> it?...I mean you go home and you don't think your computer or your
> iPad is amazing just because it's an iPad. You think it's amazing
> because of the stuff you're intertwined with.

Each of these teachers expressed that the technology, while important, was a

tool that was only as great as they used it to be in their lessons.

Student engagement in learning. When asked about technology's impact

on their students' engagement in the learning process, overall teachers'

responses indicated that the laptop initiative has positively impacted student

engagement and improved student learning. As Brenda, the AIG teacher, put it:

> They are more deeply involved, I would say. What I like most
> about it with my particular population is there's opportunity for
> tangent learning with the technology. If we're talking about for
> example, independent study on poetry, and they had a question
> about a particular author's past, they can instantly go and pull up
> another window and look at it versus if we were just talking about a
> particular poem in the classroom without access to technology,
> there wouldn't be that opportunity for curiosity and exploration so
> instantly.

Alice, who used technology with her students through an online learning

management platform called Edmodo, had students asking for her to add more

content to the class page for them to use for studying and reference.

> I felt like it was a really strong component to why some of the kids were
> able to answer some of the questions the way they did…I don't know how
> you would prove it, but I feel my kids gained and retained their knowledge
> and that computer use was a component in that.

Echoing Alice's sentiments, Ann talked about students' learning and engagement in her classroom:

> They're excited. And they perform quite nicely, as far as assessments, and just not assessments really just projects at this point and products. They seem to really grasp the concept better, especially when they're on the websites, and then I get printouts and stuff, or emails about how they've done.

Marie sees students engaged in technology in her classroom as well. "They're collaborating with their classmates. We do partner up a lot with technology. I can see them talking about it, being excited about it, not just sitting there in a daze."

Thelma expressed that her students engaged in the technology based on their access to technology at home:

> I think, really, some of the students are very technologically advanced. But those who aren't, aren't nearly as engaged. You can tell who has a computer at home or a Smartphone or whatever the case may be, that's a little bit more advanced, and you can tell those who don't have anything at home. Because when they get on the computer, the first thing they want to do is research the latest and greatest game, and play, and see if they can sneak playing a game or sneak looking something up that's inappropriate. So just it really depends on the student and the level of background and where they come from kinda thing. I know that sounds crazy, but it just seems that the students who are around technology, they can handle it. They seem to have more focus and they just jump to whatever the task is.

While Floyd expressed that his students engaged in the technology, and he sees the value in the technology for student learning, he also expressed that his students did not have to use technology to be engaged or to learn:

> I think they perform as well as they do without technology. Like I said it's good, it's important, it can be fun, you can do stuff obviously you can't do with a dry erase board or paper and pencil, but I mean I see the same level of growth, achievement, interest, motivation with technology versus not technology, and I think it comes back to it just depends on how you deliver that lesson, that assignment, how you motivate them as a teacher.

This statement demonstrates several of the teachers' sentiment that will be explored deeper in Chapter V: the quality of the technology use is in direct correlation to the quality of the teaching strategies used in the classroom.

Quality teaching practices with technology. Overall, the teacher interview participants felt that technology enhanced the quality of their lessons. Alice talked about her planning process with her teammate,

> Everything was centered around how can we tie in the technology. How can we use the technology to help the kids better understand the standards. Does this tool, does this video match what we're doing? We used some of it for bell ringers, sometimes the heart of our lesson was the technology. It just depended, but we did everything we could to pull in technology, and it wasn't like we had to try. It was better with it… one of the things we really tried to do was make sure that the standard was the focus. So we found sites, we found interactive activities, we did hands-on that addressed those standards.

Ann talked about the quality that the technology brought to her lessons since the information in her textbook is ten years old:

> [The textbook was] talking about the possibility of maybe someday being able to take a picture and send it. We can do that. The kids are like, wait, that's… I know, I know. It's old. That's when they're disengaged, it's old. That's like telling them about when the phone was invented...So more authentic writing, there's lots of blogging back and forth to each other, they've got discussion forums, Clever Classroom, discussion forums. They can make Wiki's. There's so much that's authentic writing and that's so much better than just report on the text or answer this question. They start to see why writing, no I don't agree because blah, blah, blah, doesn't tell the reader what you're talking about...So they have to learn to be much more clear in what they're saying, and I just think it makes them so much better. And it does, it really has affected what I can do in my classroom with them.

Marie talked about her students' ability to engage with the "real world" through the benefits of technology:

> A lot of kids don't leave this county, and when we go outside and visit Japan and see what their population is compared to something else, they're getting a taste of what it is and how to use it, and then move on with Math Fair and stuff. They can use the stuff they find on that technology to deepen and enrich their Math Fair projects, which I saw a lot better projects this year because of that.

In addition to seeing the quality that the use of the laptops add to their lessons, the teachers also talked about the particular things that they did with the technology that they felt were quality teaching strategies with the technology. Every teacher mentioned the use of Edmodo as an online learning management system to communicate with their students, and all but one of them mentioned

using Google Docs and or Google Apps to collaborate online. Other teaching

sites or tools tended to be content driven like IXL.com for math or Discovery

Science for the science teachers. Sammy commented in regards to online

resources:

> But as far as curriculum goes, it just enhances everything,
> especially in social studies when you've got things like history,
> photography from time periods, and geography, and using things
> like Google Maps and Google Earth and stuff, that you can really
> bring it in a real world perspective instead of just looking at a
> picture of Thomas Jefferson signing the Declaration of
> Independence. You can actually see the Declaration of
> Independence. You can watch a short two-minute clip about the
> connections with the Declaration of Independence. And then they
> can collaborate. I mean, it's just – technologies, especially to me in
> social studies, change.

Ann also commented on the availability of quality resources for science:

> There is so much out there, science is changing constantly. Every
> single day there's something new and with the Internet, everything
> is updated constantly, continually, and we've always got the
> freshest and newest stuff, articles that are just right now. The
> tornadoes happen, there you go. We study weather, there's your
> article right there. Constant and authentic things. It's not just how
> you get those textbooks and that's very dry, textbook reading,
> which is important except for certain things. But for preparing them
> for the future, for the 21st Century, they need to be able to know
> what's going on in the world and be part of what's going on in the
> world. So it gives us that very instant connection to everything.

While Sammy and Ann have an abundance of online resources for their content,

Marie struggled to find ways to incorporate laptops in her math classroom, "It's

really hard. We're trying to find more ways to use it with math...my end products

have changed. Instead of paper-pencil test, this is what you're going to do to prove that you can find the percent of this."

Alice demonstrated her use of digital resources through her comment, "I use the submission formats whether it's Google Docs or Edmodo or whatever to get the documents and the documents are always tied to the common core or the essential question, whatever the lesson is designed around." Likewise Sammy talked about how he used the technology in his classroom, "I use pretty much – I mean I try to be – and not just for the namesake, of course – but a paperless classroom. I use the [district] accounts through Google docs. We do a lot with Google Docs."

In addition, Marie talked about how the technology shifts her role as the teacher in the classroom:

> If a kid didn't get a concept I could pull up something to lead them
> in a different direction, because they may get it this way instead of
> this way. So the technology could help me when I was in a bind. If
> I had a couple of kids that didn't get something, then I could say
> let's go look here and see if there's another explanation.

Sammy also talked about this concept:

> I've become more of a facilitator, by far…I facilitate things…I'm not
> standing at the front of the classroom. I'm just facilitating, and I
> love that idea…I think the biggest thing is facilitator, from teacher to
> facilitator, it becomes that – sometimes you just need to get out of
> the way. You set the clear goals, you get an engaging lesson, but
> once it's moving – especially with technology – once it's going,
> they've got everything set out, you're just there to help.

Finally, it is important to note that Floyd pointed out that a component of quality teaching, with technology or without, is that a teacher builds relationships with the students in order to plan quality lessons with their students in mind.

> I don't think all technology engages. I think you've got to set the assignment up to make it engaging. You've got to know your kids, which goes back to something that's not technology, knowing relationships. You've got to build that relationship and know your kids in and out because if you don't it doesn't matter what kind of smoke and mirrors technology assignment you do; if you don't know your kids they're just going to kind of do it to do it, get it out of the way, go through the motions of it. They're not really going to do it to fidelity.

According to the teachers interviewed, quality practices using technology in the classroom include using technology to help students meet the standards, making learning authentic for students, providing higher quality resources, and shifting teaching strategies to help students learn. Not all teachers have an abundance of online resources, Marie and Floyd both pointed out they are more limited in their uses than their science and social studies counterparts. In addition, all teachers employed the use of the online classroom management system to organize the class and communicate with their students. How the use of these teaching strategies correlates with the idea of digital equity will be discussed further in the next chapter.

Student laptop behaviors. Teachers were asked if they perceived a difference in their students' learning behaviors when they were engaged in

utilizing laptops with their lessons. Ann said, "They become more independent,"

and Alice also commented:

> They're very focused, even in groups. They like to do group work
> where even if they're sharing one computer, if it's two kids to a
> computer, they just seem to enjoy having that open access to a
> computer and watching the videos and going through the web
> quests and being able to listen to words.

Sammy also talked about his students' behaviors, "Many kids I see are much

more confident…I think technology helps kids be more independent and more

confident in their actions, their learning." Thelma provided a specific example of

students showing this independence and confidence: "They'll message me on

SmartSync or they'll send me a little message at night, or 'I didn't understand

this,' or 'I have a problem with that.'"

While positive behaviors were noted by all of the teachers interviewed,

they each talked about negative behaviors or cautions that have to be monitored.

Brenda summed it up with her comment:

> Sometimes technology just creates an opportunity for the same
> behaviors, negative, often in a different format. The bullying or the
> off-task or doing something they shouldn't be doing. They can do
> those things in the classroom without technology too. So it really
> kind of depends. You have to set up parameters. You have to have
> that rapport. You have to understand what the expectations are in
> the kids.

According to the teachers interviewed, the use of the laptops in the

classrooms has had both positive and negative effects on the behaviors of

students. The next category is an unexpected finding in regards to teachers'

responses to student laptop behaviors and student engagement.

Monitoring. While I did not specifically ask how teachers' monitored

students' use of technology, through questions regarding how teachers knew if

students were engaged in the technology and if they were learning the desired

outcomes, the idea of constant monitoring continued to re-occur. According to

Alice, there has to be "constant monitoring. You cannot by any means let them

sit down and just let them go at it." Sammy's comments correlated with her

sentiments, "Without monitoring, it's easy to make tabs and go to other places,

and these kids think they're multi-taskers and all, but I'm not convinced. I think

they're not multi-taskers at all. I think they're distracted a lot."

Several of the teachers talked about how they had to learn how to monitor

the technology themselves. An example of this was Marie, who said,

> At the beginning it was hard to keep them focused on what we were
> actually doing, but I now know how to turn my desks to make sure
> they're where they're supposed to be, because we do have issues
> of them not being on the right stuff. But, I'm learning along with
> them on how to make sure they're still doing what they need to do.

Finally, the teachers were also able to use technology themselves to monitor.

With a program called SmartSync, teachers are able to have access to every

student's computer through their own computer. Thelma talked about the

usefulness of utilizing the SmartSync in monitoring the students to "see exactly

what they are doing, so I can go on and block or monitor or see what they're doing…so I can tell whether you're on task or not."

It is important to note that while most teachers felt it was important to keep students on-task and from going to places on their laptop that the class was not supposed to be (i.e. email, Internet, etc.), Brenda noted that she had more tolerance for her students having several windows open on their computer screen while they were working on assignments. "I also feel like I'm a multi-tasker, I can be writing an e-mail and checking some data and doing these other things too, so why couldn't my students have several different windows up?"

Regardless of their style of monitoring, teachers felt it was important to monitor students' behavior on the laptops to ensure that learning remained the focus of the classroom. While negative behaviors with the laptops could be a deterrent to using the technology in the classroom, the teachers interviewed just saw monitoring as part of the daily work of the classroom.

Challenges. While the teacher interview participants considered themselves advanced at implementing technology in their classroom, they expressed frustrations in accomplishing integrating the laptops into their instruction. Classroom structure, including time constraints, is a large factor as expressed by Marie:

> It's hard with 55 minute classes to log on and do what I need to do. That's the time constraint is what's really hard...Fifty-five minutes is just, once I get something started it's time to go. And even the kids

are disappointed, "Oh, we don't want to go."   And I'm like, "Well, you have to."

In addition to classroom constraints, technology issues such as Internet or SmartBoard outage were frequently cited by the participants as a challenge. Floyd summed up the frustration by stating:

If the Internet's not working, you've got an issue, and it's cloudy on some days. The planet's got to be in perfect alignment on some days for it to work and if it doesn't…we shouldn't be too dependent on it because you don't know what's going to happen, or we've seen this year when we've done benchmark tests, there's always three or four kids that just their computers are not working right and that's frustrating. You're trying to put that fire out and then you've got one pop up over here and this one's not getting Internet connection anymore. It can be frustrating. I'm not going to lie; it is. But you can't damn the whole thing for a few problems here and there. Everything's got its flaws and issues.

These seven teachers, even though they have these challenges, feel that the value of implementing technology into their instruction exceeds the negative impact of these frustrations.

Through the six categories of (1) technology as a tool; (2) student engagement in learning; (3) quality teaching practices with technology; (4) student laptop behaviors; (5) monitoring; and (6) challenges, the data have shown the teachers' positive and negative perceptions and understandings as they relate to technology's impact on the quality of instruction in their classrooms. In the next section, the data will explore the teachers' input in regards to the

second major prong of the research study: technology's impact on teachers'

engagement in their professional practice.

       Technology's impact on teacher engagement. To deeply engage their

students, educators must be engaged in the learning process themselves

through knowing about their students' needs and learning goals in addition to

having the knowledge of what learning resources will best help their students.

Through both the wording of the teacher responses and the questions raised, five

categories emerged representing the study prong and research question of

"teacher engagement." These categories will be explored in this section: (1)

technology's impact on teachers' work; (2) teachers as learners; (3) support for

teachers; (4) success with technology; and (5) personal enjoyment.

       Technology's impact on teachers' work. Based on teachers' input,

technology has impacted teachers' work through facilitating and encouraging the

collaborative process. Thelma commented, "There are just resources

everywhere with people who will gladly give you things. And then the best thing

about working with my teammate is collaborating. I mean we share like you

wouldn't believe." Corresponding with Thelma, Ann had a similar response that

indicated the collaborative culture surrounding the use of the technology, "I help

people, anybody who needs help, I will go help them. I help the kids, I teach the

kids to help each other because I think that in helping each other they learn."

The teachers also explained how technology made their work more efficient. In particular, most every teacher spoke about how planning was either easier or better. Marie said:

> I keep it all online. All of my lessons plans are there. Everybody can view them. They're in a public folder I think now…So, it does help me plan. It helps me figure out more what I can do and differentiate even better for these kids. Because I do, I break it up into about three different groups, as far as what the kids are expected to do. So it does help me with that a lot.

Sammy explained, "I'm constantly wanting to revise, constantly changing, and with the Google Docs and stuff like that, it's so easy to do." In addition, Brenda talked about how technology helps her with the time factor:

> When I'm planning [my lessons], if I didn't have technology, it would take me so much longer. I'm able to pull from so many more resources to create the actual lesson plans for the unit of study and integrate different resources seamlessly rather than paper pencil kind of thing.

Floyd said in reflection of how technology has impacted his work:

> I think it's just made me more conscientious about the assignments I do, especially last year, boom, the new style of teaching with one to one, this year, boom, Common Core, so you know the stuff we used last year you might not be able to use this year. I think it's just made me more…I don't want to say second guess myself, but I think things a lot more thoroughly before I select to do them.

Additionally, Alice remarked that utilizing technology has "changed how I teach, and I couldn't imagine teaching any other way anymore." Technology has clearly

shaped teachers' professional behaviors. Overall, teachers expressed a positive

feeling in regards to the impact technology has had on their work practices.

Teachers as learners. To fully support student learning with technology,

teachers indicated they needed to also be learners of the technology and their

content through the technology. Several of the teachers noted that the students

became the teachers when it came to the technology "because I want to learn

too, and [the students] are teaching me stuff" according to Marie. "I mean these

kids are probably…a lot of them are more computer literate than you and I.

They've got all kinds of tricks and tricks of the trade that we don't even know

about…," remarked Floyd.

Additionally, the teachers talked about using the technology to help them

learn for their instruction. Ann related a story of a time she was able to contact

the experts at NASA for information for herself and her class:

> I'm a very self-solving kind of person. I know how to find what I
> need to find, I know that if I have any kind of a question or problem
> with something, there's experts out there. When I was doing sixth
> grade, I had some questions about some things related to the
> universe, and I got the NASA online stuff. I just wrote to them and
> asked them. You can bring in the experts if you want...There are
> places that you can go to, to get assistance to understand
> technology even if you don't understand what to do, start small.
> Start with one little thing that you're doing consistently with
> technology. There's so much out there.

Technology is able to help teachers have the tools they need to improve their

own learning and in turn improve their students learning.

Teachers also spoke about the professional development opportunities that were available to them to help them utilize technology effectively. All teachers gave positive responses regarding the types of professional development, both within the school and professional conferences, to which they were provided access to support their laptop implementation. Four of the teachers specifically noted they had lead technology professional development for other teachers in their school: Alice, Brenda, Ann, and Sammy.

Whether through learning from their students, using the technology itself, or learning from professional development opportunities, the teachers interviewed understood that the utilizing technology in their classrooms meant constantly learning for themselves and their colleagues.

Support for teachers. All of the teachers interviewed commented positively regarding support for their technology implementation. Each middle school has in place a technology facilitator, whose primary responsibility is to help teachers with technology integration and provide professional development. Without exception, the teachers commented on the support provided by the technology facilitator in their school. "Well, we have an awesome computer person here, who just runs right up when I need help…" said Thelma from East Middle School, and at West Middle School, Sammy commented that "we have a technology facilitator and the media specialist, are always there to help if we need it."

Ann summed it nicely when she said, "I think that overall, we do a good job of teaching people, and there are enough people around that are willing to

jump in and help." Overwhelmingly, teachers spoke positively about the support they are provided to implement technology in their classrooms and professional practice.

Success with technology. Although the teachers were recruited for the interviews based on their own perception that they were advanced in using technology, the idea that they felt they were successful with the technology and had a high level of comfort using the technology is an important finding in this study as it relates to teacher engagement. Ann stated, "I have great interest in it because I love to use technology. I'm bound to be fairly successful because I like doing it, I'm going to jump in." Alice talked about her success in these terms:

> I feel very successful. I feel like…I don't know why I'm going to say
> this, but I feel like this has been the best year of my life teaching so
> far. I've really enjoyed this year, and I think part of that is not just
> because of technology. I've had a teammate who has been eager
> to learn it and implement it just as much as I have been, and if we
> don't know what's best to use, we seek it out.

Brenda reflected how important support has been on her and her colleagues' success with technology:

> The support early on and the constant technical support. I think
> that is essential to my success and other teachers' successes.
> Because if they try something and it doesn't work their first time and
> there's not somebody there immediately to help, then we're just not
> willing. It's hard to give up that time from your classroom to work
> through that. So having someone knowledgeable onsite who can
> help teach us new things as well as troubleshoot is essential I think.

While support, as noted in the previous section, has been a huge factor in the teachers' implementation of the 1:1 initiative, many of the teacher interview participants noted their individual comfort with technology as a determining factor in their success with technology. Floyd said he thought of himself as being "fluent in technology" while Marie indicated she was growing in her comfort level with technology:

> This is the end of my fourth year. The first year I did not have the desks turned to the SMART Board. I was never going to be able to learn that. Well, within one week it was on. If I had had more SmartBoard training, I think that would have been better at the beginning. But now I feel very comfortable with that and with the laptop one-to-one. There's still some issues, but I did some of the Google Docs at the high school, the professional development. So I do feel better with that. But I feel good.

Thelma talked about her comfort level in this way:

> I feel pretty good about it. My girls will tell you I'm a technotard at times. That's their favorite thing to call me sometimes because I'm old. And it's changing so rapidly that I might to get comfortable, and then by the time I get comfortable it's gone. But it – I'm never so uncomfortable because there are so many people who can say, "Oh, that, Thelma, you can do this. It's easy." And they're always willing to help, so. But I don't want it to be the forefront and run everything that I do because I think sometimes we rely way too much on it.

Finally, Alice pointed out the key to her success: "I feel like I'm a better teacher, and it's not necessarily because of the technology, but I feel like a better teacher because I know how to purposefully use the technology." Knowing how

to use the technology meaningfully, having a personal overall level of comfort with the technology, and support with the technology has helped the interview participants to feel successful in implementing the technology in their classrooms.

Personal enjoyment. A surprising finding in the teacher engagement prong was a strong link to the teachers' personal enjoyment of the technology. The correlation between six of the seven teachers' responses to a personal enjoyment and professional use cannot be overlooked. Floyd linked the two in his statement:

> Me personally, I tend to engage myself more in things I enjoy and find interesting and I don't engage myself in things I don't find interesting. There's lots of my job I love and lots of my job I don't like. I tend to be more engaged in the stuff that I do like.

Ann had a similar response, and she displayed much enthusiasm while she was speaking:

> It's more fun to plan if I can look online…It's more fun, it is. I can go anywhere, I can go to NASA. If I want something, I can go to NASA. I can go anywhere to get my information. I can go get the tornado things from Discovery Education; I can get this and that, real data from this. It's just more fun to me because it is real, it is right now, it is something I'm showing them that the kids are going to go, wow!...I just really enjoy planning, I do, I enjoy planning things for them...I've got these tissue boxes in my classroom. Why? Because we were going to make catapults out of them. I would never have thought about that. It was on Pinterest. [Laughter] I would never have thought to use a tissue box for that. There's so much knowledge out there. There's so much thinking. There are so many ideas. You've got the best. You've got all of this

at your fingertips and that's really great. It's fun, and it makes it
more fun to plan!

Finally, all teachers in addition to speaking positively about their personal use of

technology displayed positive body language while speaking about their personal

feelings of using technology. It is clear that teachers' personal enjoyment in

using technology has an impact on their use of technology in their professional

work.

Through the five categories of (1) technology's impact on teachers' work;

(2) teachers as learners; (3) support for teachers; (4) success with technology;

and (5) personal enjoyment, the data have shown the teachers' perceptions and

understandings as they relate to technology's impact on teacher engagement in

their professional practice. In the next section, the data will explore the teachers'

thoughts on the third and final prong of the research study: the 1:1 laptop

initiative's impact on the equity of learning opportunities provided for students.

Technology's impact on digital equity. Digital equity involves much

more than providing the hardware to the students, such as the types of activities

students can and will do with the technology, what their teachers know and can

do, and providing accommodations and adaptions for marginalized and disabled

students (Gorski, 2009; Solomon, 2002). Through the wording of the teacher

responses and questions raised, three categories emerged representing the

study prong and research question of "digital equity." These categories will be

explored in this section: (1) access, (2) differentiation, and (3) evaluating digital resources.

Access. All students at East and West Middle Schools, including the visually impaired students, have physical access to the laptops. "We have a child who is paralyzed from the neck down who has his laptop at home and he has…he can speak or something to it," said Marie. However, in the case of the visually impaired student, Alice and Floyd talked about how the student used the braille writer instead of the laptop. Alice further explained, "We kept in close contact with [the visually impaired teacher], to help with Braille things, and you know she might not have been able to see everything perfectly but we still used it."

Students at East and West do not take the school laptops home. When asked how many of their students had Internet access at home, none of the teachers knew for certain, but guessed that a large percentage of them did. Three of them mentioned access through neighbors, the library, or restaurants like McDonalds, while four of them mentioned that many of their students had access via a mobile device. Marie said:

> I don't put assignments online because of that, but I do put the assignment what is due online, so those kids that can access it, if they've forgotten what to do. All homework is through the Edmodo program. I don't upload it because they have books and stuff that they have to work on, but I do put page numbers and what number is group one, or group two and group three. So, they do have that. But most kids have it. And if they don't they have a neighbor or the library, since we're in walking distance with the library, so it's nice.

Sammy expressed frustration with the lack of Internet access in students' homes:

> I'm working on the flipped idea, but the problem with that is the digital divide, what kids can do at home next to other kids. I would say that the biggest thing that I use the technology for has been to collaborate online, especially through Google Docs. I use Google Docs tons.

Balancing how to plan for instruction for students understanding they will not necessarily have access to Internet or computers when they leave the school with the possibility that students may lose access to computers within their own classroom is a constant struggle for teachers. Thelma talked about having a student in her classroom that lost his laptop due to disciplinary reasons:

> We have one whose laptop we had to take away. And we tried to give it back, and we still had to take it back away. He just – he's addicted to porn. And his mother came in and said, "Yes, he's addicted to porn. I had to take it away from him at home." But when we do an assignment, I just have him pair up with somebody near him. He can still – he's responsible for writing whatever it is instead of doing it and computerizing it...He has access, but it's very limited.

Brenda called it a "knee jerk reaction" to take away the technology from students for behavior purposes. She felt that there needed to be "more professional development in terms of managing and how to handle the behavior" so that students be guided to make better choices with technology especially in the middle school years.

While all students have physical access to a laptop at East and West Middle Schools, they may not keep it due to disciplinary reasons. In addition, teachers understand that not all students have access to laptops or the Internet beyond, though they are unsure exactly how many of their students, yet all of them utilize an online classroom management system to organize their class or collaborate, like Edmodo or Google Docs. The impact of these programs on digital equity will be discussed further in the next chapter.

Differentiation. When asked how they used the technology to differentiate to meet their students' various needs, the teachers used the technology to provide different resources and options for repetition of videos or notes. Alice's response is exemplary of her colleagues:

> I can find five different articles that say the same thing or have the
> same basic information but this one's got more in depth, this one's
> got shorter sentences but bigger ideas, this one's got...So I know
> what they need and I can give them different articles and I can give
> them, something I like to do is give them two articles. Like this is
> one that I picked specifically because of their needs because
> maybe they have ESL issues or different issues, whatever the issue
> is. And then this one which is more of a challenge but it says the
> same thing. So they get it two different ways and then they may
> start to pick up on this idea. I've also got differentiation like I've got
> a Spanish speaking student, she only speaks Spanish. I can
> translate everything we've got. Anything I give to her, I can
> translate it, and she knows how now because we've shown her.
> She knows anything I give her, she knows exactly how to go
> translate it. I think that's empowering for her coming to a new
> country, she has no idea. But she can take part.

In addition, Floyd talks about his take on differentiating with technology:

> I think it's more of changing the assignment, not the technology. I think these kids get the technology perfectly, at least the ones I've had experience with this year, whether it's AIG, EC, whatever you want to call it. I think that they can log in, they can use the websites. It's pretty user friendly. It's the assignment itself, it's the application of information that I've got to modify, not the technology.

Thelma had a different perspective all together on working with students who are at different levels:

> Now, my lower levels who don't study are still not gonna study, no matter if I have it on the computer or I give them a worksheet or we talk it out loud. It doesn't matter. My higher levels are going to work hard no matter if I give it to them in technology or on paper or we talk about it out loud. So I don't see a difference. Or I guess I should say I do see a difference, but it doesn't change based on the technology.

Whether through providing different types of assignments or different levels of assignments, the teachers interviewed talked about how technology helped them to meet their students' needs. However, as the comments presented show, the teachers' beliefs about themselves and their students will dictate the equity of learning experiences provided for the students.

Evaluating digital resources. Overwhelmingly teacher interview participants responded they utilized their own professional judgment, along with the judgment of their colleagues to determine the most appropriate digital content

for their instructional needs. Sammy explained he chose digital content for his

class

> by reviewing it first. I would never show them anything or anything
> like that without going through it with a fine-toothed comb, but I
> think it's important, too, that you give perspective, and I think with
> history, perspective matters...Make sure that your ideas can be
> provocative but not offensive. I think that's important, and that, to
> me as a teacher, to really think through what I'm gonna talk about. I
> do take into consideration the population that I have, and that these
> big ideas, you're leading them in the right way, but you're hopefully
> – you're being sensitive in your understanding – and these kids are
> better than – even, again, even four years ago. They themselves,
> they almost police their own cultural sensitivity, and they are
> becoming more global-perspective kids, they just are, they have to
> be.

Thelma talked about her decision making process as well:

> I have to look at all of them and decide what I think would be – as
> bad as it sounds – most entertaining to my students. Because we
> all know that entertainment is what gonna – is gonna keep them
> actively involved. If it's boring, I try to throw it out. So I have to do
> my homework in advance too, and just see, "Okay, let's compare
> these three things and how do they present the storming of the
> Bastille. How do they – in all three of these cases, which one is the
> most exciting?" And they like the videos that go along with it that
> shows someone getting his head chopped off.

Throughout her interview, Alice talked about the role the standards played in her

decision making. In selecting and evaluating digital content, she talked again

about how she used the standards as her rule of measure:

> I think that you should know what it's for before trying to throw it
> into a lesson. What do you want to get out of it? I know that if I find

a YouTube video, I have looked and looked and looked. I've watched it. I've figured out how does it tie to my standard. Is it going to help the kids? Is there something I could use better?...You choose it based on the purpose, how it connects to your standard, and ultimately how your kids are going to use it. Are the kids going to learn from it because if it's not good for them, I don't care how great that Discovery Education video is, it's not going to work. If the kids can't connect to it, there's no point in playing it.

While all the teachers saw themselves as the expert in choosing the right content for their students, Marie summed it up by saying, "It's hard. That's very hard. It's hard without technology really."

Through the three categories of (1) access, (2) differentiation, and (3) evaluating digital resources, the data have shown the teachers' perceptions and understandings as they relate to technology's impact on digital equity in their classrooms. Throughout the teacher interview section, the teachers' ideas and attitudes concerning the how technology impacts the quality of instruction in their classroom, the engagement of teachers in their professional practice, and the equity of learning opportunities in the their classrooms has been discussed. In the next section, I will discuss the data collected during the support personnel interviews.

Support Personnel Interviews. In order to provide a deeper context to the teacher interview data as well as a holistic perspective on the 1:1 laptop implementation, I felt the perspectives of those instrumental in leading the instructional change and supporting the 1:1 initiative are crucial. To help the reader better understand the support personnel's perspectives in regards to the

three prongs of the study, I utilize their words and ideas expressed during the data collection.

Technology's impact on quality of instruction. In supporting the implementation of the laptop initiative at their schools over the last two years, the support personnel in their various roles have seen some shifts in the teachers' use of the laptops. Interestingly, six of the eight support personnel interviewed also made a comment supporting the teachers' assertion that technology was one of the many tools the teachers' could use to improve the quality of their classrooms. Suzanne, principal at West, said, "I see it as a powerful resource to engage learners. The priority is learning and teaching. The tool – we have to be careful not to idolize the tool." Craig, the instructional facilitator at East talked about the technology in these terms:

> In the beginning, we had so many new tools that we were all like, "Oh…look at this, look at this, look at this!" But now, it's more like, "OK, what do we want the student to be able to do?" What do we want them to be able to produce? What do we want them to learn? Now…which is the best tool or resource to get us there?

While the teacher interviews focused on those teachers who perceived themselves to be advanced in using technology, the support personnel perspectives reflect the whole school support. Herbert, the assistant principal at East, talked about how teachers continue to grow in their understanding of using technology wisely in the classroom:

I think that we're going to have to move teachers beyond just desktop publishing and really move towards the way kids really collaborate. We've just started seeing this year that some teachers have gotten comfortable using Google Apps for Education and kids creating Google docs and some of that sort of things. There's just a whole bunch of resources that we have to teach teachers how to use and how to classify them. You know, when would Twitter be effective, when would this be effective, when would you use Dropbox, all that sort of thing.

Patsy, media specialist, and George W., technology facilitator, from West Middle talked about the impact the laptop technology was having on the quality of instruction in their school:

P: I think I'm starting to see more and more projects being done, and then the students have a – do some kind of a report, electronic report to create – trying to deemphasize PowerPoint.

G: the students actually turn in their electronic files instead of printing things out and hang on to things. They'll turn it in and it'll be graded electronically

The overall sentiment of the support personnel interviewed in regards to the impact of the technology on the quality of instruction in the school is that the schools are still growing as whole in this area. Staff turnover was cited at both schools as an issue in keeping technology positively impacting instruction, especially when most school districts surrounding the district of study are not equipped with the same resources, thereby not giving prospective teachers the same amount of professional development and training to prepare them to teach quality lessons with the technology. Finally, all teams of support personnel

mentioned the transition period of "newness" that occurred with implementation, distracting teachers away from planning quality lessons to the tool itself. Suzanne framed this transition up in her statement:

> [Last year] I would go in classrooms and I would see that, teachers so busy teaching the kids the tool. And then you have those kids who are tech savvy and they were engaged, and they were having fun but they were missing the piece about the curriculum…Well, one thing that has changed this year that I'm very proud of, I've not walked in one time and seen what I saw last year with students spending 30 minutes trying to figure out what color they want on their Power Point, the visual effect.

In the next section, the data will explore the support personnel's perceptions and input in regards to supporting teachers' engaging in technology in their professional practice.

Technology's impact on teacher engagement. The implementation of the 1:1 laptop initiative at both East and West Middle Schools impacted the entire school culture. Each school has sent teachers to national and state professional development in addition to having teacher leaders in the schools. The support personnel talked about how their school cultures were about learning from each other and utilizing the experts in the building. The principal at East even formalized this into what he called the "Synergy" plan, where teachers were expected to go into one another's classrooms to observe and get lesson planning feedback from the technology facilitator and media specialist. Craig explained the plan to me like this:

The synergy plan, what that means is that teachers, on a rotating basis, are asked to submit their lesson plans to either me (the technology facilitator) or our media specialist, or one of our two administrators (Principal or Assistant Principal). And then we sit down with that teacher and we discuss their lesson plans and we look and see if they've integrated technology? Are they using media resources as well as they could? Things like that. Another key component of the synergy plan is that teachers would visit other classrooms. We could make a recommendation to them and say why don't you take a look at this teacher during your planning period or if necessary, we could get coverage. And let you see how this other teacher is delivering instruction. And get some good ideas. So, that's why it's called synergy, I guess, because we are using the resources that we have here, amplifying their value and effect, and by spreading them out throughout the staff.

While Suzanne does not have a "Synergy" plan, she did talk about a similar concept in her school:

If you go out of the building to learn about technology, then you will teach others. And having a plan for how they're going to teach others. Giving them spotlights at your faculty meetings and staff trainings – sending them into each other rooms and building the relationship. I have no idea of all the different ways my teachers are helping each other right now, but the culture in the building has said that you're expected to develop yourself and you're also expected to use the gifts you have to develop the teachers for the greater good of the school.

Teachers at both middle schools are expected to be learners, not only from one another, but also from the students. George S. shared:

Bring the kids into the teaching process. Like we have teachers in the building who share with me, they can't figure out something on the SmartBoard or the laptop. Their kids show them. And creating that comfort level that that is okay and that's empowering our learners too. The kids are teaching the teachers, and that's okay.

And the kids are teaching advanced teachers as well as teachers
who are not quite there with technology.

Craig talked about modeling his own technology learning with a group of students

he works with through an enrichment project, "I didn't know how to do the Google

Lift Trip so I just took a small group of AIG students into my office and I thought,

I'd learn it with them. We'll figure it out together."

If a teacher isn't learning or engaging in the technology, George S. sees it

more as a personnel issue than a technology issue:

> The person who's not implementing technology well or not moving
> forward is also not moving forward in other areas. So, again, it's
> because it's a tool – an extension of themselves. And the one who
> wants to – so you have to address something else rather than the
> technology piece.

Understanding how important having supports for his teachers are,

Herbert talked about the importance of having his technology facilitator and

media specialist at East to help his teachers, but he also understands the

importance the desire of his teachers is to work with the technology:

> You need to have right people. It's people. Again it's a tool, but if
> you just dumped some carts in here and didn't have the supports in
> place and the framework of the people, the expertise and the desire
> to have that happen, I don't think it would. You could have the best
> principal and administrator in the world but you got to have others
> who really want to do it.

The support personnel at East and West Middle Schools expressed that in order for technology to positively impact the students, it had to positively impact the teachers. Creating a learning culture in their respective schools through expectations of teachers learning from each other and from their students, the leadership has provided a systematic way for teachers to learn about the technology implementation. In the next section, the data will explore the support personnel's perceptions and input in regards to supporting teachers' providing equitable learning opportunities for students.

Technology's impact on digital equity. Ensuring equitable physical access to students is important to the support personnel. They each echoed the teachers' responses in providing access to a wide range of students including those who are disabled and visually impaired working in collaboration with the exceptional children's department to meet each child's individual needs, such as a computer with a large monitor for the visually impaired child and special furniture for a student in a wheelchair to access his laptop. When asked about students' access to technology in their homes, the support personnel responded in similar fashion to the teachers by being uncertain how much of their student body had access to computers and/or Internet at home. They all referred to a survey that had been done in the past, but had no recollection as to the accuracy of the information.

Bob talked about his students' access beyond the school:

> I really think smartphones have changed that a lot as far as that
> kind of Internet, data plan Internet. I think I see very few kids who
> don't have access to at least a data plan, but that's kind of a
> different kind of Internet. At home, like, wifi, at home, I would
> venture to guess maybe 60 to 70% maybe. That's a total guess.

Suzanne had a similar response for her students:

> We did a survey two years ago and any number I gave you right
> now would be a guess, and that's a question – that's something we
> need to do...But honestly, based on – and this is just a guesstimate
> – based on the cell phones, the conversations, the Facebook
> issues I have to deal with --It's got to be in the 90 percent, at least.

In addition to these administrators' perspectives, Vicki talked about her

perception of students' access to technology beyond the school:

> You bring up questions about equity, and I was in a conversation
> just a couple of days ago about if we went to a bring your own
> device policy here at school. What would we do for students who
> didn't have them. And I said well, I don't know too many students
> that don't have it despite their economic situation. It seems to me
> that almost everyone has one.

While it is clear that providing access to laptops for students is important

for the support personnel, it is unclear whether this group understands the use of

classroom activities versus the access of students to equipment and Internet at

home. Whether it is access through a handheld device or a personal laptop, will it

be important for East and West Middle Schools to understand accurately the

students who have access to the Internet beyond the school day? This is an issue that I will discuss in Chapter V more in-depth.

Supporting teachers to use the technology to provide rigorous and challenging instruction for all their students is important for the support personnel in the two middle schools. Herbert talked about the

> thoughtful teachers here who will disperse different versions of the same story…We're zeroing in on assessments a lot quicker, we're able to get data…there is on-going data especially in language arts and science and some level in math, that teachers are getting access to really quickly and are able to show, communicate…So they are learning how to envision themselves as someone who generates products and data and can set some goals, which is probably a good thing, but I know we are just scratching the surface, but it's definitely new in this state I would guess over two or three years ago.

Patsy also talked about teachers using data to provide specific learning experiences for their students. In particular, she used the example of the data provided by the Scholastic Reading Inventory (SRI) to improve reading and reading levels:

> We've seen tremendous growth in SRI. And I think that's because teachers have that data, and they take it to heart and really work with those students. And we've seen more checkouts, more activity in the library this year than ever. And I think having that data has helped because they see where the needs are. And it is important to get them in and get some books, and to give them time during the school day to read.

When teachers choose digital content for their students to use, the support personnel are content to let the teachers be the experts. According to media specialist, Vicki:

> There's no standard process. They just know they're not supposed to be there. Students know. Most of the time teachers have no trouble finding stuff to use. Of course we're always on the lookout for new stuff, and if a teacher tells me their interest or they are going to be doing something, I'll go ahead and collect some sources or some websites and I'll send it on to them to make the final decision.

Technology facilitator at West, George W. also said, "For the most part…they're professionals and that's their area. If they have questions, they would ask." However, Bob, principal at East, indicated that not all digital content his teachers choose for their students is appropriate:

> I say Google images is probably the scariest, when you still have those teachers that want to let their kids look for images, like do some random research and they haven't funneled it down into specific websites or anything like that, that's kind of a dangerous thing.

In addition, the support personnel mentioned the district filters as a safeguard in protecting the students from unsafe content. Herbert also commented that he felt there were "enough checks and balances that a parent or a student somewhere would say, 'Hey, guess what we saw in today in class.'"

Other issues that arose for the support personnel under the equity of access were the issue of taking away student privileges from laptops for

disciplinary problems and students damaging their laptops. Both groups of administrators spent time talking about the large amount of time they spend with students and parents handling bullying or harassing issues that are initiated by students through technology, such as Facebook. Suzanne stated:

> When your assistant principal and principal are spending half their days on Facebook conversations that have interrupted education, and cell phones being stolen, and bullying and harassing, and I'm supposed to be the instructional leader – well, you can't ignore it when you have this going on...So, we have to educate students and teachers on ethical use of technology.

In addition, broken or damaged laptops are not available for students to use. The principal at East Middle School, Bob, worries about middle school students understanding the value of the laptop based on the damages the administration has been handling:

> I think it's amazing how quickly kids adjust, modify, and it becomes the norm. Like the laptop is now just the norm…We still have to keep up the fact that this is a really good thing that you have these laptops. It's not just a pencil.

Support personnel see the teachers as having the primary role in providing equity in learning opportunities for students. The administrators felt the disciplinary and policy items associated with the laptop initiative kept them from supporting the teachers instructionally, while the technology facilitators and media specialists helped teachers when and if they asked for help.

Summary

In this chapter, data from the online teacher survey and comments shared from the teacher and support personnel interviews were intended to highlight the thoughts and perceptions the study participants expressed in regards to their experience with or support of implementing technology to improve quality of instruction, engage in professional practice, and provide equitable learning experiences for students. In the final chapter of this study, I will share the conclusions that emerged from the data.

One example would be the importance of a school's culture of support and professional development in implementing a 1:1 laptop initiative. Without this culture in place, how would teachers adapt to the changes in instructional practices needed with using laptops in instruction, and how are administrators and technology facilitators able to meet all teachers' needs? This conclusion as well as others is explored in Chapter V.

CHAPTER V

RESULTS AND IMPLICATIONS

I was in Mr. Allen's room today, he's a 7th grade social studies teacher...His students had been researching religions…different religions, finding out interesting things about these religions to compare and contrast world religions. That's what they are doing in 7th grade social studies. So he had them creating a blog using Google Apps…They were naming it and they were giving it an address, and then the title of their first blog entry was, "What I didn't know about religion." So they were taking their research notes, making a blog entry, they were adding images. They were adding links to external sites. They were embedding videos to it. And when they are finished with their blog, they will take that and embed that blog into their website. So they will have this whole collection of all their things that they have been doing all year. They can use it for study, they can use it for sharing with others, they can use it to show off to their parents, or grandparents. They can send a link to anyone in the world and say, "Hey, check out what I'm doing at school."

And then on the other [end of the] spectrum we see a class today, for example that I was working with. They had a pencil that was broken and they were trying to write a timeline of the Korean War. Well, I said, "Why don't we just do that on Google Docs because we can all work together?" And they looked at me, and they didn't even know what the Google Doc was or where they could access their G-mail. So of course, we get on there, and I set up a Google Doc, share it with them, log them into their G-mails and they were amazed.

Introduction

This study investigated the instructional implementation of a district-wide

middle school 1:1 laptop initiative, and its impact on the quality of instruction,

teacher engagement, and equity of student access to learning experiences

101

during the second year of implementation. Just as the story above relayed by instructional facilitator Craig Dixon illustrates, the implementation of the 1:1 laptop initiative is an on-going process with teachers at varying levels of classroom and professional use.

In Chapter III of this paper, the research questions for this study were introduced to the reader and in Chapter IV, the data collected in relation to those research questions and the three major prongs of the study were displayed. This final chapter will describe my findings from the data followed by what implications can be taken from those findings. Finally, I make suggestions for further research in this area followed by concluding remarks from my experience in the research study.

What I Learned From the Data

Based on the all data collected and presented in Chapter IV, I have identified four major conclusions I believe significantly represent the overall findings in this study. These conclusions are supported by the study participants' voice as well as the literature cited in Chapter II of this study:

1. A culture of support and professional development is important in a school implementing a 1:1 laptop initiative.

2. Teachers' engagement with technology impacts their instructional use.

3. Teachers unintentionally marginalize some students through their use of technology.

4. Quality instruction is enhanced but not dependent on technology integration.

In the next section of this chapter, I have taken each of these conclusions and provided support and evidence from the literature (Chapter II) and the data presented (Chapter IV) to support my assertions.

A Culture of Support and Professional Development Is Important in a School Implementing a 1:1 Laptop Initiative. Throughout all the participants' responses was a common thread of support, collaboration, and personal learning the technology has brought into their buildings and sustained. Teachers spoke about their support for learning as if it was common practice and the result of the expectation from their leadership as well as their expectations from each other. Most often, educators refer to this type of organized value structure as the culture of the school. Peterson and Deal (1998) define school culture as the "underground stream of norms, values, beliefs, traditions, and rituals that has built up over time as people work together, solve problems, and confront challenges" (p.28). Undoubtedly, the integration of the 1:1 initiative was a challenge that the staffs at East and West Middle School worked together to confront.

Leadership. "Meaningful school improvement begins with cultural change—and cultural change begins with the school leader" (Reeves, 2007, p.94). One of the determining factors to the strong, supportive culture at both

middle schools was the leadership. The teachers at East Middle School spoke about the "Synergy" plan developed by the administration that formally organized the learning and support in their building for curriculum and technology delivery, while the West Middle School teachers talked of a less formal, yet nonetheless real, sense of support and sharing. Floyd described the culture of support at West like this:

> I wouldn't say our whole staff is going out every night and hanging out, but we have a good rapport with one another, and so I know that certain people are good with Wiki Pages, and I know who I can go to if I want to work on my website. There's opportunities for us available. For instance [State Technology Conference] was available this year. I wanted to go to that to get some more. There's ISTE this summer, which I know we're taking a team down there.

Productive and supportive school cultures are not happenstance, and the most important factor in helping teachers to have success with technology are the actions of the leaders (Dufour & Marzano, 2011; Hall, 2010; Peterson & Deal, 1998; Reeves, 2007). When asked factors that contributed to the success of their technology implementation, one teacher commented, "Administration is very supportive." The interviews with the administrators revealed how their individual schools and styles supported the technology implementation. Suzanne, principal at West said, "The culture of this building is talking with your colleagues. And if you're not sure—if you're really not sure, they come, and they put the responsibility on me." Bob, principal at East, talked about his priority in making

sure bi-monthly professional development is taking place in the building and managing the resources so teachers were able to have the necessary supports for implementation.

I found it odd that none of the interview participants specifically mentioned their administrators as providing the supports necessary to implement the technology successfully. While they mentioned the elements of culture that were in place to help them feel supported such as collaboration, professional development, and support staff, the teachers, as a whole, failed to see or note a connection to their school leadership as an element in their success. However, just under half of the survey respondents noted leadership supports as one of the supports available to them when offered the choice on the online survey. While it was apparent to me, the researcher, that the leadership had provided the structure for the school culture to support teachers through the implementation of the 1:1 laptop implementation, I wonder if the teachers had a hard time seeing the connection to the leadership because they were immersed in the culture themselves or if they attributed the supports to another source.

Finally, I was surprised to find that no one mentioned or produced a technology plan for their school during our interviews. It is not clear if the leadership at the schools did not create a technology plan or if one exists but it was not mentioned because I did not specifically ask about the technology plan. However, in all of the support personnel interviews, there was no reference to "our vision" or "our plan" when asked about where the program will be in five

years. In addition, as a result of having no plan, both administrators talked about

learning to talk to their staff about using the laptops purposefully rather than the

teachers feeling like they had to use them daily because they were new. Bob

phrased it in these terms:

> It did seem like a revolutionary concept when I came in and said,
> "You don't have to use the laptop…This is just a tool." That it can
> be closed and that's okay. It seemed to be like a big a-ha moment
> for the leadership team when I said that.

Bob's statement and Suzanne's similar story indicate to me that no formal

technology plan for the laptops was in place at the schools.

Collaboration. Part of the culture in both schools that was pervasive

through the data was the idea of collaboration among the teachers. By creating a

collaborative school culture, administrators and teachers "support one another's

journey toward better instruction" (Kohm & Nance, 2009). On the online survey,

teachers most frequently cited on-site support as their factor for success with

technology, with 60% of the comments specifically mentioning their co-workers

and other professionals as their source of support (rather than the technology

facilitator or other professionals).

Teachers have developed a network of sharing and learning from one

another as Brenda's, the AIG coordinator at East, comment explains:

> We share a lot of resources. There's always e-mails going around,
> I found this, I found this. And then me, I try to serve that role as
> well for other teachers. I try and find easy online resources that I

can give out. Instead of saying here's a cool link, I create a lesson
with it. Here's what you can do with this, and make it applicable for
teachers.

Patsy, media specialist, summed up the culture of collaboration among her staff

at West:

Well, it's things we've learned from each other. We have people on
each team, I think, that are experts and those that's "What's that?"
And so they help each other. And sometimes we don't even see all
that. We will hear about it afterwards. But I think that's one of the
behind-the-scene things that goes on.

Whether the technology implementation was the impetus for the collaboration or

the collaboration facilitated the implementation of the technology is unclear.

What is clear from this study is, in correlation with research from Means and

Olsen (1995), the collaboration of the teachers was having a positive impact on

the teachers' perceptions of their implementation of and engagement with the

technology.

Peer-to-peer professional development. Part of the culture developed by

the two schools in the study is one of expected professional development

through peer-to-peer learning. Thomas and Brown (2011) define peer-to-peer

learning as a "new culture of learning" where the fluid connections and

interactions people establish with one another are built on mutual interests and

convenience (p. 50). In this type of culture, anyone with knowledge or

experience can advise others at any time. One of the teachers who responded

to the online survey indicated the peer-to-peer learning factor as contributing to his/her success with technology:

> Being given a menu of options for professional development led by teacher leaders. This has allowed me to learn about the kinds of technology implementation that I need and avoid sitting through something I have already mastered. For example, I chose to attend a session on Google Apps this year. I learned from a fellow teacher how to use Google Docs and Google Presentations to foster collaboration among students. Also I learned how to use Google Sites to have students create individual websites that can serve as a digital portfolio.

All participants in the teacher interviews mentioned learning from peers and/or providing support for their peers. In addition, all support personnel mentioned how teachers learned from each other and shared ideas. One of the teachers interviewed demonstrated the fluidity of her role as both the learner and teacher when asked about professional development meeting her personal needs: "I would say through some of my professional development…we've had some where different teachers have led sessions. I myself have done one."

While the overall data demonstrated that a supportive culture was evident in both middle schools, it is important to note that one person voiced dissatisfaction and four gave a neutral response on the online survey in regards to the quality of support they have received in integrating technology. Since no opportunity was given to express the reasons for their selection, it is unclear as to why these teachers feel unsupported or not positive about the support in their school. When teachers were given the opportunity to voice factors that inhibited

their ability to implement technology, negative student behaviors with the laptops was the most frequent response. This problem could indicate an area where teachers feel they need support and are not receiving it through professional development or leadership.

Finally, it should be noted that participants overall felt positively about their technology facilitators in both middle schools and the support they provided. Along with the formal professional development and side-by-side assistance technology facilitators gave teachers, teachers were able to assist one another using collaboration and formal learning. Through the professional development and support provided by the technology facilitators and the peer-to-peer learning that was a part of the expected behavior in the buildings, teachers at East and West Middle Schools developed a culture of support to collaborate about the 1:1 laptop initiative and student learning.

Teachers' Engagement with Technology Impacts Their Instructional Use. Teachers in this study demonstrated a high level of comfort and engagement with technology. In addition, they acknowledged that their comfort with technology enabled them to use technology to be more efficient in their instructional planning.

An unexpected finding in this study was that teachers spent more time working in their professional duties when technology was involved than when technology was not involved. On average, survey respondents reported spending 0.81 hours longer planning a lesson integrating technology than they

spent planning a lesson that did not integrate technology. One reason for this might be that teachers enjoy using the technology and are willing to invest extra time and effort into utilizing the technology into their lessons. A teacher responded on the online survey wrote, "Technology is an everyday part of my life." As noted in Chapter IV, six of the seven teachers were enthusiastic about their personal enjoyment of technology use. The epitome of this enthusiasm was demonstrated in my interview with Sammy when I asked him how the 1:1 laptop initiative has changed what he does beyond the classroom:

> *Sammy*: Sometimes I tend to do more work, believe it or not, because I'm constantly wanting to revise, constantly changing, and with the Google Docs, it's so easy to do…I work much more than I get paid for, and technology is why.
>
> *Me*: But you're smiling.
>
> *Sammy*: Yeah, 'cause I love it.

Another reason that teachers may be willing to spend more time in planning for lessons with technology is their expressed comfort in using technology. Using the "happy face" slider scale on the online survey, all but two teachers indicated a positive comfort level with technology, while all teacher survey participants noted a positive comfort with technology. These finding correlates with existing research (Mueller et al., 2008; O'Dwyer et al., 2005; Wozney et al., 2006) that suggests teacher comfort with technology and personal use were strong predictors of teachers' instructional use of technology.

In addition to expressing high levels of comfort and personal enjoyment with technology, interview participants explained the benefits of technology on teachers' work including collaborating virtually with coworkers, finding quality and current resources, managing student data, and accessing planning materials (plan anywhere/anytime). Making work more efficient was also a major factor expressed by the teachers interviewed in the study. In this way, the teachers' computers became a useful tool to access other resources while giving them the freedom to work from various places at a variety of times (Parr & Ward, 2011).

Teachers Unintentionally Marginalize Some Students through Their Use of Technology. Based on research that acknowledges issues of access for students extend beyond physical contact with a technology device to what they are asked to do with the technology as well as the content to which they are exposed (Chen, 2010; Gorski, 2009; Mouza, 2008; Solomon, 2002), study participants were asked questions regarding their use of technology and their students' access both in and out of school. I was curious to see if the teachers at East and West understood the principle of equity as it applied to laptops in their instruction. What I found was that teachers want to use the laptops instructionally and purposefully, but they unintentionally marginalized some students in the process through their implementation strategies of an over reliance on online sites for classroom management and communication, a dependency on their own teacher judgment and lesson needs to select digital

content for students, and the use of technology to discretely provide less rigorous assignments to groups of students.

Online access. While the 1:1 implementation model differs at the two middle schools in this study, both middle schools do not allow students to take the laptops home overnight. Students must dock the laptop for charging at the school overnight, leaving behind anything they have stored on the computer, and for some—access to the Internet. To organize and store classroom information, as well as communicate with students online, teachers have encouraged the use of Google Apps and/or a classroom management platform called Edmodo. For those students who do not have Internet access at home, teachers say that students can access the Internet at the public library, a neighbor's house, or via a mobile device if needed.

Teachers say they do not require students to access the Internet outside of the class, yet they send mixed messages to the students by encouraging them to use the Edmodo site outside of class. An example of this mixed message is when one of the teachers said:

> I don't personally send homework home that involves a computer
> because if you do, you have kids that just can't. They don't have
> any access, so I would say outside of the classroom I just
> encourage them to go back onto the Edmodo page, go back into
> the library and review, practice and review.

This statement illustrates the teacher's lack of understanding of her students without access to a computer or Internet at home or the ability to obtain a ride or

112

walk to the library. Both middle schools have a high rate of students who qualify

for free and reduced lunch (East—57% and West—80%). In addition, while no

solid data exists for middle school students, when the IMPACT grant initiated the

1:1 at the district high school, a 2011 student survey revealed that 12.4% of

students did not have Internet access at home and 15.7% did not have a family

owned computer. Therefore, teachers must understand the implications poverty

can have on the students they teach such as fewer supportive networks, and the

likelihood of living in a home with strained resources that may not be able to

afford the time or gas for a trip to the library (Jensen, 2009).

One teacher even has turned his classroom into a "paperless classroom"

using the online word processing of Google Docs and talked about how his

perceived success rate with technology of "85%" was due to the 15% "digital

divide" preventing him from completely flipping his classroom, where students

would preview videos or online content that would usually be lectured about in

class at home via the Internet. Another of his colleagues talked about how she

uses the Edmodo site to store enrichment activities and review materials for

students to access at home. These examples illustrate how teachers are

marginalizing a group of students with the use of their technology. Students who

do not have access at home cannot participate in utilizing the Edmodo or Goggle

Apps sites for communicating with their classmates or teacher, or they cannot

access their class study or enrichment materials. Therefore these students

cannot participate fully in the educational opportunities alongside their peers.

Digital content. Teachers must also consider the digital content they utilize (websites and computer software) as critically as the other learning materials they use to ensure the digital content they expose their students to is affirming and non-hostile (Gorski, 2009). In the two middle schools of the study, teachers primarily relied on their current need in the lesson to drive the choice of digital resources utilized as well as their own professional judgment. The criteria study participants cited most often included what they felt the students would enjoy and engage the students. In addition, cost was also cited as a factor; therefore, free sites were utilized most often, unless the district purchased the resource, such as Discovery Education.

Surprisingly, only one of the teachers talked about issues of race, gender, sexuality, or social status when evaluating digital resources. Ann talked about how she evaluated resources keeping her student population in mind:

> You have to look at it. Even if you're showing them a movie or something like a video and the tornadoes. Where can you find the one with different people? Not the typical white, male scientist. Anybody can be a scientist and if you look, you just can't take the first one you look at, you've got to really look and be thinking, okay, I've got this, this is the people that I'm serving and this is how I can best serve them. I need to show them because I want my Hispanic students to know that there are Hispanic scientists and the fact that they maybe struggle in reading or whatever doesn't mean they can't be an excellent scientist. Helping them understand that, helping them see that scientists are all kinds of different people. It's just you have to look. You just have to know who you're looking for and know what you're looking for and look for it.

However, Ann's perspective is isolated from the other respondents in the study. It is important to note that disparities between the make-up of the schools' student populations and the schools' staffs are apparent, particularly in the number of Black and Hispanic students as compared to their teacher counterparts (See Table 11 below).

Table 11. School Demographic Information by Students and Teachers.

	EAST Students	EAST Teachers	WEST Students	WEST Teachers
Black	15.2%	5%	15.6%	8%
Asian	1.5%		1.6%	
White	40.4%	95%	32.9%	84%
Hispanic	38.7%		45.9%	5%
American Indian	0.3%		0.6%	3%
Other/Multi	3.8%		3.4%	
Male	50%	37%	46%	21%
Female	50%	63%	54%	79%
Exceptional Children	12%		11%	
AIG	19.2%		13.9%	
Limited English Proficient	9.3%		20%	
Total Free and Reduced Lunch	57%		80%	

Google searches, including Google Image searches, can produce hostile and agenda filled content, yet teachers and students utilize the search engine in

the classroom to complete research and projects. Search engines, like Google, generate results that not only "mask the unequal access to social, political, and economic life in the United States as broken down by race, gender, and sexuality—they also maintain it" (Noble, 2012). The media specialist at West noted that teachers "Googling everything" rather than using one of the databases in place was one of the school's biggest challenges. The principal at East called this search practice a "dangerous thing," but noted there was no standard process or district policy for ensuring that digital content is screened for cultural responsiveness. If no formal system exists to trigger teachers' conscientiousness to see embedded stereotypes or masked agendas in digital content, will teachers be able to see past their own frame of reference (gender, race, social class, etc.) or the status quo when evaluating resources for students who are not like them?

Rigor level. When asked how the technology in the 1:1 laptop initiative was used to differentiate for students, the participants in the study all indicated the technology allowed them to provide students different levels of the same assignment. In other words, the technology can make it possible to provide less rigorous assignments to some students while others are given more rigorous assignments in a discrete fashion. One teacher on the online survey put it this way: "It is easy for them to each have a different assignment, and the kids don't even realize it. It can be an assignment at their level."   In this way, students are tracked into ability level groups rather than providing personalized scaffolding to

bridge the gap between the grade level task and the current learner needs
(Carolan & Guinn, 2013).

One of the ways most often cited for providing different assignments was
through offering different levels of texts for students. An administrator offered an
example of an English/Language Arts teacher, who provided different versions of
the same essay "The Most Dangerous Game," "the teacher had actually four
versions of it, and was able to disperse it through her Edmodo site." Another
teacher on the online survey said this:

> I can modify assignments and send it to each student individually
> (through Edmodo, for example) so the students don't know. This
> way nobody is embarrassed or realizes it. I find an article I want
> them to read and respond to in some way. I find the Lexile and then
> adjust it to two different levels. This way I assign the same article
> on three different levels. Nobody realizes it...they all think they are
> reading the same article. We even have discussions of the articles.
> The lowest kids can discuss the same article as the AIG kids.
> Works great! I can make assignment choices easily for different
> learning styles and multiple intelligences.

While observing and honoring students' interests and learning styles are
important components of differentiation (Wu, 2013), not providing access for all
students to rigorous, grade-level curriculum "denies students the very language,
information, and modes of thought that they need most in order to move up and
on" (Adams, 2009, p.26).

In 2012, the Common Core State Standards for English Language Arts
were implemented in the state in which the district of study resides. According to

the ELA Common Core State Standards, being able to read complex texts

competently is critical for life beyond K-12 education. By not exposing students

to grade level complex texts, we are setting students up for failure. Appendix A

goes on to say:

> A turning away from complex texts is likely to lead to a general
> impoverishment of knowledge, which, because knowledge is
> intimately linked with reading comprehension ability, will accelerate
> the decline in the ability to comprehend complex texts and the
> decline in the richness of text itself. This bodes ill for the ability of
> Americans to meet the demands placed upon them by citizenship in
> a democratic republic and the challenges of a highly competitive
> global marketplace of goods, services, and ideas ("English
> Language Arts Literacy in History / Social Studies , Science , and
> Technical Subjects Key Elements of the Standards Glossary of Key
> Terms," n.d., p.4).

This problem is even more consequential for the students of poverty, who

are even less likely to have complex texts and reading support at home (Jensen,

2009). While teachers are not specifically aware of who the disadvantaged

students are at East and West Middle Schools, they are aware of the amount of

students in poverty in each of their schools. The challenge is to help teachers

see that their instruction is the key to helping all students be successful beyond

formalized schooling. According to Robyn Jackson (2011) in her book *How to

Plan Rigorous Instruction*:

> To reserve rigorous learning opportunities for an elite group of
> students while relegating others to lives of memorizing
> disconnected facts and blindly participating in meaningless
> activities is to leave the majority of students unprepared to meet the

demands of the 21st Century and beyond. All students can and
should have access to rigorous instruction and learning.

Although I do not feel that teachers are intentionally marginalizing their
students or keeping some students from accessing the curriculum while
accelerating others, I do feel the technology has made it easier for teachers to
overlook important issues of equity in their classrooms. Teachers who are
excited about using technology in their classroom, particularly those who see the
benefits of its efficiency in their work, may not see past their enthusiasm to how
not having access at home is affecting a percentage of their students. Teachers
may not see past their own social and gender biases when selecting digital
content for their classes. As the 2010 National Educational Technology Plan
challenges educators, the teachers of East and West Middle School must ensure
equitable learning opportunities for all students (*Transforming American
Education: Learning Powered by Technology*, 2010), and with professional
development and support, the teachers could address these issues of equity for
their students.

**Quality Instruction Is Enhanced but Not Dependent on Technology
Integration**. In his synthesis of research on the achievement of school-aged
children, Hattie (2009) described effective teaching in the following terms:

> The act of teaching requires deliberate interventions to ensure that
> there is cognitive change in the student: thus the key ingredients
> are awareness of the learning intentions, knowing when a student
> is successful in attaining those intentions, having sufficient

understanding of the student's understanding as he or she comes to the task, and knowing enough about the content to provide meaningful and challenging experiences in some sort of progressive development. It involves an experienced teacher who knows a range of learning strategies to provide the student when they seem *not* to understand, to provide direction and re-direction in terms of the content being understood and thus maximize the power of feedback, and having the skill to "get out of the way" when learning is progressing towards the success criteria (p.23).

Moreover, to be effective, teachers must also create a warm and supportive climate in their classrooms where students feel safe to make mistakes while maintaining high standards for student achievement (Dufour & Marzano, 2011). As evidenced by the research, quality instruction is multi-dimensional and independent of technology. However, teachers are being called on to leverage technology to enhance student learning as technology is pervasive in our students' 21st Century modern world (*Transforming American Education: Learning Powered by Technology*, 2010).

Using technology effectively matters. While understanding that effective teaching practices are not dependent on the use of technology, when teachers add technology on to poor practices the result is poor instruction. "Computer-based technology—or any other kind of technology—cannot in and of itself improve instructional practice" (Coppola, 2004, p.150). Suzanne, principal at West, talked about leading her staff's transition over the last two years in using technology effectively:

> I wish I had known as that I had been firmer in my confidence that good teaching and good teaching practices are the same whether you're using a textbook or a laptop, and that I had known how to better articulate that and to lead in such a way that it would have not allowed or maybe been perceived by some people as that I'm anti-technology… we just got so excited about technology that we threw what we knew about good instruction out the window.

Herbert, assistant principal at East, had a similar reflection:

> I think last year there was a lot of excitement that we have these and that had to run its course, and we maybe more quickly should have said it's okay _not_ to use these. If you have a purpose for using them then use them; if you don't then just don't. Use them; because we had people just taking what I would put on a PowerPoint, and putting it on your screen, so kids are just looking at their screens. We didn't see any great jump in test scores last year, nothing remarkable happened last year. We had laptops. So I think having had more of a vision of what this will be like in a few years versus saying what we have to have happen by October, November, December to use this to justify this now. It may have had a difference.

Both schools learned the lesson that to have quality instruction with technology, the content and students, rather than the technology, must drive the planning process (Koehler & Mishra, 2009).

Using the laptops purposefully was a common thread through all of the teacher interview data. The idea that the technology should be seen as one of the tools at the teachers' disposal to enhance the lesson or further engage the students emerged as a dominate category during the coding of the data. One of the teachers put it like this, "You can get there by supplementing it with technology, but technology is not the panacea." Another said, "I don't think you

121

should just dive in and try to use something without a purpose." Teachers'

perceptions of how they used technology effectively included project-based

learning, research projects, authentic reading and writing tasks, sharing videos,

student collaboration, and student-led investigations.

What we believe about kids matters. Teachers core beliefs shape their

pedagogical practices through how they plan, interact, and ultimately expect their

students to perform; sometimes even attributing students failure to engage to

their personal attributes of class, race, or background rather than attributing their

behavior to ineffective teaching practices (Ladson-Billings, 1994). For example,

when a teacher participant made the comment as reported in Chapter IV:

> Now, my lower levels who don't study are still not gonna study, no
> matter if I have it on the computer or I give them a worksheet or we
> talk it out loud. It doesn't matter. My higher levels are going to
> work hard no matter if I give it to them in technology or on paper or
> we talk about it out loud. So I don't see a difference. Or I guess I
> should say I do see a difference, but it doesn't change based on the
> technology;

the teacher's core beliefs about students became evident as well as the level of

expectation she held for her "higher levels" versus her "lower level" students.

Furthermore, this teacher makes a point that is important in regards to the quality

of instruction and technology: Technology will not make a difference in any

classroom where a teacher does not first have high expectations of all students.

Student learning matters. An emphasis on student learning does not

diminish the importance of quality instruction for teachers because quality

teaching and student learning must go together (Dufour & Marzano, 2011).

Throughout the interviews, it was evident that teachers aligned their instruction

with the standards prior to implementing technology. When asked how they

knew students were meeting the desired outcomes, all teachers talked about

aligning their assessments or rubrics to the standards or objectives for the

lesson/unit of study. One teacher put it this way: "The rubric is created from the

objectives so if they're meeting the goals of the rubric, they're meeting the

objectives you need to get this year." Another teacher framed student learning in

these terms:

> We used our clarifying objectives to create the questions. If they
> were able to master, if they successfully completed all of it, well
> obviously they have a pretty good understanding and then come
> assessment time, you look at the assessment, did it match up, did
> they do well?

Using the standards to drive the student learning outcomes rather than the

technology was a pedagogical stance shared by all but two of the teacher

interview participants. Of the two who did not specifically speak about standards,

one said she measured students outcomes based on the particular assignment

students completed, either technology or otherwise. The other said she used

discussion to determine whether students understood the course concepts.

All study participants were asked if the technology improved students'

academic performance, retention, and comprehension. While the majority of the

data indicate participants felt that technology had a positive effect on these

student areas, some of the teachers talked about the importance of the teacher in the process. One such answer came from Floyd, who responded the following when asked how his students performed academically when he engaged technology in his lessons:

> I think they perform as well as they do without technology. Like I said, it's good. It's important. It can be fun. You can do stuff obviously you can't do with a dry erase board or paper and pencil, but I mean, I see the same level of growth, achievement, interest, motivation with technology versus not technology, and I think it comes back to it just depends on how you deliver that lesson, that assignment, how you motivate them as a teacher.

Another teacher's comments support his colleague's: "It is on the teacher to make sure there are clear goals, clear standards, monitoring, things like that." While the perception of the study participants was that student learning was not dependent on the technology, they did perceive that student learning was enhanced when they integrated technology into their instruction as illustrated by this math teacher's comment:

> I do [see a difference in comprehension] because they can play games that are really learning instead of playing games, so they're comprehending the math there. They can see [math] in those real world settings. I always go back to real world, because I tell them this is what you're going to use. You're going to use math in everything you do.

This perception is in alignment with Berry and Wintle's (2009) research that showed middle school students involved in rich-technology projects

demonstrated greater comprehension levels, greater retention of information, and greater levels of engagement with their work than their peers who did not participate with the technology.

The authenticity that technology brings to student learning was one of the major factors teachers indicated for incorporating technology into their instruction. When Ann spoke the relevancy she found using online sources and experts, like the NASA, versus her dates textbook, in Chapter IV, her reasoning was to prepare her students "for the future, for the 21st Century, they need to be able to know what's going on in the world and be part of what's going on in the world." One survey participant wrote, "We can access so much information online that is authentic to my curriculum."

While the current body of research links laptop integration with supportive school atmospheres and increased student learning and engagement (Berry & Wintle, 2009; Mouza, 2008), the data from this study indicate that quality teaching is more complex than integration of technology alone, including teachers' core beliefs about their students. These beliefs affect many of their instructional planning choices including the digital content selections and the levels of rigor they employ for students. However, aligning instruction to standards allows teachers to use technology to have options for supporting and engaging students in learning (*Transforming American Education: Learning Powered by Technology*, 2010).

Implications of This Study

The participants in this study provided me with an insiders' perspective of how the 1:1 laptop implementation impacted their classrooms. In the following section, I have offered suggestions I feel may benefit teachers and districts implementing a middle school laptop initiative.

Administrative Leadership Needs to Play a Continual, Active, and Visible Role in the Technology Implementation of Their School. In talking with the administrators, it was clear that they were happy to allow the technology facilitators to take the lead role in shaping the technology staff development in their schools. While they saw themselves as important in providing the structure and resources for implementing the technology, the administrators clearly were not prepared to be the instructional models with technology. Flanagan and Jacobsen (2003) submit that not many principals have used laptops in relevant ways with students themselves, therefore, lacking the "requisite pedagogical vision and experience to guide teachers" (p. 127).

Administrators must not only support ongoing and relevant professional development that focuses on using the laptops for student learning, but they must attend the technology professional development and observe the teacher utilizing the practices. Just as the principal is the instructional leader in the building, he cannot abdicate his role as the technology instructional leader. The principal must demonstrate a thorough understanding of the outcomes of the

technology integration initiative and communicate that through his communications, decision making, and actions.

A formal way to communicate the expected outcomes of the technology integration is for the administrator to develop a school technology plan with the school leadership team or school technology team. The technology plan should encompass the vision and goals for the implementation of the laptops over a three to five year period with ongoing monitoring and evaluation. The principal must assume the role of technology leader and grow in technology effectiveness along with her teachers. "When a principal is competent at technological leadership and integration and also creates a technological learning environment, teaching effectiveness will increase and in turn will improve student performance" (Chang, 2012, p. 336).

Schools Need to Help Teachers Appropriately Address Negative Student Laptop Behaviors. While negative student behaviors did not diminish the interview participants' enthusiasm for integrating technology into their lessons, it was the most frequently cited factor for inhibiting successful technology integration into lessons. Clearly, student behaviors with laptops in the middle school 1:1 implementation are an issue. This teacher talked about one of the most cited problems of students' lack of social skills in using the technology appropriately:

> There are a lot of social things that are a problem because they
> haven't got that experience of this is a problem, this is an issue and

now we're trying to teach them in middle school…If they're doing it at home, they can post whatever they want on Facebook at home, so why can't they do that here? They lose a boundary, and I think a lot of times they've lost a boundary of understanding of what's acceptable and what's not acceptable because they can't see the person they're typing to.

In addition to social behaviors, teachers complained about students getting off-task with the technology as a deterrent or frustration to using technology in the classroom.

There is a Need to Develop Uniform Systems for Selecting and Utilizing Digital Content. As evidenced by the data presented in Chapter IV, teachers are making decisions about digital content through a variety of means, with only a small number (seven) indicating they used any type of rubric or matrix for evaluating resources. The result of this decision making is the marginalization of some students through the content teachers' select and employ in their instruction.

While teachers are experts in their content, only looking at digital resources from a content lens will not fulfill the necessary requirements to ensure that digital content is culturally responsive and appropriate for students. Teachers must employ the full range of the TPACK objectives to ensure that whatever they employ lies within the intersection of the three central domains of content (knowledge, concepts, and constructs within the subject area), pedagogy (knowledge of epistemology and how to redress some of the problems students

face), and technology (typically digital technologies such as computers and software applications) (Koehler & Mishra, 2009).

One way to help teachers look at digital resources and content equitably is to establish and utilize a standardized and routine method for evaluating each resource. Achieve, a national bipartisan, non-profit organization, whose agenda includes helping states to raise academic standards through the adoption of the Common Core State Standards, published a rubric to help teachers evaluate web resources (Achieve, 2011). The resource called the "Rubrics for Evaluating Open Education Resource [OER] Objects" could serve as a model for districts or could be used in whole or part to help teachers look at digital content in a more objective format. The rubric can be found online and downloaded at http://achieve.org/oer-rubrics.

Whether teachers want to utilize a nationally developed rubric like the one from Achieve or develop their own rubric or matrix for evaluating digital content, I would recommend that administrators focus professional development on helping teachers understand the role that equity plays in the overall school culture. Focusing solely on the use of the technology itself is failing to see the overall impact of technology on instruction and student outcomes.

Ongoing and Relevant Professional Development Is Needed for Teachers. While teachers in the study clearly indicated they felt supported and had the necessary professional development and training for implementing the technology in their classrooms, it is important to note that the dominant voices in

this study came from those who perceived themselves to be advanced with the technology. Through the survey data 17% of the respondents indicated that the professional development offered at their school had not met their personal needs. Clearly, there are some teachers that need more meaningful professional development offerings to implement the technology effectively.

It is important to understand the needs of the teachers when planning professional development. Craig, instructional facilitator at East talked about the initial strategy for supporting teachers:

> From the beginning, I believe that there has been a focus on professional development with an emphasis on instruction, quality of instruction. We would have professional development sessions where all the teachers would be there. Now it's more likely to be a one-on-one or small group professional development, depending on the needs of the teacher.

Understanding the needs of the teachers through school needs assessments is daunting, but crucial step in the technology plan monitoring. In addition, when planning professional development activities, educational leadership should let their technology plan goals and staff needs guide their planning. They should also ask themselves some important questions: What is the right professional development to support each desired outcome? How can this professional development transform and inform current practice?

Just as school leaders must ensure the right professional development is provided for their teachers, they must also ensure that teachers have

differentiated opportunities for professional growth with technologies as well. As evidenced by this study, not all teachers perceive themselves to be at the same level of comfort and self-efficacy with computer technology. School leaders must see that the "one-size fits all" staff developments are no more effective than teaching to the middle in the classroom. An example of the need for differentiation in the ongoing professional development support will be at West as the implementation model changes from a stationary cart model, where students pick up a new laptop in each of their core classes, to a student carry model, which will allow students to have access to laptops in their electives classes on a daily basis. Where previously they only used laptops if they accessed a cart, in the future they will be able to have students use the laptops in their instruction on a more regular basis. Therefore, elective teachers will need more support on how to effectively use laptops versus their core subject colleagues who have had two years with them in their classrooms. In addition, each year new teachers are hired at each school, which do not have experience integrating laptops into their instruction. These teachers will also need individualized support for their own growth.

Finally, in a district that utilizes a 1:1 integration model, I feel it is important that technology be embedded in all professional development as a model for effective instructional practice. Teachers should see a seamless integration of technology tools and instructional practice in all formalized learning opportunities from district leaders to school leaders. Alice gave an example of how she

preferred this type of professional development in her interview when she referenced a mini-conference the district held during a workday:

> The last one we had at the high school was really good. [The presenter] did a great job…in her lesson, she had the links, and…she had one where she had a nice little hook. She had the video hook, and I thought that was kind of cool. I don't know if I'd be considered a veteran or not, but it's always a good thing to see what you hear about doing. You should always use a hook to get your kids' attention….she modeled it.

Teachers notice this modeling and use these opportunities to not only learn about the content offered, such as teacher leadership or science content, but the technology integration as well.

Conceptual Framework Revisited

In Chapter II, I referenced the TPACK model as my working conceptual framework for this study. While teachers must ensure that they consider content, pedagogy, and technology, using the TPACK model alone may not be enough to prevent the unintentional marginalization of students as found in this study. The model falls short in pushing educators to see digital equity issues in each of its lenses. In addition, the model gives the appearance of equality of technology knowledge to pedagogy knowledge and content knowledge for teachers. As referenced previously in this paper and the research, one does not need a vast amount of technology knowledge to ensure quality teaching nor does a vast amount of technology knowledge ensure that students will receive a quality or equitable education. In addition, the learner is conspicuously absent from the

TPACK model, which could contribute to teachers unintentionally using technology in the classroom with students in potentially harmful ways. To ensure cultural responsive instruction, teachers must approach the student as well as content, pedagogy (including technology uses in the classroom), personal bias, 21st Century skills, and classroom climate, with a cultural responsive lens.

I propose the following framework as a broader model for educators to consider as they work to integrate technology into instruction. First, teachers must develop a filter of cultural responsiveness through which to evaluate and examine all other elements of instructional practice. Through the filter of cultural responsiveness, teachers must determine if the content, strategies, skills, and resources students are exposed are respectful of students' cultural integrity as well as "accommodates the dynamic mix of race, ethnicity, class, gender, region, religion, and family that contributes to every student's cultural identity" (Wlodkowski & Ginsb, 1995, p. 17). Only through the use of a culturally responsive filter when evaluating content, pedagogy, resources, classroom climate, and teacher viewpoint can all students have the opportunity to succeed (Bazron, Osher, & Fleischman, 2005; Gay, 2010; Wlodkowski & Ginsb, 1995).

Secondly, the student should be considered in planning for instruction. Floyd talked about this concept:

> You've got to know your kids, which goes back to something that's not technology…relationships. You've got to build that relationship and know your kids in and out because if you don't, it doesn't matter what kind of smoke and mirrors technology assignment you

133

do; if you don't know your kids they're just going to kind of do it to do it, get it out of the way; go through the motions of it. They're not really going to do it to fidelity.

Additionally, technology has become so prevalent in our world and work that it cannot be isolated away from how it affects teachers' acquisition of knowledge of content or pedagogy. The creators of the TPACK model wrote that defining technology was "notoriously difficult" and went on to say that "any definition of technology knowledge is in danger of becoming outdated by the time this text has been published" (Koehler & Mishra, 2009, p.64). In addition, their model envisioned technology as a separate knowledge that merged with teachers' other knowledge to impact how technology is used in the classroom. I contend, based on the findings presented, that technology knowledge has become integrated into teachers' content and pedagogy knowledge. Teachers demonstrated that they accessed, acquired, learned, and taught their content through technology. An example of this was from Marie:

> I mean I can immediately find out information, even if there's something teaching new Common Core stuff this year…I could teach myself quickly and efficiently, so that I could find ways to teach them. If a kid didn't get a concept I could pull up something to lead them in a different direction, because they may get it this way instead of this way. So the technology could help me when I was in a bind. If I had a couple of kids that didn't get something, then I could say let's go look here and see if there's another explanation.

In addition, teachers in the study demonstrated that their own pedagogical

knowledge and decision making was integrated with technology use through their

own technology infused professional development as well as their own personal

use. An example of this is when Ann said,

> I'm a very self-solving kind of person. I know how to find what I
> need to find, I know that if I have any kind of a question or problem
> with something, there's experts out there. When I was doing sixth
> grade, I had some questions about some things related to the
> universe, and I got the NASA online stuff. I just wrote to them and
> asked them. You can bring in the experts if you want...There are
> places that you can go to, to get assistance to understand
> technology even if you don't understand what to do.

The more knowledge teachers have of their individual students, the better

they can adjust instruction to meet students' distinct learning needs and

goals (Bransford, Brophy, & Williams, 2000).

Figure 3. Updated Conceptual Framework Based on Research Findings
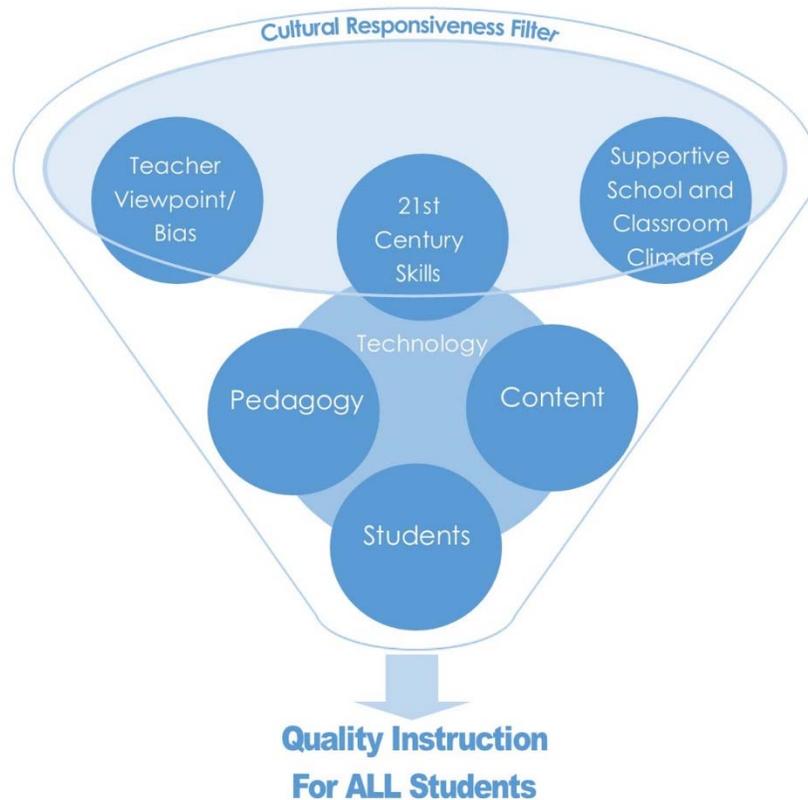
This model understands that technology is both present independently and integrated in how teachers access other contexts for creating instruction. In using this model, teachers would carefully consider the contexts of students, pedagogy, content, technology, 21st Century Skills, personal viewpoint, and classroom climate in preparing for instruction and selecting appropriate resources *after* filtering each distinct context through the cultural responsiveness lens. Instruction that is culturally responsive is comprehensive, seeking

academic excellence as well as teaching the whole child (Gay, 2010; Villegas & Lucas, 2007; Wlodkowski & Ginsb, 1995).

Future Research

If I were able to repeat or continue this research in the future, I would be interested in contrasting the perceptions of those who feel they are advanced in integrating technology with those whose perceptions are that they are not or that their comfort level is more neutral. I also feel that the voice of the students would be interesting comparison data to consider. I think student surveys and interviews to investigate how the technology impacts their engagement, learning, and comprehension as well as their perception of the continuum of the degrees to which teachers implement technology and how it benefits them. I believe the comparison between teacher perception and student perception may help to inform professional development and practice for teachers as well as the development of technology goals and plans for schools.

While many studies show the effects of teacher behaviors and perceptions on ubiquitous computing, the role of the principal in the body of research is not as substantial. More research could be done to determine the impact that school leaders have in the success of a 1:1 laptop implementation to help guide other schools in their implementation efforts.

Limitations of the Study

This study utilized the input of a non-random sample of 7 teachers and 8 support personnel along with a random sample of an average of 29 survey

participants in a small district implementing a 1:1 middle school laptop initiative. The non-random sample represented teachers who self-perceived they were advanced with technology integration. A larger sample of teachers across several districts implementing a laptop initiative could provide a more robust estimate on the instructional implementation of the 1:1 laptop model. This case study is meant to inform the reader about a particular implementation at two middle schools in a small district.

Conclusion

In Chapter III of this study, I asked four questions about technology's impact on teaching and learning at East and West Middle School in an effort to determine if the laptops were having a positive impact on the quality of instruction, the impact on teacher engagement, and the equity of learning experiences for students. I expected to find positive correlations between the technology implementation and the major areas of focus for this study. However, a negative impact discovered through the course of this study suggests that not all students have access to equitable learning experiences as teachers unintentionally use technology to marginalize students. While unintentional, by not focusing on digital equity, teachers used the technology in harmful ways. This finding indicates that equity of learning experiences does not rest solely on resources and infrastructure, so much as the social discourse of teaching and teacher practices and beliefs.

To address this unintended negative impact, I have adjusted my conceptual framework into a working model that teachers could use to help them create instruction that is inclusive for all students and address the issues that I feel the TPACK model does not. My hope is that educational professionals can use this model as a foundation for educational discourse to improve instruction as well as instruction utilizing technology.

What became obvious during the study was that teachers at these two schools are comfortable with the technology they are utilizing, which in turn increases their professional use of technology, even when they noted it caused them to work outside of school or longer hours. However, the technology helped their work to become more effective and efficient, so they engaged in their professional practice more.

To help teachers engage more in the technology and improve their professional practice, a strong culture of professional development and support grew at each school through the process of the 1:1 implementation. Teachers received support from school leaders, technology facilitators, through peer-to-peer learning, and through a network of constant collaboration throughout the building and district. This support was integral in helping teachers to engage in the technology.

While this study focused on the teachers' perspectives of the technology integration and impact on instruction, the impact of administrative and technology facilitator leadership on the technology and school culture was apparent. In this

study, the school administrators appeared to be content with allowing their technology facilitators to take the lead with technology instructional leadership. This contentment most likely stemmed from the shift in administrative leadership to the current leadership, who did not participate in the planning phase.

Teachers predominate view regarding the technology was that technology was one of the many tools they have at their disposal to help students learn, and they used the technology in a variety of ways from showing videos to collaborating online. They also unintentionally used technology to marginalize some students through sending mixed messages about using online content at home, tracking students, and selecting potentially hostile content. These choices impacted the quality of instruction they provided for their students.

One component to quality instruction with technology demonstrated in this study is knowing how to use technology effectively. In addition, teachers in the study chose to let student learning outcomes determine the technology integration. A negative example from the study showed that teachers must also have pedagogical skills that encompass high expectations of their students and a classroom climate that is inclusive and inviting for all students to learn.

As an educator who works with administrators and teachers that utilize technology in instruction, these findings have helped me to see areas in which teachers and support personnel need further support in the implementation of the 1:1 laptop initiative. I am encouraged by the work and enthusiasm that the teachers have displayed in regards to the laptop implementation, most

especially, the collaboration and teacher leadership that has occurred as a result of the cultures within the schools. Teachers are under tremendous pressure in this current age of accountability to prepare students for state tests, but the teachers in this study understood the larger impact of helping students to be global citizens and critical thinkers with 21st Century Skills. Thereby, understanding the need and undertaking the task of implementing technology into their instruction.

REFERENCES

About | G1:1 – G1on1.org. (n.d.). *www.g1on1.org*. Retrieved September 07, 2013, from http://g1on1.org/about/

Achieve. (2011). Rubrics for Evaluating Open Education Resource (OER) Objects. *Website*. Retrieved July 02, 2013, from http://www.achieve.org/files/AchieveOERRubrics.pdf

Adams, M. J. (2009). Reading more, reading better: Are American students reading enough of the right stuff? In Elfrieda H. Hiebert (Ed.), *The Challenge of Advanced Texts: The Interdependence of Reading and Learning* (pp. 1–38). New York: Guilford Publications. Retrieved from http://www.childrenofthecode.org/library/MJA-ChallengeofAdvancedTexts.pdf

Ash, K. (2010). Building on a Decade Of 1-to-1 Lessons. *Education Week*, *29*(26), 12–15. Retrieved from https://libproxy.uncg.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=48817224&site=ehost-live

Bakia, M., Means, B., Gallagher, L., Chen, E., & Jones, K. (2009). *Evaluation of the Enhancing Education Through Technology Program: Final Report* (p. 76). Washington, DC. Retrieved from http://www2.ed.gov/rschstat/eval/tech/netts/finalreport.pdf

Bauer, J., & Kenton, J. (2005). Toward Technology Integration in the Schools: Why It Isn't Happening. *Journal of Technology and Teacher Education*, *13*(4), 519–546.

Bazron, B., Osher, D., & Fleischman, S. (2005). Creating culturally responsive schools. *Educational Leadership*, *63*(1), 83–84.

Berry, A. M., & Wintle, S. E. (2009). *Using Laptops to Facilitate Middle School Science Learning:* University of Southern Maine. Retrieved from http://www2.umaine.edu/mepri/sites/default/files/Bristol_Final_Copy_cover.pdf

Bransford, J., Brophy, S., & Williams, S. (2000). Meet the Learning Sciences : Issues and Opportunities. *Journal of Applied Developmental Psychology*, *21*(1), 59–84.

Burns, K., & Polman, J. (2006). The Impact of Ubiquitous Computing in the Internet Age : How Middle School Tea ... *Journal of Technology and Teacher Education*, *14*(2), 363–385. Retrieved from http://mariaesposito.org/disseration docs/One to One Computing/Burns.pdf

Buzzard, C., Crittenden, V. L., Crittenden, W. F., & McCarty, P. (2011). The Use of Digital Technologies in the Classroom: A Teaching and Learning Perspective. *Journal of Marketing Education*, *33*(2), 131–139. doi:10.1177/0273475311410845

Carolan, J., & Guinn, A. (2013). Differentiation: Lessons from Master Teachers. *Educational Leadership*, *64*(5), 44–47.

Chang, I.-H. (2012). The Effect of Principals ' Technological Leadership on Teachers ' Technological Literacy and Teaching Effectiveness in Taiwanese Elementary Schools. *Journal of Educational Technology & Society*, *15*(2), 328–340.

Chen, M. (2010). *Education Nation*. San Francisco: Jossey-Bass.

Cooper, J. (2006). The Digital Divide: The Special Case of Gender. *Journal of Computer Assisted Learning*, *22*(5), 320–334.

Coppola, E. M. (2004). *Powering Up: Learning to Teach Well with Technology*. New York: Teachers College Press.

Creswell, J. W. (2007). *Qualitative Inquiry & Research Design: Choosing Among Five Approaches* (2nd ed.). Thousand Oaks, California: Sage Publications, Inc.

Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (3rd ed.). Thousand Oaks, California: Sage Publications, Inc.

Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high school classrooms : Explainin ... *American Educational Research Journal*, *38*(4), 813–834. Retrieved from http://faculty.education.illinois.edu/m-osbor/507SE06/cubantech.pdf

Darling-Hammond, L. (2010). *The Flat World and Education: How America's Commitment to Equity Will Determine Our Future*. New York: Teachers College Press.

DeSantis, L., & Ugarriza, D. N. (2000). The Concept of Theme as Used in Qualitative Nursing Research. *Western Journal of Nursing Research*, *22*(3), 351–372. doi:10.1177/019394590002200308

Dewey, J. (1980). *The School and Society*. (J. A. Boydston, Ed.). Carbondale, IL: Southern Illinois University Press.

Dufour, R., & Marzano, R. (2011). *Leaders of learning*. Bloomington, IN: Solution Tree Press.

Dunleavy, M., Dexter, S., & Heinecke, W. F. (2007). What added value does a 1:1 student to laptop ratio bring to technology-supported teaching and learning? *Journal of Computer Assisted Learning*, *23*(5), 440–452. doi:10.1111/j.1365-2729.2007.00227.x

Dunleavy, Matt, & Heinecke, W. F. (2008). Computers in the Schools The Impact of 1 : 1 Laptop Use on Middle School Math and Science Standardized Test Scores The Impact of 1 : 1 Laptop Use on Middle School Math and Science Standardized Test Scores. *Computers in the Schools*, *24*(3-4), 7–22. doi:10.1300/J025v24n03

English Language Arts Literacy in History / Social Studies , Science , and Technical Subjects Key Elements of the Standards Glossary of Key Terms. (n.d.). Retrieved August 15, 2013, from http://www.corestandards.org/

Flanagan, L., & Jacobsen, M. (2003). Technology leadership for the twenty-first century principal. *Journal of Educational Administration*, *41*(2), 124–142. doi:10.1108/09578230310464648

Foundation, N. S. (2008). *Fostering Learning in the Networked World: The Cyberlearning Opportunity and Challenge. A 21st Century Agenda for the National Science Foundation*. Retrieved from http://nsf.gov/pubs/2008/nsf08204/nsf08204.pdf

Fried, C. B. (2008). In-class laptop use and its effects on student learning. *Computers & Education*, *50*(3), 906–914. doi:10.1016/j.compedu.2006.09.006

Gay, G. (2010). *Culturally responsive teaching: Theory, research, and practice (multicultural education series)*. New York: Teachers College Press.

Generation M2: Media in the Lives of 8-to18-Year-Olds. (2009). Retrieved from http://www.kff.org/entmedia/upload/8010.pdf

Gom, O. (2009). Motivation and Adult Learning. *Contemporary PNG Studies*, *10*(May), 17–26.

Goodwin, B. (2011). Research Says … / One-to-One Laptop Programs Are No Silver Bullet. *Educational Leadership*, *68*(5), 78–79.

Gorder, L. M. (2007). Creating Classrooms ofthe Future: Connecting Classrooms With One-to-One Computing. *Delta Kappa Gamma Bulletin*, *73*(4), 19–38.

Gorski, P. C. (2009). Insisting on Digital Equity: Reframing the Dominant Discourse on Multicultural Education and Technology. *Urban Education*, *44*(3), 348–364. doi:10.1177/0042085908318712

Hall, G. E. (2010). Technology's Achilles Heel: Achieving High-Quality Implementation. *Journal of Research of Technology in Education*, *42*(3), 231–253.

Hardaker, G., Dockery, R., & Sabki, A. A. (2010). Cognitive learning styles and digital equity : searching for the middle way. *International Journal of Inclusive Education*, *14*(8), 777–794. doi:10.1080/13603110802680786

Hattie, J. (2009). *Visible Learning: A Synthesis of Over 800 Meta-anylyses Relating to Student Achievement* (p. 392). New York: Routledge.

Holcomb, B. L. B. (2009). Results & Lessons Learned from1 : 1 Laptop Initiatives : A Collective Review. *TechTrends: Linking Research & Practice to Improve Learning*, *53*(6), 49–56.

Horrigan, J. (2009). *The Mobile Difference: Wireless Connectivity Has Drawn Many Users More Deeply Into Digital Life*. Washington, DC. Retrieved from http://pewinternet.org/~/media//Files/Reports/2009/The_Mobile_Difference.pdf

Jackson, R. (2011). *How to Plan Rigorous Instruction*. Alexandria, VA: ASCD.

Jacobs, H. H. (Ed.). (2010). *Curriculum 21: Essential Education for a Changing World*. Alexandria, VA: ASCD.

James P. Sampson, J. (2012). *A Guide to Quantitative and Qualitative Dissertation Research* (pp. 1–93). Retrieved from

http://diginole.lib.fsu.edu/cgi/viewcontent.cgi?article=1000&context=edpsy_faculty_publications

Jensen, E. (2009). *Teaching with Poverty in Mind: What Being Poor Does to Kids' Brains and What Schools Can Do About It*. Alexandria, VA: ASCD.

Kennedy, C. A. (1998). Turning the Tables: Engaging Teachers in the Learning Process. Retrieved February 09, 2013, from http://bearcenter.berkeley.edu/publications/paper2.htm

Kim, S. H., & Bagaka, J. (2005). The Digital Divide in Students ' Usage of Technology Tools : A Multilevel Analysis of the Role of Teacher Practices and Classroom Characteristics. *Contemporary Issues in Technology and Teacher Education*, *5*(3/4), 318–329. Retrieved from http://www.citejournal.org/articles/v5i3currentpractice1.pdf

Klassen, A. C., Creswell, J., Plano Clark, V. L., Smith, K. C., & Meissner, H. I. (2012). Best practices in mixed methods for quality of life research. *Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation*, *21*(3), 377–380. doi:10.1007/s11136-012-0122-x

Koehler, M. J., & Mishra, P. (2009). What Is Technological Pedagogical Content Knowledge ? *Contemporary Issues in Technology and Teacher Education*, *9*(1), 60–70. Retrieved from http://www.citejournal.org/articles/v9i1general1.pdf

Kohm, B., & Nance, B. (2009). Creating Collaborative Cultures. *Educational Leadership*, *67*(2), 67–72. Retrieved from http://www.ascd.org/publications/educational-leadership/oct09/vol67/num02/Creating-Collaborative-Cultures.aspx

Ladson-Billings, G. (1994). What We Can Learn from Multicultural Education Research. *Educational Leadership*, *51*(8), 22–26.

Lenoue, M., Hall, T., & Eighmy, M. A. (2011). Adult Education and the Social Media Revolution. *Adult Learning*, *22*(2), 4–12.

Levin, B. B., & Schrum, L. (2013). Technology-Rich Schools Up Close. *Educational Leadership*, *70*(6), 51–55.

Levin, S. M. (1956). John Dewey's Evaluation of Technology. *American Journal of Economics & Sociology*, *15*(2), 123–136.

Livingston, P. (2008). 1 to 1 Learning. *Education Week*, *1*(3), 18–21. Retrieved from http://www.edweek.org/dd/articles/2008/01/23/3laptop.h01.html

Livingston, P. (2009). *1-To-1 Learning: Laptop Programs That Work* (2nd ed.). Washington, DC: International Society for Technology in Education.

Maninger, R. M., & Holden, M. E. (2009). Put the Textbooks Away: Preparation and Support For A Middle School One-To-One Laptop Initiative. *American Secondary Education*, *38*(1), 5–33.

Mason, J. (2006). Mixing methods in a qualitatively driven way. *Qualitative Research*, *6*(1), 9–25. doi:10.1177/1468794106058866

McLester, S. (2011). Lessons Learned from One-to-One. *District Administration*, *47*(6), 34–38.

Means, B., & Olson, K. (1995). *Technology's Role in Education Reform: Findings from a National Study of Innovating Schools* (p. 206). Washington, D.C. Retrieved from http://www2.ed.gov/PDFDocs/techrole.pdf

Merriam, S. B. (2009). *Qualitative Research: A Guide to Design and Implementation*. San Francisco: Jossey-Bass.

Miles, M. B., Huberman, A. M., & Saldana, J. (2013). *Qualitative Data Analysis: A Methods Sourcebook* (3rd ed., p. 408). Thousand Oaks, California: Sage Publications, Inc.

Modarres, A. (2011). Beyond the Digital Divide. *National Civic Review*, *100*(3), 4–7. doi:10.1002/ncr

Mouza, C. (2008). Learning with Laptops : Implementation and Outcomes in an. *Journal of Research on Technology in Education*, *40*(4), 447–472.

Mueller, J., Wood, E., Willoughby, T., Ross, C., & Specht, J. (2008). Identifying discriminating variables between teachers who fully integrate computers and teachers with limited integration. *Computers & Education*, *51*(4), 1523–1537. doi:10.1016/j.compedu.2008.02.003

Muir, M. (2007). Technology and Student Learning. *Research Summary*. Retrieved July 17, 2012, from http://www.amle.org/Research/ResearchSummaries/TechnologyandStudent Learning/tabid/275/Default.aspx

National Center for Education Statistics. (2012). *Digest of Education Statistics*. Retrieved from http://nces.ed.gov/pubs2012/2012001.pdf

Noble, S. U. (2012). Missed Connections. *Bitch Magazine: Feminist Response to Pop Culture2*, (54), 36–41.

O'Dwyer, L. M., Russell, M., & Bebell, D. (2005). Identifying Teacher, School, and District Characteristics Associated With Middle and High School Teachers' Use of Technology: a Multilevel Perspective. *Journal of Educational Computing Research*, *33*(4), 369–393. doi:10.2190/4BVW-5NDJ-L2G3-EAND

OECD. (2010). *Lessons from PISA for the United States: Strong Performers and Successful Reformers*.

One-to-One Laptop Initiatives: Providing Tools for 21st Century Learners. (2004). Folsom, CA. Retrieved from http://i.i.com.com/cnwk.1d/html/itp/K12WhitePaperHiResFinal05.pdf

Parr, J. M., & Ward, L. (2011). The Teacher's Laptop as a Hub for Learning in the Classroom. *Journal of Research on Technology in Education*, *44*(1), 53–73.

Peterson, K. D., & Deal, T. E. (1998). How Leaders Influence the Culture of Schools. *Educational Leadership*, *56*(1), 28–30. Retrieved from http://www.ascd.org/publications/educational-leadership/sept98/vol56/num01/How-Leaders-Influence-the-Culture-of-Schools.aspx

Reeves, D. (2007). Leading to Change: How Do You Change School Culture? *Educational Leadership*, *64*(4), 92–94. Retrieved from http://www.ascd.org/publications/educational-leadership/dec06/vol64/num04/How-Do-You-Change-School-Culture¢.aspx

Rosen, Y., & Beck-Hill, D. (2012). Intertwining Digital Content and a One-To-One Laptop Environment in Teaching and Learning: Lessons from the Time To Know Program. *Journal of Research on Technology in Education*, *44*(3), 225–241.

Shapley, K., Sheehan, D., Maloney, C., & Caranikas-Walker, F. (2009). *Final Outcomes for a Four-Year Study*. Austin, Texas. Retrieved from http://www.tasb.org/about/related/tcer/documents/etxtip/y4_etxtip_final.pdf

Sheldon, J. P. (2004). Gender Stereotypes in Educational Software for Young Children. *Sex Roles*, *51*(7/8), 433–444.

Skills, P. for the 21st C. (n.d.). *Maximizing the Impact: The Pivotal Role of Technology in a 21st Century Education System*. Retrieved from http://www.p21.org/storage/documents/p21setdaistepaper.pdf

Solomon, G. (2002). Digital Equity: It's Not Just About Access Anymore. *Technology & Learning*, *22*(9), 18–24.

The Intellectual and Policy Foundations of the 21st Century Skills Framework. (2007) (pp. 1–24). Retrieved from http://route21.p21.org/images/stories/epapers/skills_foundations_final.pdf

The National Commission on Excellence in Education. (1983). *A Nation at Risk : The Imperative for Educational Reform*. Retrieved from http://datacenter.spps.org/uploads/SOTW_A_Nation_at_Risk_1983.pdf

Thomas, D., & Brown, J. S. (2009). *Learning for a World of Constant Change: Homo Sapians, Homo Faber & Homo Ludens revisited* (pp. 1–16). Retrieved from http://www.johnseelybrown.com/Learning for a World of Constant Change.pdf

Thomas, D., & Brown, J. S. (2011). *A New Culture of Learning: Cultivating the Imagination for a World of Constant Change* (p. 137). Lexington, KY: CreateSpace.

Transforming American Education: Learning Powered by Technology. (2010). Retrieved from http://www2.ed.gov/about/offices/list/os/technology/netp.pdf

Villegas, A. M., & Lucas, T. (2007). The culturally responsive teacher. *Educational Leadership*, *64*(6), 28–33.

Watling, S. U. E., & Crawford, K. (2010). Digital Exclusion : Implications for Human Services Practitioners. *Journal of Technology in Human Services*, *28*(4), 205–216. doi:10.1080/15228835.2011.565242

Weiser, M. (1993). Some Computer Science Issues in Ubiquitous Computing. *Communications of the ACM*, *36*(7), 77–84.

Wells, J., & Lewis, L. (2006). *Internet Access in U.S. Public Schools and Classrooms: 1994-2005*. Washington, D.C. Retrieved from http://nces.ed.gov/pubs2007/2007020.pdf

Wlodkowski, R. J., & Ginsb, M. B. (1995). A framework for culturally responsive teaching. *Educational Leadership*, *53*(1), 17–21.

Wozney, L., Venkatesh, V., & Abrami, P. C. (2006). Implementing Computer Technologies : Teachers ' Perceptions and Practices. *Journal of Technology and Teacher Education*, *14*(1), 173–207. Retrieved from http://doe.concordia.ca/cslp/wozneyetaljtte141.pdf

Wu, E. H. (2013). The Path Leading to Differentiation: An Interview With Carol Tomlinson. *Journal of Advanced Academics*, *24*(2), 125–133. doi:10.1177/1932202X13483472

Zickuhr, K., & Smith, A. (2012). *Digital differences*. Washington, D.C. Retrieved from http://pewinternet.org/Reports/2012/Digital-differences.aspx

APPENDIX A

IRB APPROVAL

THE UNIVERSITY *of* NORTH CAROLINA
GREENSBORO

OFFICE OF RESEARCH INTEGRITY
2718 Beverly Cooper Moore and Irene Mitchell Moore
Humanities and Research Administration Bldg.
PO Box 26170
Greensboro, NC 27402-6170
336.256.1482
Web site: integrity.uncg.edu
Federalwide Assurance (FWA) #216

To: Julie Pack
Ed Ldrship and Cultural Found

From: UNCG IRB

Date: 4/23/2013

RE: Notice of IRB Exemption
Exemption Category: 2.Survey, interview, public observation
Study #: 13-0115
Study Title: Understanding the Instructional Implementation of a Middle School 1:1 Laptop Initiative

This submission has been reviewed by the IRB and was determined to be exempt from further review according to the regulatory category cited above under 45 CFR 46.101(b).

Study Description:

The purpose of this study is to investigate the instructional implementation of a district-wide middle school 1:1 laptop program and its potential to raise the quality of instruction, to increase levels of teacher engagement, and to provide equity of access to enriched learning experiences.

Through the investigation of these issues, this study will determine the overall impact of the program on the schools as well as examine more closely the impact of the laptop initiative on the issues of quality of instruction, teacher engagement, and equity of access.

Regulatory and other findings:

- **For online survey only:** meets criteria for a waiver of written (signed) consent according to 45 CFR 46.117(c)(2)

Study Specific Details:

- Your study is approved and is in compliance with federal regulations and UNCG IRB Policies. Please note that you will also need to remain in compliance with the university Access To and Data Retention Policy which can be found at http://policy.uncg.edu/research_data/.

Investigator's Responsibilities

Please be aware that any changes to your protocol must be reviewed by the IRB prior to being implemented. Please utilize the most recent and approved version of your consent form/information sheet when enrolling participants. The IRB will maintain records for this study for three years from the date of the original determination of exempt status.

CC:

Carl Lashley, Ed Ldrship and Cultural Found

APPENDIX B

TEACHER INTERVIEW PROTOCOL

Teacher Interview Protocol

Date	Interviewee's Gender	Time End
Time	Subject Taught	
Site	Years of Exp	Interviewer

Script:
Thank you for agreeing to meet with me. I have some questions to ask you about your classroom practice and use of computers in your teaching. These questions are part of a research project I am conducting as part of a graduate study at UNCG looking at the instructional impact of the one-to-one computer initiative. I am coming to you in the role of a researcher.

What you tell me will remain anonymous and confidential. I hope you will feel free to be very candid in your responses. I would like to have an audio recorder running strictly for accuracy and completeness. I will not be identifying any individual names with comments in any of my data reporting.

At the beginning of the recording, I will state the date, time, site, interviewee, and my name for my record keeping. After I have transcribed the data, I will destroy the recording.

Quality of Instruction	How do you view the role of technology in education?
	How are you using the technology? How do you know if students are engaged in the technology? How do you know if students are learning the desired outcomes?
	When you utilize technology, how does student engagement differ in your classroom? Student retention? Student comprehension?
	Do you perceive a difference in the quality of your lessons when utilizing technology?
	Do you perceive a difference in the behaviors of your students when utilizing technology in classroom learning?

	(i.e. engagement, self-efficacy, independence, motivation, etc.)
	Do you perceive that your students do better with technology integration?
	How do your students perform academically when technology is integrated in the lesson?
	How do your students perform emotionally and socially when technology is integrated in the lesson?
Teacher Engagement	What kinds of supports are available to you?
	How often do you need each type of support (Technical support, instructional support, help in the classroom)?
	What is the quality of the support you receive?
	What type of professional development do you most prefer?
	Has the professional development offered for the implementation of the technology met your personal needs?
	How successful do you feel with implementing the technology in your classroom?
	What factors have contributed to success? What factors have inhibited implementation?
	How has the 1:1 initiative changed what you do in the classroom instructionally? What you do beyond the classroom? Your perception of yourself as a teacher?
Equity of Access	Do all students have access to laptops in the school (including students with disabilities)?
	What exceptions are made for students with impairments (such as blindness)?
	How many students have access to the Internet beyond the school day?

	What kinds of activities are students asked to do on computers in your class?
	How do you differentiate using technology?
	How do you decide which software, website, or digital content to utilize?
	How do ensure that digital content is culturally responsive and meets diverse learners' needs?

SUPPORT PERSONNEL INTERVIEW PROTOCOL

Support Personnel Protocol (Administrators, Tech Facilitators, Media Specialists)

Date	Interviewee's Gender	Time End
Time	Position	
Site	Years of Exp	Interviewer

Script:
Thank you for agreeing to meet with me. I have some questions to ask you about the use of computers in teaching in your school and your support of them. These questions are part of a research project I am conducting as part of a graduate study at UNCG looking at the instructional impact of the one-to-one computer initiative. I am coming to you in the role of a researcher.

What you tell me will remain anonymous and confidential. I hope you will feel free to be very candid in your responses. I would like to have an audio recorder running strictly for accuracy and completeness. I will not be identifying any individual names with comments in any of my data reporting.

At the beginning of the recording, I will state the date, time, site, interviewee, and my name for my record keeping. After I have transcribed the data, I will destroy the recording.

Implementation of the Program	In your view, what are the goals of the 1:1 Initiative? What are the criteria for success of this program? What is your view of the role of technology in education? In the district and at the school, who has been critical for making this project happen? • How have you staffed for the project? • How have the staff worked together to make the project happen? How did the teachers react to the initiative? The students? What were the stages that you went through?

	Tell me about all the things that happen behind the scenes and structures that are in place that help to make the computing project a success. (things that you just can't walk in and observe) I'm sure having so many computers around have caused some problems, but have they solved any? How so?
Teacher engagement	I know that there are many different ways that teachers use computers in the classroom and that there are many different teaching styles. I'm trying to get the whole range. So, with that in mind, can you tell me what would I see in a classroom using technology? What would I see in the best? The worst? How do you account for the differences? How are addressing this gap? What would I see in a typical classroom norm? What supports do you provide teachers?
Quality of Instruction Equity	How do you see the technology making a difference in your school for teachers? Students? Do all students have access to laptops in the school (including students with disabilities)? What exceptions are made for students with impairments (such as blindness)? How many students have access to the Internet beyond the school day? How are resources and digital content approved for students' use?
Vision	Where do you see your school in the next 5 years with regard to the one-to-one initiative? In hindsight, what do you know now that you wish you had known when you were first implementing the program in regards to support for instruction?

APPENDIX D

ONLINE SURVEY DATA TABLES

Table i. Teacher perceptions of technology

Question	Yes	No	Total Responses
Do you perceive a difference in the quality of your lessons utilizing technology?	27	2	29
Do you perceive that your students enjoy learning with technology?	29	0	29
Do you perceive that students prefer learning with technology?	28	1	29

Table ii. Student classroom laptop activities

Answer		Response Frequency	Total %
Word Processing (Word Documents, PowerPoint, Google Docs)		27	93%
Research		26	90%
Web 2.0 Activities		14	48%
Installed Software Programs (Read 180, etc.)		9	31%
Learning Management Platform (Moodle, Edmodo, etc.)		22	76%
Notetaking		12	41%
Communicating with others (global partners, Skype, email, etc.)		12	41%
Watch videos (Eduvision, YouTube, TeacherTube, etc.)		28	97%
Read texts		23	79%
Other:		8	28%

Other:
interactive online simulations
Note naming, rhythmic reading, Audacity rhythm section jazz improvisation, etc.
Projects
voice thread for foreign language practice
media production, Google maps
Assessments
interactive online simulations
Scootpad, Tenmarks

Table iii. Satisfaction of teachers with support for technology

Question	Extremely Satisfied	Satisfied	Neither Satisfied nor Dissatisfied	Dissatisfied	Extremely Dissatisfied	Total Responses
Quality of Support	12	13	4	1	0	30

Table iv. Frequency table for factors for success in implementing technology

Categories of Responses	Frequency
On-site support	10
Access to technology resources (laptops, SmartBoards, document cameras, etc.)	9
Ease and comfort with technology	3
Frequency of Use	1
Ability to use for special students' needs	1
Students' eagerness to use technology	1

Table v. Actual* open ended responses from the survey for the question: What factors have contributed to success of technology implementation in your classroom/instruction?

Names, if referenced, were removed and changed to positions such as administration or technology facilitator.

Teachers' Text Response
My overall ease and comfort implementing and exploring with technology.
Funding for an on-site tech facilitator, on-site troubleshooting, funds for maintenance and upkeep of hardware
Excellent resources provided and the staff is very helpful with them. Resources purchased if money is available. Administration is very supportive.
being able to meet with other peers and learn from them
SmartBoard, laptop, PD on technology (Audacity, Google Docs, Edmodo, Google Apps, etc.)
1:1 computer Access to Internet Tons of activities to practice in Internet
How often I use it and the ability of technology to meet the needs of my special education students.
Each student having a laptop makes it easy to integrate Internet and online assignments on a daily basis.
Working with others who answer any questions and give suggestions for programs that will work with what it is I want my students to do.
reliable resources
I am amazed at how resourceful and helpful the technology facilitator and media specialist are to each of us. I have asked for help and they will show up at my door, very pleasantly and efficiently. I have only been here since January, and I have already attended 3 PD they have offered on Technology after school and during planning. I just feel like the tech support is so incredible. Also if a student has an issue with their laptop, they can go to the HELP DESK and get a resolution immediately! AMAZING!
Freedom of MOST websites from being blocked. Reliable WiFi
Being given a menu of options for professional development led by teacher leaders. This has allowed me to learn about the kinds of technology implementation that I need and avoid sitting through something I have already mastered. For example, I chose to attend a session on Google Apps this year. I learned from a fellow teacher how to use Google Docs and Google Presentations to foster collaboration among students. Also I learned how to use Google Sites to have students create individual websites that can serve as a digital portfolio. Another huge factor that has contributed to my success is access to experts within my school and having assistance with technology "glitches" within 24 hours. Our school has a technology guru on site! His job is strictly to assist us with technology.

Using the smartboard everyday, showing educational youtube videos that help students understand the content.
Great coworkers who have helped me.
Having a technology facilitator and other teachers who are using technology to help inspire me. Also, students who are using technology in some classes often convince the other teachers to try it too.
Our technology facilitator and media specialists have done an amazing job in coordinating the 1;1 roll-out with central office, as well as providing us with on-going organizational leadership, support, and information on important updates and issues whch impact our general program.
Understanding how programs work and being able to provide a way to get information to students, ie; Edmodo
The technology facilitator.
We can access so much information online that is authentic to my curriculum.
1 to1
Support is awesome here! The technology facilitator is wonderful. Anxious to help in any way. Other teachers are very helpful as well.
Internet access, professional development, learning from other professionals, student engagement, instruction in research process
I am a young teacher and I have a lot of experience using technology in college and in my teaching placements. Technology is an every day part of my life.

Table vi. Frequency table for factors inhibiting classroom implementation of technology

Categories of Responses	Frequency
Negative student behaviors	7
Lack of planning/teacher learning time	7
Equipment Issues	4
Technology Issues (Internet connectivity, computer problems)	4
Not having access to laptops (elective teachers and specialists not having equal resources as the core classes)	3
Lack of program/website options	3
Website unreliability	1
Inability to adapt technology for special needs students	1
None	1

Table vii. Actual* open ended responses from the survey for the question: What factors have inhibited technology implementation in your classroom/instruction?
*Names, if referenced, were removed and changed to positions such as administration or technology facilitator.

Teachers' Text Response
Keeping students focused on using their device properly i.e. seeing the value of the equipment, using it to play "games" or go to Facebook/Instagram/social media sites instead of completing their school work
Logistics - how to manage equipment during the school day while giving students ownership of it. How do you hold kids accountable for doing the wrong thing with technology without limiting their use of it?
I need more TIME to plan.
having my own laptop and the students being able to travel with laptops
A recording room is desperately needed in the band/chorus area. West is the only middle school in the entire county without an available practice room. All other schools have at least two; East has three and an office for the band teacher. There were three practice rooms built when the school was built, but they have been used as offices for the past 5+ years. I have requested the permanent use of all three practice rooms every year.   Also, I would really like to have music notation software program, such as Sibelius 7. By showing the entire conductor's score on the SmartBoard, it would make it more clear for students to understand how their individual parts fit with the entire group. It would also allow me to create music for the students in order to help motivate them for continued growth.
Time Problems with the web Do not have control of all students at the same time. Lack of programs to write Math symbols in the computer.
Lack of enlargment on web sites.   Lack of time to expand my technology skills
A lot of times students' computers are broken.
None
computer difficulties
There are so many programs that are available that it is difficult to choose just the right one.
WiFi connection issues, blocked sites
Troubleshooting issues, technology issues
Sometimes there are not a lot of good online resources for students to do with laptops. In math, pencil and paper is usually more helpful then using a laptop
Keeping students on task and using their time wisely
Unreliability of Internet sites, students want to play games instead of completing tasks
Students breaking laptops and no clear plan for refreshing the laptops that were purchased through a federal grant.

Computers not being charged, students using them inappropriately, computers breaking, not having a replacement.
Time to plan.
Students are distracted and want to play games all the time. It is hard to monitor every single student on the laptops and still be a great teacher.
time factor
SmartBoard light bulb is about to go out (was instructed to use sparingly because bulbs are hard to come by), SmartBoard touch screen does not work
Need more time! There just aren't enough hours in the day. :o)
use of social media during instructional time

Table viii. Full response on open question: How does integrating laptops into your instruction affect your willingness or ability to improve your practice?

Teachers' Text Response
Integrating technology is NOT the single factor or even a large factor in my willingness or ability to improve my practice.
It is easier, less time consuming. I am able to access all of the information available to find the best fit for my students instead of being limited to only what we have in hard copy at the school.
Very strongly! It is so much fun for me and my students. I plan very engaging activities.
having everything digital was much easier to record, grade, and get responses back to students
We don't use laptops very often because it is difficult to get them into our classrooms. I would need to borrow two carts from other teachers in order to have a computer for every child. I look forward to next year when all students will carry their own laptop around the school.
it allows me to reflect on differnt ways to reach students
Having the laptops makes me want to find neat and interesting ways to improve my own practice!
When I find good information I see good practice
it gives more feedback
i am always open to learning and I can learn from other language teachers by using technology.
I am much more willing and able to do project-based learning and diff. instruction for my different levels and types of learners because of technology.
It is hard to integrate laptops in math instruction because it's not worth it to use laptops if they are answering the exact same question that they would on paper, but now it is on a screen. Laptops should only be used in math if they are going to enhance the instruction instead of change the appearance

I don't force it. It comes naturally to use laptops at some point in a lesson, but if they aren't needed we don't force it. I find laptops to be a lifesaver for quickly making presentable products and higher levels of Blooms.	
With resources available, my teaching is rarely stagnant. Student interest and abilities keep me motivated to improve.	
Laptops provide another tool to be used in the classroom. It presents several other challenges, however, such as with classroom management and having to ensure students are using appropriate sites and engaged in their work. Cyberbullying and a constant desire for students to get around "firewalls" to access Facebook has been a problem since laptops were introduced here. All this being sad, laptops have required teachers to have to rethink some of their practices and adapt to new tools (e., Smart Sync). Also, teachers have been learning more about when to use technology and when to not use it. Again, it is another tools that teachers have learned to use, and so part of their growth is knowing when it does/doesn't enhance learning.	
For students to have access to the same information that I have and ability to check on how they're using it.	
I am more on my toes, especially to make sure my students are doing what they should be doing and going to the appropriate sites.	
Greatly...it is SOOOO much fun using technology and laptops.	
Greater access to information Engaging ways to present information through multiple formats Collaboration tools such as Google apps	
I think that integrating technology positively affects my ability to improve your practice.	

Table ix. Frequency table for responses on differentiating with technology

Categories of Responses	Frequency
Give different assignments	9
Access to various resources	5
Use flexible grouping	5
Independent/self-paced learning	4
Use choice options	4
Vary levels of the same assignment	3
Utilize technology generated data (i.e. Lexile)	2
Enrichment	1
Audio files of texts	1
Chunk smaller objectives	1

I don't differentiate using technology	1

Table x. Evaluating digital content

Q. How do you decide which software, website or digital content to utilize? (Check all that apply)			
Answer Choices		**Response**	**%**
Evaluate based on a rubric		7	24%
Evaluate based on current need		26	90%
Based on referral of colleague		21	72%
Google search		14	48%
Other:		3	10%
Other Open Ended Responses: Compare the activity to the objective I am looking to cover. Professional Publications and Facebook Professional Community Technology facilitator			
Q. How do you ensure that digital content is culturally responsive and meets diverse learners' needs? (Check all that apply)			
Answer Choices		**Response**	**%**
Evaluate based on a rubric		7	25%
Evaluate based on current need		21	75%
Based on referral of colleague		15	54%
Google search		6	21%
Other:		4	14%
Other Open Ended Responses: I thoroughly examine all technological tools before use I view it before showing. Self reflection based on my education and experience Ask technology facilitator			