

Planning, Preparing, and Implementing a One-to-One Computing Initiative in K-12 Education:
A Case Study of a School Division's Journey Toward a One-to-One Computing Environment for
Students and Staff

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ABSTRACT

One-to-one computing initiatives are becoming a part of many school divisions across the United States as district leadership analyzes ways to improve student learning and create 21st century learning spaces. Studying how school divisions planned, prepared, implemented and sustained a one-to-one computing initiative is an important step that school leaders must do in order to help foster learning environments that promote critical thinking, collaboration, communication and creativity.

The research presented in this paper came from a case study conducted on City School District (CSD), a kindergarten through twelfth (K-12) grade school system that implemented a one-one computing initiative for all students. A detailed analysis of archived meeting minutes, surveys, questionnaires, classroom observations, student assessments and interviews helped answer research questions that focused on the planning, implementation, and plans for sustaining the one-to-one computing initiative.

The one-to-one computing initiative for CSD started with a vision created by the superintendent of schools that focused on developing an individualized education plan for all students. The vision eventually became the vision for the entire school division during the digital conversion. School leaders can use the studies' findings and recommendations to help guide them through the implementation of a one-to-one computing initiative.

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GENERAL AUDIENCE ABSTRACT

Providing an electronic mobile device such as a laptop or tablet computer to all students in a kindergarten through 12th grade school system is an undertaking that requires a coordinated effort from the school division's leadership as well as the teachers, students and other community stakeholders. Beginning in 2013, City School District (CSD) began the planning process for providing every student in their school system with electronic mobile devices. After five years of planning, implementing, conducting pilot programs and expansion, CSD has been able to provide all students in grades 3-12 with an electronic mobile device.

This case study focuses on three research questions.

1. How did the school division implement a one-to-one computing initiative?
2. How has the staff adapted to the innovative change of a one-to-one computing initiative?
3. How does the school division plan to continue and sustain the one-to-one computing initiative?

The case study found key elements for implementing a one-to-one computing initiative by collecting data from archived meeting minutes, surveys, questionnaires and interviews. School leadership teams attempting a one-to-one computing initiative can use the findings and recommendation from this study to implement a one-to-one computing initiative.

DEDICATION

This dissertation is for my family. We did this together! Our family grew throughout this process. Now, as I put the final additions on this research project, we are a wonderful family of five. My children, Brady, Bryce and Lillian, you all were so helpful and I thank each of you for sacrificing time with Daddy so that I could complete this process. Now we have so much time to spend with each other and I cannot wait to coach your teams, play hide 'n' seek, read books with you or just simply be there to watch you all grow up to be amazing people. I hope this shows you that all things are possible if you have the support of your family.

Rebecca Frischkorn, my wife, you were a constant support throughout this process. Thank you for supporting me, pushing me and keeping our family together throughout this six-year process. When I first signed up for this program, I remember sitting with you and discussing if we can pull this off. You told me that you would do anything to help and you certainly did. You are the reason I completed this and I will always love you for being our family's #1 cheerleader and organizer. Without you, I think we would all be lost.

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Chapter 1

Statement of Problem

A one-to-one (1:1) computing initiative places a mobile electronic device in the hands of every student within a school. A mobile electronic device is digital technology that can move freely with a person, such as laptops, smartphones, tablets, netbooks, iPods, iPads, and e-readers (Magana & Marzano, 2014; Franklin, 2011). One-to-one computing initiatives within K-12 education have become prevalent for many reasons.

In 2013, Virginia's Department of Education (VDOE) helped schools provide students in grades 9–12 with a laptop or tablet through a program called the e-Learning Backpack Initiative. The goal of VDOE's e-Learning Backpack Initiative was to improve student achievement, lower the dropout rates, provide students with college and career readiness skills, and prepare students to be able to compete in a globally connected world (VDOE, 2017). School divisions are visualizing technology as a way to improve and innovate current educational practices and promote students learning 21st century skills (Pautz & Sadera, 2017). Research has found links to associate increased productivity and digital technologies. The average worker's productivity improves with the incorporation of digital technologies (Fleck, Glaser, & Sprague, 2011). Similarly, Project RED found that proper implementation leads to higher educational achievement and financial savings for schools (Greaves et al., 2012). A one-to-one computing initiative can cost roughly \$100 to \$400 per student if implemented correctly (Greaves et al., 2012).

A school's path to a one-to-one computing environment is far more complicated than simply allocating monetary resources in order to purchase digital devices for its students. A one-to-one computing initiative requires a systemic approach that studies the financial implications,

the planning of professional development for teachers, the monitoring of the digital infrastructure within schools, revisions to school policy regarding digital technology, plans for maintenance of electronic devices, implementation strategies for successful use of the digital resources, and the gathering of input from stakeholders within the community. School divisions must be willing to research the planning, implementing, and monitoring stages of one-to-one computing before starting such an initiative.

A common mistake among school divisions attempting a one-to-one computing initiative is purchasing the technology and simply adding it to the current teaching practices already in place (Horn & Staker, 2015). Technology itself does not improve the teaching and learning within schools. Teachers need professional development on how to create lessons within a technology-enriched environment (Walser, 2008). Focusing on pedagogical change using the one-to-one computing initiative is vital to the success of the initiative (Edwards, 2014). The school principal is a critical piece to a successful one-to-one computing initiative (Greaves et al., 2012).

How do school divisions plan to continue and sustain the one-to-one computing initiative? Strong leadership capable of managing a one-to-one computing initiative efficiently is one of the key pieces to success of the overall program (Islam & Grönlund, 2016). A 2014 research study identified that educational administrative leadership at all levels is necessary for a successful one-to-one computing initiative (Topper & Lancaster, 2014). Leadership must show a commitment to the one-to-one computing process due to the fact that they are responsible for establishing a clear vision for educational technology use among students and staff, building community support, and identifying data points that will determine whether the initiative is successful or not.

The planning, preparation, and continued monitoring of a one-to-one computing initiative is important to the successful implementation (Greaves et al., 2012). The addition of laptops to the current structure of school does not have the positive effect that school divisions need to see in order to continue to fund a one-to-one computing initiative.

Study Background

One-to-one computing initiatives date back to the 1990s (Islam & Grönlund, 2016). School divisions across the country have attempted one-to-one computing initiatives with varying levels of success (Horn & Staker, 2015). Many school divisions have become beacons of success for what can happen when a school division successfully implements a one-to-one computing initiative (Edwards, 2014).

A case study approach will be used to conduct an action research study on a mid-Atlantic school division's one-to-one computer initiative. A school division located in the mid-Atlantic region of the United States began a one-to-one computing initiative for an entire school division during the spring of 2013. For confidentiality purposes, the school division will be referred to as City School District (CSD). CSD consists of four schools: a primary elementary school for grades PK–2, an intermediate elementary school for grades 3–5, a middle school, and a high school. The PK–12 student enrollment for CSD is 3,568 students as of September 30, 2016.

City School District is located in the mid-Atlantic region of the United States. CSD is attempting a digital conversion in order to personalize the instruction for its 3,500 students in grades PK–12. Part of the digital conversion includes a one-to-one computing initiative that provides each student in grades 3–12 with a personal electronic device to use for instructional purposes. The idea for CSD's one-to-one computing initiative started in the spring of 2013. An April 3, 2013 email from the superintendent to the leadership team of CSD with the simple title

of “A Must Read as We Think about the Future” opened the conversation for what may be possible for the students of CSD. Attached to the email was an article about Mooresville Graded School Division and how it transformed its teaching and learning with the help of a one-to-one computing initiative.

A small group of educators from CSD, consisting of the superintendent, members of the information technology department, and members of the instructional department, traveled to a two-day conference that focused on transforming teaching and learning using a one-to-one computing initiative. The host for this two-day conference was the same school mentioned in the superintendent's email on April 3, 2013. Mooresville Graded School District (MGSD) hosted the conference. MGSD is a nationally recognized school system because of its digital conversion. MGSD's digital conversion issued every student in grades 4–12 a MacBook to carry to and from school. Students in kindergarten through third grade receive a laptop or iPad (MGSD, 2016). The two-day conference provided CSD leadership with the groundwork for what would become CSD Connects. CSD Connects is the title for CSD's digital conversion. CSD Connects is a digital technology initiative with the focus of personalizing instruction for students by putting a laptop or tablet in the hands of every student.

Purpose of Study

The study will analyze the planning and preparation that went into the one-to-one computing initiative, the implementation process for distributing digital devices to students, the monitoring process of the one-to-one digital initiative, the current perception of teachers on their concern with the one-to-one computing initiative, and the school division's plan for continuing the one-to-one computing initiative. Documents, archived records, interviews, surveys, and questionnaires will be used to collect data on CSD's one-to-one computing initiative.

CSD provides a look at how an entire school system pulled resources and energy together to create a one-to-one computing environment for students. Over the course of four years in which the one-to-one computing initiative has been in place, the school division has learned some positive and not so positive lessons. CSD had to learn to navigate its way through the one-to-one initiative by learning from others. CSD can be a source of data on the trials and tribulations of a one-to-one computing initiative. Research on how CSD planned, prepared, and implemented a one-to-one computing environment for students is of utmost interest.

Need for the Study

School divisions invest time, money, and human resources into one-to-one computing initiatives. The school division's goal of implementing a one-to-one computing initiative often deals with improving instruction and academic achievement for students, as well as exposing students to the 21st century skills of collaboration, communication, critical thinking, and creative thinking (Topper & Lancaster, 2014). School divisions must understand that implementing an idea such as a one-to-one computing initiative takes years of planning and preparation prior to ever putting laptops in the hands of the students (Edwards, 2014). Strong leadership from the division level and the school level is required to implement an innovative idea such as a one-to-one computing initiative for every student in grades 3-12 (Greaves et al., 2012).

Research Questions

1. How did the school division implement a one-to-one computing initiative?
2. How has the staff adapted to the innovative change of a one-to-one computing initiative?
3. How does the school division plan to continue and sustain the one-to-one computing initiative?

Definition of Terms

21st Century Skills: 21st century skills include the ability to be creative and innovative, the ability to work collaboratively with others, the ability to communicate effectively, and the ability to think critically.

Case Study: A qualitative research study that analyzes one or more cases and provides a descriptive interpretation of the case (Johnson & Christensen, 2012).

Digital Conversion: A term that some school divisions have used to explain the process of providing digital technology to students and teachers in order to personalize instruction.

Digital Technology: Includes electronic devices, such as laptops, smartphones, tablets, netbooks, iPods, iPads, and e-readers (Magana & Marzano, 2014; Franklin, 2011).

e-Learning Backpack Initiative: Provides an individual with a “tablet or laptop computer, digital content and applications, and access to content creation tools” (VDOE, 2017).

Mobile Device: Electronic device that can move freely with a person, such as laptops, smartphones, tablets, netbooks, iPods, iPads, and e-readers (Magana & Marzano, 2014; Franklin, 2011).

One-to-One (1:1) Computing: Every student in school has access to a digital device that is capable of connecting to the Internet (United States Department of Education, 2004).

Limitations and Delimitations for the Study

Limitations

The mixed methods research approach allows for the collection and analyzation of a combination of qualitative and quantitative research data in order to provide answers to questions posed for this dissertation (Johnson & Christensen, 2012). Limitations for this study include the fact that this is only a case study of one school division that consists of 3,500 students. The study

depicts how this specific school division pursued personalizing instruction for students using digital technology. The results from this case study may not be duplicated in other school divisions due to various factors, such as school size, financial situations, and stakeholders' involvement. The research will show how a school division planned, prepared, and implemented a one-to-one computing initiative in which all students in grades 3–12 received a personal electronic device in order to personalize instruction.

Delimitations

The case study for this research analyzes one school division located in the mid-Atlantic region of the United States. The school division chosen for this case study began implementing a one-to-one computing initiative in 2013 and has recently rolled out personal digital devices to all students in grades 5–12. All schools within this particular school division are involved in the district's digital conversion initiative, titled City Connects.

Summary

School divisions across the country are pursuing one-to-one computing initiatives in order to prepare students to enter the future workforce, to improve students' skills and achievement, and to positively influence the instruction that students receive (Horn & Staker, 2015; Lei & Zhao, 2008; Lowther et al., 2003; Penuel, 2006; Zucker, 2004). It is important that school divisions attempting a one-to-one computing initiative realize that it is more complicated than simply putting a personal electronic device in the hands of students. Planning and preparation are vital for a one-to-one computing initiative. It is important to continue to study school divisions that are currently attempting one-to-one computing initiatives in order to learn from their experiences.

Chapter 2

The globally competitive economy is forcing the United States to examine its education system. The United States' education system must produce graduates who are prepared to compete for jobs and become productive citizens in a globally connected world. Houle and Cobb (2011) claimed that, with regard to the United States education system, "in recent years there has been a growing sense of failure, frustration, and acceptance that what exists no longer serves our children, our society, our county, and our place in the world" (2011, pg. 1). This sense of frustration may be due to the fact that the current education system within the United States was constructed during the industrial revolution and has not changed as rapidly as society outside of the school building has during the digital age (Houle & Cobb, 2011).

In this chapter, I will address how technology has connected the world. First, I will describe the evolution of educational technology in schools. Next, I will look at what the 21st century learning environment must contain based on society's needs. Then, I will describe how new national standards have paved the way for educational technology in schools. I will discuss the evolution of today's student and analyze the effect of a personalized digital environment on the student. Finally, I will highlight the educational change needed to meet the needs of today's students and explain the role school administrators have in supporting educational technology in schools.

Educational Technology over Time

Administrators, teachers, students, and parents have been adapting their methods of teaching and learning as new technological innovations reach the classroom. The integration of information and communication technologies, such as personal computers, laptops, technology software, and the use of the Internet, has become pervasive in education. Students have increased

access to technology at very young ages and technology is not a novelty within schools (Ng, 2015).

Computers Enter the School Building

Computers have been changing the way people work, think, and communicate. Computers first entered schools in the 1960s with the introduction of mainframe computers. At that time, researchers began to investigate the questions of how to incorporate computers into education (Lei et al., 2008). By the 1970s, K–12 educators began to regard computer technology as an area of study beyond their use as a tool in all instructional areas (Lei et al., 2008). One researcher predicted in the 1980s that the use of technology as an instructional tool was unlikely to occur quickly due to the conservative and slow change that is typical in the American education system (Bork, 1985).

The Evolution of the Computer to an Instructional Tool

Computers' effect on K–12 education began in the 1980s with the introduction of personal computers. In 1985, the National Center for Educational Statistics reported that close to 500,000 personal computers were being used within schools in the United States, approximately six personal computers per school on average (Bork, 1985). In 1985, the computer-to-student ratio was 125:1, but within the next two decades, it dropped down to 3.8:1 (Lei et al., 2008).

Governments around the world realized that the country capable of implementing the use of computers within the field of education was most likely to succeed in the future (Bork, 1985). Furthermore, it was evident that if the education system was to move forward in the era of the personal computer, an overhaul of the mid-1980s education system needed occur (Bork, 1985).

The Internet Served as a Game Changer for Computers in Schools

The computer as an instructional tool experienced another significant revolution in the mid- to late 1990s with the rapid development of the Internet (Lei et al., 2008). Research conducted on computers as educational tools before the availability of the Internet became obsolete due to the Internet's vast capabilities to bring information to people (Burns & Polman, 2006). The growth in the number of people able to connect to the Internet during the 1990s was staggering. In 1994, only 3 percent of the student population in the United States was capable of accessing Internet-connected computers within their classrooms. That number increased to an astounding 87 percent of the population with access to an Internet-connected classroom computer by the year 2001 (Burns & Polman, 2006). By 2004, 99 percent of instructional classrooms had access to the Internet (Lei et al., 2008). School curriculums began to change due to Internet-connected computers. Students began to see a dramatic increase in the number of computer courses that schools offered. Schools began offering courses to students that focused on networking, search engines, web-page development, and e-mail (Lei et al., 2008).

Mobile Computing Devices Become Mainstream

The computer as educational tool took another leap forward with the introduction of mobile devices. A mobile device is digital technology that can move freely with a person, such as laptops, smartphones, tablets, netbooks, iPods, iPads, and e-readers (Magana & Marzano, 2014; Franklin, 2011). Mobile computing devices allowed students to access learning anytime and anywhere (Franklin, 2011). Learning was no longer relegated to a specific classroom during a specific time (Magana & Marzano, 2014).

In response to the use of mobile computing devices, some schools implemented an educational initiative called one-to-one computing. The U.S. Department of Education (2004)

defined one-to-one computing as providing students and teachers with a wireless technology device that can allow students and teachers to access learning wherever and whenever they want. In 2008, the North Carolina State Board of Education implemented a one-to-one computing initiative at ten traditional high schools and eight early college high schools in order to increase student achievement and identify the challenges of implementing a one-to-one computing initiative (Corn et al., 2012). Helping students acquire 21st century skills and knowledge and to increase student achievement was the goal of Michigan's Freedom to Learn One-to-One initiative (Lowther et al., 2012).

The world experienced a knowledge revolution driven by personal computers, video games, the Internet, and cell phones (Collins & Halverson, 2009 in Magana & Marzano, 2014). The technology will continually change, so there will be no way of predicting what future technology will look like. M. van't Hooft (2008) predicted that technology would move forward in the following areas:

1. Personal (one-to-one access).
2. Mobile (always-on-you technology).
3. Networked and connected to the Internet 24/7 (always-on technology).
4. Accessible (cheap and easy to use).
5. Social (allowing for creating, sharing, aggregating, and connecting knowledge).
6. Multimodal (support different media, including text, image, sound, and video) (p. 874).

As the world transitions to a personalized learning environment using mobile computing devices, educators must realize that the learning possibilities are becoming limitless. Learning will no longer be relegated to the four walls of a classroom.

Learning the 4 Cs

Students are now required to compete in a digital world that fosters competition on a global scale (Kivunja, 2015). One component of the digital world is known as the 4 Cs. The 4 Cs stand for creativity, communication, critical thinking, and collaboration. Schools are attempting to foster students' 4 Cs within the school building by creating items such as the Profile of a Graduate by the Virginia Department of Education. A 2012 study that examined 195 schools involved in Michigan's Freedom to Learn one-to-one computing initiative found that students who participated in a technology-enhanced learning environments were exposed to more student-centered learning and project-based learning that directly supported the skill acquisition required for 21st century learners (creativity, communication, critical thinking, and collaboration) (Lowther et al., 2012).

The Four Cs: Creativity, Communication, Critical Thinking, and Collaboration

The Partnership for 21st Century Skills identified four areas of learning and innovation skills that are essential for students in order to be prepared for the future: creativity, effective communications, thinking critically, and collaboration (2015). Saxena (2015) stated that the four Cs are the super skills that students will need in order to be successful in a digital environment in college, in their careers, and as a citizen. School divisions have been implementing technology rich learning environments to provide the students the ability to cultivate and incorporate the four Cs into their learning (Varier et al., 2017).

Creativity. The Partnership for 21st Century Skills maintained that a person's ability to create and think innovatively was a highly marketable skill in today's global economy (Partnership for 21st Century Skills, 2007). DeBone (1995) stated that creativity and innovation were two of the most important human skills, and without creativity and innovation, the world

would not progress and simply repeat what had been done before. Creative people possess the following five abilities: disagreeing constructively with others, searching for new solutions to problems, drawing connections from various fields of knowledge, finding solutions to problems, and identifying problems (Amabile, 1998). Technology allows individuals to creatively manipulate data in ways to support or disagree with various topics (Garner, 2000).

Communication. Communication is the ability to receive ideas and information and disseminate thoughts and ideas (Lippl, 2013; Piascik, 2015; Kivunja, 2015). A person who can effectively communicate is someone who can inform, instruct, and persuade when placed in a wide array of environments (Trilling & Fadel, 2009). People lacking communication skills will eventually be unable to sustain effective participation in the workplace or build meaningful relationships (Kivunja, 2015). Technology offers a variety of avenues for students to practice communication skills, e.g., social networking, email, blogs, collaborative projects, etc.

Critical Thinking. Multiple researchers have attempted to define critical thinking, but there has been little agreement over the true meaning of the term (Kivunja, 2015). However, the National Council for Excellence in Critical Thinking (2016) defined critical thinking as “the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action.” A simpler definition states that critical thinking is the desire to use reason in the forming of our beliefs (Mulnix, 2010). A person who demonstrates successful critical thinking skills would be able to use Bloom's higher order thinking levels of analyzing, evaluating, and creating (Kivunja, 2015). Thinking and learning tools, such as search engines, spreadsheets, graphing software, analysis tools, and databases, provide avenues for students to practice these skills.

Collaboration. Collaboration is a person's ability to cooperate with other individuals while working in teams or groups (Kift, Israel, & Field, 2010). Think-pair-share, working as a team to process a science experiment, challenging colleagues to explain themselves, and working as a group to solve a problem are all examples of collaboration. One-to-one computing programs can help build collaboration skills due to their ability to connect people near and far through blogs, e-zines, chat rooms, wikis, or meeting sites, such as Google Hangouts (Kivunja, 2015).

Educational Technology Standards

Educational technology is “any tool, piece of equipment, or device—electronic or mechanical—that can be used to help students accomplish specific learning goals” (Davies & West, 2014, p. 843). As the capabilities of educational technology increased throughout the 1980s and 1990s, it became evident that standards and expectations for technology use needed to be set in order to maximize the potential of technology in the classroom. The National Education Technology Plan (NETP) first appeared in 1996 (Department of Education, 1996) and has been revised four times since its creation. The International Society for Technology in Education (ISTE) published its first set of standards in 1990s (ISTE, 2015). These standards describe what effective integration of educational technology looks like within schools. The National Education Technology Plan and the ISTE standards helped build a conceptual framework of what education needed to transform to a 21st century school.

National Education Technology Plan

The 1990s were a time when policy makers began looking at how to incorporate 21st century skills into educational reforms in order to keep up with globalization and rapid change due to the connectedness resulting from information technologies (Anderson, 2008). The U.S. Department of Education unveiled its first National Education Technology Plan in 1996

(Department of Education, 1996). The NETP has been updated four times to address the ever-changing needs of students, teachers, and technology leaders. Each of the plans identified new national technology goals. The NETP was developed as a “call to action, a vision for learning enabled through technology, and a collection of recommendations and real-world examples” (Department of Education, 2016, p. 2).

Since 1996, the NETPs have focused on different areas of instruction and technology. The NETP 1996, titled “Getting America’s Students Ready for the 21st Century: Meeting the Technology Literacy Challenge,” had a focus on connecting students and teachers to the information superhighway in order to access effective software and online learning resources. NETP 2000, “e-Learning: Putting a World-Class Education at the Fingertips of All Children,” focused on five goals: increasing access to technology, effectively using of technology within the classroom, building technology and information literacy skills, researching the most effective use of technology in the coming years, and digital content. NETP 2004, “Toward a New Golden Age in American Education: How the Internet, the Law, and Today’s Students Are Revolutionizing Expectations,” noted that the reason computers were not revolutionizing education the way it was envisioned was not due to the lack of funds, but the lack of adequate professional development (Department of Education, 2004). The 2010 version of the NETP, “Transforming American Education: Learning Powered by Technology,” focused on five areas: learning, assessment, teaching, infrastructure, and productivity (Department of Education, 2010). Additionally, the NETP 2010 placed further emphasis on the Elementary and Secondary Act of 2001 that mandated technology integration in all areas of K-12 education (Davies & West, 2014).

The latest version on the NETP, “Future Ready Learning: Reimagining the Role of

Technology in Education,” was released in January 2016 (NETP, 2016). The report further warned schools should not focus only on providing students with Internet-connected devices. Even more important was preparing teachers to effectively integrate the educational tools into their daily instructional practices in a way that engaged students and made learning relevant (Department of Education, 2016). NETP 2016 also added an important category designed to address the need for leadership in the field of educational technology (Department of Education, 2016).

The International Society for Technology in Education Standards

The ISTE standards help guide students, teachers, administrators, and educational technology leaders as they learn, teach, and lead in the information age. ISTE standards have been adopted, adapted, or referenced in statewide curriculum frameworks in 29 states (ISTE, 2015). ISTE standards set a common vision of what a technology-literate student, teacher, administrator, and technology leader is (ISTE, 2015).

The ISTE updated the student standards in 2016 to focus on transforming student's learning opportunities with technology (ISTE, 2016). The new ISTE standards focused on creating seven areas for improving students' learning opportunities. The ISTE standards wanted to empower learners, help learners become digital citizens, be knowledge constructors, innovative designers, computational thinkers, creative communicators and global collaborations (ISTE, 2016). ISTE teacher standards were updated in 2017. The standards for teachers focused on two specific areas, being an empowered professional and being a learning catalyst (ISTE, 2017). ISTE also created standards for education leaders that were updated in 2018 and replaced administrator ISTE standards. Education leader ISTE standards emphasized being a visionary planner, an empowering leader, a systems designer, a connected learner, and an advocate for

equity and citizenship (ISTE, 2018). NETP and the ISTE standards have evolved as today's students have evolved.

Today's Students

Over the years, researchers have classified people who were born during a certain year into specific groups that help define the generation. More generations, with different experiences growing up, are currently working and living together than ever before (Oh & Reeves, 2014). Worldviews, social trends, pop culture, economic realities, and behaviors are all influenced by a person's generation (Twenge, 2006). An examination of the different generations of students illustrates how current learners need and expect a different learning environment than did previous generations.

Generational Differences

The Silent Generation, baby boomers, Generation Xers, millennials, and digital natives are all terms that have been coined to categorize the array of individuals born between 1925 to present (Twenge, 2010; Houle & Cobb, 2011). Each of the different generations is characterized by different traits. Table 2.1 describes the current generations of workers found in workplaces across the United States.

Table 2.1 Generation Workplace Descriptors

Generation	Workplace Descriptors
Baby Boomers 1946 to 1964	<ul style="list-style-type: none"> • Results Driven • Plan to Stay Long Term • Give Maximum Effort
Generation X 1965 to 1981	<ul style="list-style-type: none"> • Tech Savvy • Learn Quickly • Seek Work/Life Balance • Embrace Diversity • Like Informality
Millennials 1982 to 1999	<ul style="list-style-type: none"> • Wired • Tech Savvy • Learn Quickly • Embrace Diversity • Needs Supervision

(Twenge et al., 2010; SHRM, 2004)

Today's K–12 students will make up a new category once they enter the workplace. This new generation has been designated as digital natives or Generation Next (Houle & Cobb, 2011; Tapscott, 2009). Students in our schools have grown up immersed in technology. For this generation, the digital divide is no longer the obstacle that schools must overcome (Department of Education, 2016). The digital natives have been described as follows:

... active initiators, collaborators, organizers, readers, writers, authenticators, and even strategists, as in the case of video games. They do not just observe; they participate. They inquire, discuss, argue, play, shop, critique, investigate, ridicule, fantasize, seek, and inform. (Tapscott, 2009, p. 21)

The Changing Student

Tapscott argued, “students won't be prepared for the world of today unless schools use technology to implement real change to their model of education” (2009; p. 144). This finding came from a comprehensive study that examined 7,685 young people, ages 13 to 20 from 12

different countries. Contrary to guidelines in 21st Century Skills, traditional classrooms in secondary schools tended to be teacher centered and restrained students from collaborating as active participants (Galloway & Lasley, 2010 in Lemly et al., 2014). As students graduate from high school, they will need to be prepared to participate in a highly competitive global environment, which requires more skills, including collaboration, than in previous generations (Kivunja, 2014).

A survey study completed in 2004 by 40 U.S. employers showed that most high school graduates entering the workforce lacked the skills and knowledge associated with the 21st century (Casner-Lotto & Barrington, 2006). Instilling the skills of the 21st century in remained a priority, as shown by a national survey that found that 99 percent of registered voters believed that teaching students the 21st century skills was important to ensure our country's future economic success (Partnership for 21st Century Skills, 2007).

Greaves et al. (2012) found in a national survey of 997 schools from 49 different states and the District of Columbia that students need to be offered relevant instruction based on their current life experiences, not that of students born prior to the boom in technology. One-to-one technology-based learning environments could help ensure students are being prepared with 21st century skills (Greaves et al., 2012). The tools for this change have become increasingly present as students' access to digital tools continued to increase, as 62 percent of students owned a desktop, 55 percent of students owned a laptop, and 90 percent of students owned a cell phone as of 2005 (Lloyd et al., 2009). A 2010 study found that 66 percent of students between the ages of 8–18 years old use mobile cell phones (Rideout, Foehr, & Roberts, 2010).

A 2014 study found that the 21st century students do not request the use of technology as much as request a learning environment that allows them to choose and offers them the ability to

learn material in a manner that helps them be successful (Lemly et al., 2014). Multiple research articles over the past couple of decades have shown that educational technology helps motivate and engage students (Ng, 2015). Motivation leads to engagement, which is a significant factor in determining the quality of student learning and personal development (Gebre, 2014).

One-to-One Computing

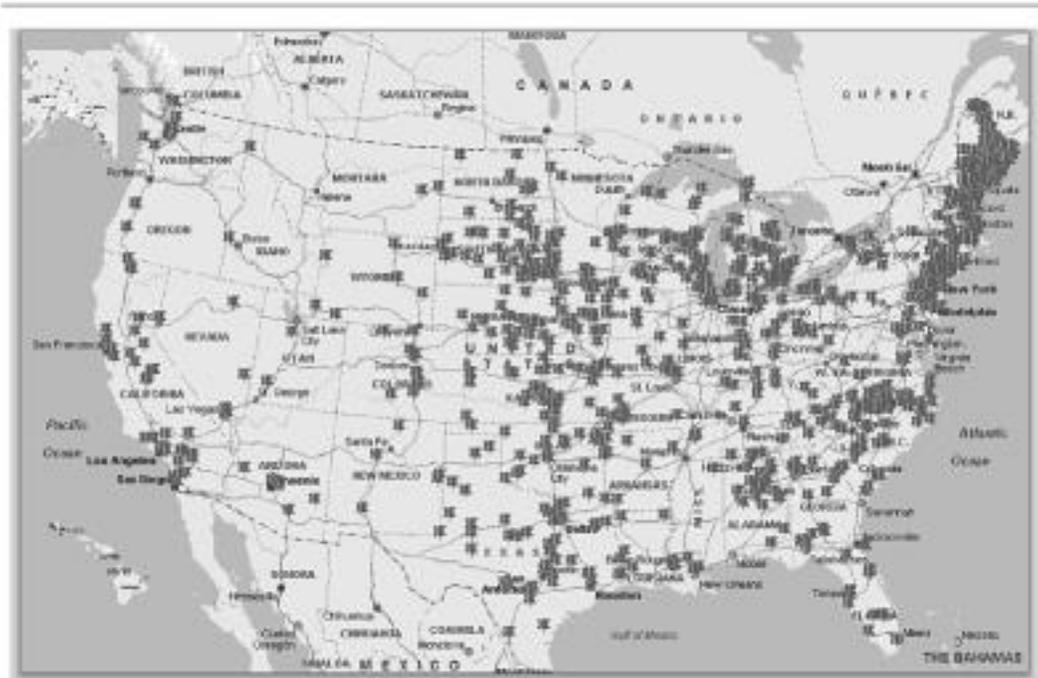
According to the Partnership for 21st Century Skills (2003), “students will spend their adult lives in a multitasking, multifaceted, technology driven, diverse, vibrant world—and they must arrive equipped to do so” (p. 4). Technology is becoming more personalized with the growing array of personal devices. To respond to this need, the National Technology Education Plan 2016 included a goal to increase access to powerful and connected technology so that students could create, design, and explore (Department of Education, 2016). While society has been significantly transformed by technology, the educational system has not kept pace (Oh & Reeves, 2014). Reading, writing, communication, and thinking processes in the adult world have been influenced by technology (Collins & Halverson, 2009). To reflect this, companies have designed devices and software to be human-centered and available whenever and wherever a person may need them (van't Hooft & Swan, 2007). Therefore, today's learners must be prepared to participate in a digital world that changes rapidly (Oh & Reeves, 2014). One way for schools to catch up to the business world is to offer students learning opportunities such as one-to-one computing initiatives.

One-to-One Computing Initiatives Grow in K-12 Education

The U.S. Department of Education defined one-to-one computing as the provision of wireless technology devices that allow students and teachers to access learning wherever and whenever they want (2004). Inserra and Short further defined one-to-one computing as “every

teacher and student having access to a laptop, Internet service, printers, and computer software within a school system to use anytime and anywhere” (2012, p. 147). One-to-one computing initiatives primarily emphasized increasing students’ access to technology for educational purposes (Davies & West, 2014). As Figure 1 shows, one-to-one computer K-12 initiatives have become prevalent throughout the United States.

Figure 2.1 Schools in the United States Participating in a One-to-One Computing Initiative



(One-to-One Institute, 2013 in Horn & Staker, 2015)

In the 21st century, more schools have begun to implement one-to-one computing projects. Three major goals have driven efforts to integrate one-to-one computing: to prepare students to enter the future workforce, to improve students’ skills and achievement, and to positively influence the instruction that students receive (Lei & Zhao, 2008; Lowther et al., 2003; Penuel, 2006; Zucker, 2004). As a result, technology is now an everyday tool for teachers as they

try to enhance their students' learning (Voogt et al., 2009).

Within a one-to-one computing learning environment, students are exposed to new ways of learning. These may include sharing with one another, deeper understanding of the content, and self-directed inquiry, connecting with experts from around the world and creating artifacts to show understanding (Kim & Jang, 2015). The 21st century learner will need to take an active role in his or her own learning process. Educators must stop saying that the students need to change in order to learn (Franklin, 2011). A 2012 nationwide study found that educators must attain second-order change in order to experience a positive outcome with one-to-one computing initiatives. Second-order change is a "fundamental or significant break from past and current practices" (Greaves et al., 2012, pg. 7). Attainment of second-order change in one-to-one computing schools permit one-to-one computing environments the ability to sustain and withstand economic challenges, teacher and staff turnover, and various other factors that tend to effect schools (Greaves et al., 2012).

Successes of one-to-one computing implementations. Positive results for students and teachers have been reported in schools and classrooms that are taking part in one-to-one computing initiatives (Higgins & Bushell, 2018). A 2012 research synthesis revealed that one-to-one computing had a mostly positive impact on students' learning experiences (Fleischer, 2012). Fleischer concluded that students participating in one-to-one computing programs were engaged in learner-centered educational activities (2012). Other researchers found that students were able to present information in multiple ways that led students to having a greater sense of autonomy and motivation (Grimes & Warschauer, 2008). Furthermore, Winking found that the implementation of one-to-one computing led to higher academic achievement, increased attendance rates, greater student engagement, and improved ability to accommodate students'

needs (Winking, 2009). Similarly, Keengwe found that student's engagement levels, learning, motivation, and ability to complete individualized assignments all increased due to the implementation of one-to-one computing (Keengwe et al., 2011).

Studies have shown that students favor one-to-one computing initiatives as well. More than 5,700 students from the state of Michigan reported that laptops increased their engagement within school and helped them improve their learning and research skills (Lowther et al., 2012). Teachers that participated in Michigan's Freedom to Learn one-to-one computer initiative implemented a more project-based, student-centered approach. This, along with independent research lessons, helped build the 21st century skills of the students (Lowther et al., 2012). In Oliver's 2010 study, schools reported that as students took more responsibility for their learning, they were able to conduct more online research, and more individualized instruction took place (Oliver, 2010).

A 2015 study by Downes found that teachers viewed technology as a tool that opened opportunities for creating lessons that students viewed as purposeful and led to higher student engagement (2015). The teachers realized that their middle school was only in the early stages of a one-to-one computing movement but already believed that producing purposeful lessons using technology would be easily sustainable (Downes, 2015).

Fleischer (2012) found that one-to-one computing allowed for students of varying backgrounds (i.e., learning disabilities and native languages) to engage in the same learning projects as their classmates due to the accommodations afforded to them by their personal laptop. Through the combination of one-to-one computing and the incorporation of information and communication technologies, learners with sensory, physical, and learning disabilities can have many of their educational barriers taken down and access the general education curriculum

(Treviranus & Roberts, 2008). One-to-one computing has been found to positively impact teachers and students.

Best practices for one-to-one computing programs. In a case study, Ciampa (2014) identified six aspects necessary for successful educational technology implementation: enhanced learning environment, challenge, control, curiosity, recognition, cooperation, and competition. She found evidence that educators who are able to incorporate these aspects of a successful learning environment were more likely to succeed in a one-to-one computing environment. Furthermore, Horn and Staker (2015) also found that most successful one-to-one computer initiatives articulated goals without referencing technology in their statement. These school divisions, recognizing the importance of real instructional change, avoided the temptation to purchase computers without a goal in mind. Successful one-to-one computer implementations focused on establishing a goal and vision beyond the technology (BCPS, 2015). However, investments in a reliable network, technical support, time, and professional development for teachers are also necessary for success (Topper & Lancaster, 2014).

Project RED, the 2012 study of 997 schools within the United States, identified key components in technology-transformed schools (Greaves et al., 2012). Project Red also found that successful one-to-one computing initiatives were a mixture of many factors, including hardware, software, and working collaboratively (Greaves et al., 2014). The findings from Project RED nationwide survey show that saving money, improved academic success, and increased student engagement occurred when proper implementation of a one-to-one computing initiative occurs. The study also found that leadership is key to the success of the initiative (Greaves et al., 2012).

Challenges faced with implementing one-to-one computing programs. Not all studies have agreed on the positive impact of computers on student achievement (Davies & West, 2014). A variety of factors, including funding, technical support, professional development, and lack of pedagogical teaching change led to unsuccessful one-to-one computing initiatives (Hero et al., 2013). Some educators, finding technology to be a distraction, have banned laptop use in their classroom focus (Melerdiercks, 2005). Lei and Zhao (2008) found that a growing number of parents, administrators, and educational bureaucracies were becoming concerned about the correlation of technology use with student achievement and the cost associated with one-to-one computing initiatives. A 2010 research study on the effectiveness of one-to-one computing found that one-to-one computing initiatives actually increase the achievement gap among students (Vigdor & Ladd, 2010).

Some school divisions have abandoned one-to-one computing initiatives and incorporated one-to-two computing for their students. Such changes were made because some studies found that one-to-two computing led to increased interactions among students and between students and teachers (Larkin, 2011). Larkin (2001) also found that one-to-one computing decreased communication among students who preferred to work on class assignments individually rather than collaboratively. In a one-to-two computing classroom, students collaborated with other students to complete the assigned tasks (Larkin, 2011).

Research from the early 2000s showed computers had little to no impact on student learning across a large sample of schools. However, the research also stated that the lack of student learning was often affected by the teachers' inability to transform their teaching in order to incorporate the technology (Cuban, 2001). The limited use of computers seldom transformed the current instructional practices within the classroom (Cuban, 2001). From the studies cited

above, in order for one-to-one computer initiatives to avoid failure, an emphasis must be placed on helping teachers change their pedagogical practices to better integrate the technology.

There are numerous examples of districts' lack of success in one-to-one computing. School districts from New York State to Los Angeles faced a variety of problems including the following: lack of board support (Hu 2007), the abuse of laptops, inflexible curricula, exorbitant costs, technical issues, and inadequate filtering software (Horn & Staker, 2015).

Further barriers for effective educational technology integration. One-to-one computing initiatives and technology integration attempts are littered with barriers to effective use of educational technology and to the failure of one-to-one computing initiatives. Wan Ng identified several barriers that negatively influence one-to-one computing initiatives. Lack of resources, lack of leadership and technical support, lack of confidence with technology, insufficient professional development on pedagogically sound technology integration, and insufficient time to plan and prepare for technology integration all significantly hinder a one-to-one computing initiative (Ng, 2015).

Furthermore, research studies conducted nearly a decade apart from one another found similar barriers for the integration of educational technology in both studies. A 2001 study by Pelgrum identified lack of teacher knowledge about technology and an inability to integrate technology into instruction as key barriers to improving technology use among students. A 2011 study by Shear, Gallagher, and Pattel found that teachers were using technology more within the classroom, but students' use of technology was still lacking and opportunities for students to develop technology skills during instruction did not occur. The findings of these two research articles illustrate the slow evolution of educational change.

Teaching with Technology

Initiating a one-on-one technology initiative clearly results in significant change to a school's operations. Schools that have implemented such change must begin to look at the curriculum being taught to their students, the level of questioning that students are being exposed to on a daily basis, and the needs of today's K-12 students compared to the needs of a K-12 student before the digital revolution (BCPS, 2015). School divisions realize change is required in order to prepare our current K-12 students for a future of unimagined possibilities.

Some districts have already made the successful change to a fully integrated one-to-one computing environment. Mooresville Graded School District (MGSD), a leader in digital conversions, was recognized by President Barack Obama (MGSD website, 2015) and in *The New York Times* (2012) for innovative teaching and learning. MGSD Superintendent Mark Edwards stated that the district's digital conversion was not about the technology but more about changing the instructional practices (Schwartz, 2012). A visitor to schools that have successfully implemented one-to-one computing environments will notice that more has changed within those schools than simply giving a digital device to each student. Pedagogical change has occurred with the teaching and learning that happens inside MGSD.

Baltimore County Public Schools (BCPS) identified eight changes that need to occur within its school division to successfully implement a one-to-one computing environment for students.

1. Redeveloping curriculum to align with standards and infuse 21st century skills.
2. Focusing on transforming instruction into learner-centered environments.
3. Developing a continuum of assessments that range from formative to summative and measure student growth.

4. Providing professional learning opportunities for all staff members in the organization through an organizational development plan.
5. Addressing the infrastructure of the school division in order to support and sustain the user experience in a one-to-one computing environment.
6. Updating policies and procedures that reflect the school division's priorities.
7. Reallocating budgets to support the implementation of the theory of action.
8. Improving communications with all stakeholders (BCPS, 2015).

BCPS (2015) stated that its digital conversions were not about simply giving students devices, but more about changing the culture of the schools. BCPS officials explained that the district's digital conversion started two years before the first one-to-one computer program was implemented at one of its elementary schools (BCPS, 2015). Using a backward design model (Wiggins & McTighe, 2005), they incorporated technology's ability to enhance instruction and developed a curriculum that focused on 21st century skills and included digital sources for reading texts, materials, activities, and assessments (BCPS site visit, 2015).

Fullan (2014) found that successful technology initiatives require an understanding of how to promote change. School divisions embarking on a digital conversion must understand how to motivate staff, students, and community members to become active participants in the change process. Leadership must guide people back toward the mission and vision when setbacks occur. Finally, leaders must utilize the whole group in order to promote the change and complete successful change toward a digitally enhanced learning environment on a large scale (Fullan, 2014).

A student's success cannot come before the ensuring the success of the teachers (Barber & Mourshed, 2007). Teacher success involves connecting to peers with purpose (Fullan, 2008).

Schools divisions completing a digital conversion must first attain second-order change on instructional practices. Second-order change requires that individuals realize how a certain change will influence the curriculum, the way they assess students, and the instructional practices used (Marzano, Waters, & McNulty, 2005). This second-order change is similar to the change that occurred within MGSD. The teaching and learning will appear different because teachers have changed pedagogical practices based on technology's influence on the curriculum, assessment, and instructional practices.

School Administrators Role in Supporting Educational Technology

Significant stakeholders, including district-wide leadership, principals, teachers, and community leaders, have influenced the quality and level of technology integration within the classroom. It was evident as early as 1991 that leadership in the field of educational technology could not be relegated to computer coordinators and lead computer teachers. Educational technology leadership required college professors, superintendents, principals, teachers, and parents (Cory, 1991).

The implementation of any change, including educational technology, requires leadership, which has often been ignored in much of the educational research on instructional technology implementation (Jameson, 2013). Jameson (2013) contended that leadership in the field of educational technology must be recognized as a specific construct for researchers to focus on. School leaders will need to take into consideration the massive scope of a one-to-one computing initiative. Such one-to-one computing initiatives will have an effect on students, teachers, community stakeholders, and curriculum development (Downes & Bishop, 2015).

School Administrators

School administrators play a vital role in the direction of any school. As such, they are responsible for setting the educational goals of the school, providing the supports needed to meet those educational goals, observing and providing feedback to teachers who are tasked with leading students toward the educational goals, and providing professional development opportunities for the staff (OECD, 2012). As stated earlier, Project RED identified the school principal's ability to lead as a critical element in any successful one-to-one computing initiative (Greaves et al., 2012). In this role, administrators offer guidance and support to teachers, support staff, and parents to move in a consistent direction toward meeting the needs of the 21st century learner (Cory, 1991).

A full-scale digital conversion such as a one-to-one computing program would need to be guided by a principal who is adept to the processes of procuring stakeholder commitment and leading in the area of education technology. Fullan (2008) identified six secrets to achieving change in organizations and found that believing in your employees, connecting with peers, building capacity, continuous learning, transparency, and continuous improvement of the entire system is necessary. Topper and Lancaster (2014) analyzed data collected from school divisions via on-site visits and semi-structured interviews with key decision makers such as principals, superintendents, and curriculum and technology directors. They found that a commitment by all levels of school administration to integrate technology into instructional practices is an important component of successful one-to-one computer implementations (Topper & Lancaster, 2014).

A 2018 study conducted on principals' leadership during a one-to-one computing initiative found that principals used the initiative as a way to change instructional practices in order to promote what they envisioned as a good school (Mårell-Olsson & Bergström, 2018).

Furthermore, principals and other district administrators must display digital competence to effectively lead a one-to-one computing initiative (Mårell-Olsson & Bergström, 2018).

Possessing digital competence will allowed the leader to support their teachers as they work to learn the new tools and teaching strategies that can be implemented using a one-to-one computing initiative.

Although some people in the 1990s were well aware of the need to educate school administrators in educational technology, preparation for technology leadership for aspiring administrators did not receive the same emphasis as educational technology training for aspiring teachers (Schrum, 2011). In 2011, Ahmad and Raza administered a two-part questionnaire that determined the extent to which technology was integrated into a school and a questionnaire that analyzed a principal's leadership style. They found that successfully integrating technology into schools was linked to the beliefs and decisions of the instructional leaders within the school division or school. They also found that effective leaders in the field of educational technology value technology as a tool that will change the way we teach and students learn (Ahmad & Raza, 2011). Additionally, they found that administrators who focused on giving teachers tasks that incorporated technology and building positive relationships with staff were found to be the most effective at increasing the use of educational technology within their schools (Ahmad & Raza, 2011).

In the Project RED study, Greaves et. al found that principals should be well versed in change management due to the impact that principals have on technology use in schools. Principals need to model technology use, allow for teacher collaboration, provide professional development, and reevaluate management practices (Greaves et. al, 2012). In analyzing a 2012 national survey that focused on what is working in technology transformed-schools, Greaves et.

al identified the following key characteristics of principals who effectively lead one-to-one computing initiatives:

- Skillful change leadership;
- Conceptual and tactical understanding;
- Real system reform versus tinkering around the edges;
- Communication about best practices;
- A shared and inspiring vision;
- Stakeholder buy-in;
- Consistent, open communication with and among stakeholders;
- Planning for technology acquisition, implementation, and assessment (pg. 14).

Furthermore, principals provided the primary professional development opportunities to teachers (Greaves et al., 2012). The authors recommended that principals also be able to model technology use, provide time for teachers to collaborate on best practices for integrating technology into instruction, provide professional development through Internet resources, and establish professional development opportunities that occur on a regular basis (Greaves et al., 2012). Principals must ensure that teachers participating in a one-to-one initiative are provided common planning time to work with one another on learning the technology, establishing new pedagogical practices and updating curriculum (Downes & Bishop, 2015).

To reiterate, all school administrators should be involved and need to understand how one-to-one computer initiatives influence a school division's budget, assessment, curriculum, professional development opportunity for staff, and the overall district plan (Topper & Lancaster, 2014). School administrators provide technology, model technologies' use within educational settings, and are primary motivators for teachers integrating educational technology (Unal et al., 2014). School administrators also reported having a sense of responsibility for promoting digital

citizenship through the use of technology by creating and establishing rules for legal, ethical, and safe use of digital technologies (Unal et al., 2014).

Summary

Students must be equipped a workforce that is inundated with technology. (Tapscott, 2009). Leaders in the field of education stated that the United States' Industrial Age model of education that focused on the three Rs of reading, writing, and arithmetic has led to American students dropping out of college at alarming rates (Kivunja, 2015). Today's education system needs to make sure that students are being prepared to be successful for what their future resembles and not prepared to be successful based on what the past of educators resembles. Resources available to educate students have changed greatly over the past 60 years. The current students entering today's K-12 schools have evolved into students who have different interests, needs, and learning styles than students of previous generations. The demands of today's high school graduates have changed and are no longer based on the model of our archaic K-12 education system that was constructed in the early 1900s.

Students must be prepared to participate in a global competition for jobs compared to the national competition for jobs during the Industrial Age (Kivunja, 2014). Schools need to change instructional practices in order to meet the needs of today's learners and prepare today's learners for success in their future. "Capitalizing on the astounding power of new electronic tools, the world outside education has moved beyond the idea of mass production" (Kelly et al., 2009, p. 18). The National Education Plan in 2010 challenged educators with the task of meeting the needs of today's learners through the incorporation of technology-enhanced instructional practices (Alamin et al., 2014). The technology challenge is nothing new for educators. The Elementary and Secondary Act of 2001 mandated that technology in all areas of K-12 education

be emphasized (Davies & West, 2014). Schools must successfully integrate technology into their daily instructional practices. Davies and West (2014) define technology integration as “effective implementation of educational technology to accomplish intended learning outcomes” (p. 843).

Schools are trying to cope with an ever-changing landscape in regards to today's students and the expectations of what today's students must be able to accomplish when they graduate from high school. Today's students are evolving quickly and adapting to a world that has been connected by technology. The world is evolving rapidly due in large part to how technology connects people around the world. Schools are transitioning to twenty-first century learning environments in order to help prepare high school graduates to compete in a globally competitive world. One way schools are fostering the transition to a twenty-first century learning environment is through the adaptation of a one-to-one computer initiative in which every student in the school is given a form of mobile technology that is used to enhance their education.

Successful implementation of one-to-one computer initiatives cannot be pinpointed to one key factor. Instead, successful one-to-one computer initiatives look like a connected web of task and activities, supportive resources, clear communication and articulation of a vision for one-to-one computing in schools, and collaboration among stakeholders (Topper & Lancaster, 2014). Establishing a clear vision is critical to the success of a one-to-one program; however, a strong implementation plan set in place by school leadership is key to success (Department of Education, 2016).

Chapter 3

Research Questions

A case study was conducted on a school system located in the mid-Atlantic region of the United States. The school system is currently in the midst of a digital conversion. Part of the school system's digital conversion involves providing every student in grades 3–12 with a personal electronic device that helps personalize instruction for the students. This is a one-to-one computing initiative. The following research questions will be the focus for the study:

Research Question 1: How did the school division implement for a one-to-one computing initiative?

Research Question 2: How have educators adapted to the innovative change of a one-to-one computing initiative?

Research Question 3: How does the school division plan to continue and sustain the one-to-one computing initiative?

Research Design

This chapter will outline how the research was designed to answer the three research questions and to provide a detailed account of a school division's journey toward a one-to-one computing initiative. The research methodology used for this dissertation was a case study. The actions of City School District were studied as the school district planned, prepared, and implemented a one-to-one computing initiative for students in grades 3–12. The goal of the research was to answer the research questions, as well as help improve this particular school division's knowledge base, improve current practices involving the one-to-one initiative, and help with the school division's transformation to a one-to-one computing environment.

A mixed methods research design was used to develop answers to the three research questions. This single site case study gathered both quantitative data and qualitative data in order to produce credible research findings that answer the proposed research questions. Case studies that look to study a specific occurrence tend to rely on qualitative measures to help explore and explain what has occurred (Joyner et al., 2013). Qualitative data in the form of archived meeting minutes, interviews, and surveys were analyzed in order to answer the research questions. Quantitative data collected from the Stages of Concern Questionnaire (SoCQ) was analyzed to determine how the innovation of a one-to-one computing initiative has affected teachers (George, Hall & Stiegelbauer, 2013). Data from informal observations completed by building administrators was also used to determine the effect that the one-to-one computing initiative had on instruction. Administrators at all schools within CSD conducted informal classroom observations using a common assessment tool that helps determine the level of technology usage within the classrooms.

Ethics, IRB, Confidentiality

This research focused on a single school division's digital conversion, an innovative plan to transition an entire school division into a one-to-one computing environment for students and staff in order to personalize instruction for students. The school division currently offers a one-to-one computing environment for students in grades 3–12. Pseudonyms were used for the school division's name, the names of schools located within the school division, the name of the one-to-one computing initiative for the division, staff members, and other identifiable names such as location of the city, county, and state. No data on students was collected during the research. Due to the fact that the research involved human participants, a proposal to the Internal Review Board for Virginia Tech was approved by the university.

Information collected from the school district had all identifying features deleted. The research was stored on a password-protected external drive. Information for this research was also stored on password-protected computer that was stored at my personal residence and my workplace office that has a lock and key door. Any loose materials collected for research purposes that contained identifying information was stored in a locked filing cabinet.

Study Participants

In order to participate in this study, a school division must be in the process of completing one-to-one computing initiative for students in grades K–12. A school division that participates must be willing to share school division data with the researcher. The researcher must be allowed to collect additional data that is required to answer the research questions.

Site Selection

City School District (CSD) is a school system made up of four different schools: a primary elementary school for grades PK–2, an intermediate elementary school for grades 3–5, a middle school for grades 6–8, and a high school for grades 9–12. The school division is located in suburban area in the mid-Atlantic region of the United States. Enrollment for the entire school division as of September 30, 2016 was greater than 3,000 students in grades PK–12. CSD has a diverse student population with nearly 40 different languages spoken by students who receive English Language Learner services. Half of the students in grades PK–12 receive English Language services. Greater than 50 percent of CSD's student population are identified as economically disadvantaged.

The school district has two distinct campuses. The secondary campus consists of the high school and middle school. The schools are separated by a ten foot walk way and share many resources due to the close proximity. The elementary campus consists of the primary school

(grades PK-2) and the intermediate school (grades 3-5). These two schools share resources due to the close proximity. Some of the resources shared include instructional staff, technology support staff and materials.

City School District has been recognized for their state-of-the-art buildings that have been constructed over the past 20 years. One of the goals of the new construction was to promote widespread use of technology and to prepare students for the global community (Duke, 2008). With this engrained mindset resonating throughout the school division, it makes CSD an ideal location to pursue a one-to-one computing initiative that geared towards personalizing students' educational experience using digital technology.

The journey toward a one-to-one computing environment for students and staff began in April 2013. The superintendent sent an email to the leadership team of CSD. The leadership team consisted of central office staff, building administrators, and educational specialists. The email challenged the leadership team to look at the future of education and ask how CSD can meet the needs of the 21st century learner. The email sparked interest among the group and led to a professional development trip to observe the success of another school division.

In 2013, a leadership group from City School District attended a conference in Mooresville, North Carolina, that highlighted Mooresville Graded School District's one-to-one computing initiative. Following that conference, City School District's superintendent focused on how CSD could personalize students' learning through one-to-one computing. During that same period, the high school located within City School District qualified for an e-Learning Backpack Initiative implemented by the State Department of Education. The State Department of Education issued funding to high schools that were not fully accredited based on state standards.

With the state-issued funds, high schools could then pursue the purchasing of laptops or tablets for students in order to transition to a more digitally connected curriculum.

City School District continued to explore the e-Learning Backpack Initiative with its high school leadership. CSD progressed with the plan to provide every student in the high school with a mobile electronic device. During the 2014–2015 school year, CSD had constructed a pilot group of teachers and students to begin studying the one-to-one initiative. By the middle of the 2014–2015 school year, all students in grades 9–11 were provided wireless tablets. City Connects was created during the 2014–2015 school year to oversee the digital conversion and one-to-one computing initiative. City Connects is a committee made up of instructional leaders from all four schools and central office personnel responsible for instruction and technology within CSD. City Connects is responsible for meeting regularly to monitor the school division's one-to-one computing initiative.

During the 2015–2016 school year, all students in grades 9–12 were issued a mobile electronic device and a pilot program was implemented within the eighth grade. The eighth grade pilot program provided eighth grade students a personal laptop to use at school and home. To start the 2016–2017 school year, CSD rolled out laptops to all students in grades 6–10 and tablets computers in grades 11 and 12. A pilot program was initiated in the intermediate elementary school with all fifth grade students receiving a tablet to use while at school. CSD once again expanded the program during the 2017-2018 school year to include all students in grade 3-12.

The City Connects committee created a mission statement for their digital conversion and one-to-one computing initiative:

“Where traditions of excellence and a path of innovation meet to transform teaching and learning. CSD has embraced a blended learning

model for all students' grades 5 through 12 by creating a one-to-one environment designed to provide individualized learning that can occur anytime and anywhere. This rigorous learning environment incorporates CSD values embracing our 5 C's: Creativity, Critical Thinking, Communication, Citizenship and Collaboration as we educate our students to be global learners." (City Connects, 2016)

City Connects identified five cornerstones that are equal in level of importance and priority. The five cornerstones consist of:

1. Finance
2. Teaching and Learning
3. Professional Development
4. Infrastructure
5. Communications

(CSD, 2016)

The five cornerstones are areas that require attention during the one-to-one computing initiative. All five cornerstones carry importance and need to be addressed with equal time and effort.

Selection of Cases

City School District was selected for this case study because the school division was in year four of its one-to-one computing initiative. Another reason CSD was selected was due to the fact that students in this school division continue their education together. All students who enter the primary elementary school will receive their education in the same intermediate school, middle school, and high school as their grade level peers as long as they continue to reside within district boundaries. This continuity allows students to benefit from the division's initiative to

provide a one-to-one computing environment for students in grades PK–12. The one-to-one computing initiative is a key component to the entire school division.

Teachers in grades 3–12 were selected for the case study because they are the current group of teachers working with students in a one-to-one computing environment. Third through fifth grade teachers are in the second year of the one-to-one computing initiative at the elementary school. Teachers in grades 6–8 work in a middle school that is in its third year of a one-to-one computing environment for all students. Teachers in grades 9–12 are in a high school that is in its fourth year of one-to-one computing environment.

Data Sources

Multiple sources of data were used to triangulate findings. A key issue to research is selecting appropriate sources of data that will allow the researcher to answer the research questions at the end of the study (Patton, 1990). Figure 3.1 shows the various data sources that were used during the research.

Table 3.1: Data Sources

Research Question	Data Source
1. How did the school division implement a one-to-one computing initiative?	<ul style="list-style-type: none"> • Interviews • City Connects meeting minutes
2. How has the staff adapted to the innovative change of a one-to-one computing initiative?	<ul style="list-style-type: none"> • Stages of Concern Questionnaire • Interviews • City Connects survey • Informal observation data
3. How does the school plan to continue and sustain the one-to-one computing initiative?	<ul style="list-style-type: none"> • Interviews • Standardized assessment data • Surveys

The data sources used to answer research question 1 included meeting minutes kept by the school division's City Connects committee dating back to the 2014–2015 school year and

interviews with key individuals responsible for the planning and preparation for implementation of the one-to-one computing initiative for grades 3–12.

CSD has been documenting their City Connects meeting minutes since 2015. The meeting minutes for CSD's City Connects meeting were analyzed in order to establish the timeline of key events that have led CSD to its current level of implementation of the one-to-one computing initiative. The documents were coded using the five cornerstones (finance, teaching and learning, professional development, infrastructure, and communication) that have been identified by the City Connects committee to be of equal importance in the one-to-one computing initiative. Particular items that do not fall in a specific cornerstone will be placed in a miscellaneous column and analyzed to determine common themes. The documents were used to help determine key areas in the planning, implementing, and monitoring that need to be addressed when other schools decide to pursue a one-to-one computing initiative.

For research question two, the data sources included the Stages of Concern Questionnaire (SoCQ), a Concerns-Based Adoption Model (CBAM) that is used to determine how a person feels about an innovation that they are currently implementing into practice. The questionnaire was provided to teachers electronically via email. Teachers participating in the survey were teaching a class that consisted of students who were participating in the one-to-one computing initiative. This included teachers from grades 3–12. A successful response rate on the survey will be 50 percent of those initially asked to complete the survey. The survey was administered using an online survey produced by American Institutes for Research. The SoCQ offers seven stages of concern that identify a person's current adoption of an innovation. A CBAM, such as the SoCQ, helps researchers, school leadership, and higher education faculty understand how a teacher adapts to a change or an innovation and helps gear the thinking toward improving teacher

professional development and school improvement while utilizing the innovative change agent (George et al., 2013). In this case study, the innovative change agent was the one-to-one computing initiative for students.

The Stages of Concern Questionnaire (SoCQ) was administered to teachers in grades 3–12 to determine the level of concern that teachers had regarding the one-to-one computing initiative. The SoCQ is a 35-question questionnaire that participants respond to questions by rating their level of concern. The SoCQ focused on the innovative idea of students participating in one-to-one computing initiative. The SoCQ will categorize all individuals who complete the assessment into one of the following seven stages of concern: 0- Unconcerned, 1- Informational, 2- Personal, 3- Management, 4- Consequences, 5- Collaboration, and 6- Refocusing.

Table 3.2: Stages of Concern

Impact	6	Refocusing	The individual focuses on exploring ways to reap more universal benefits from the innovation, including the possibility of making major changes to it or replacing it with a more powerful alternative.
	5	Collaboration	The individual focuses on coordinating and cooperating with others regarding use of the innovation.
	4	Consequences	The individual focuses on the innovation’s impact on students in his or her immediate sphere of influence. Considerations include the relevance of the innovation for students; the evaluation of student outcomes, including performance and competencies; and the changes needed to improve student outcomes.
Task	3	Management	The individual focuses on the processes and tasks of using the innovation and the best use of information and resources. Issues related to efficiency, organizing, managing, and scheduling dominate.

Self	2	Personal	The individual is uncertain about the demands of the innovation, his or her adequacy to meet those demands, and/or his or her role with the innovation. The individual is analyzing his or her relationship to the reward structure of the organization, determining his or her part in decision making and considering potential conflicts with existing structures or personal commitment. Concerns also might involve the financial or status implications of the program for the individual and his or her colleagues.
	1	Informational	The individual indicates a general awareness of the innovation and interest in learning more details about it. The individual does not seem to be worried about himself or herself in relation to the innovation. Any interest is in impersonal, substantive aspects of the innovation, such as its general characteristics, effects, and requirements for use.
	0	Unconcerned	The individual indicates little concern about or involvement with the innovation.

(George et al., 2006).

The results of the SoCQ will help administrators determine the areas in which teachers are struggling most within the transition to a one-to-one computing environment. The validity and reliability of the SoCQ has been tested many times since the initial publication of the SoCQ manual in 1978 (George et al., 2006).

Data collected from informal classroom observations conducted by school administrators at the intermediate elementary school, the middle school, and the high school were analyzed to determine the level of usage of the one-to-one computing initiative within the classrooms. Administrators at all schools within CSD conducted informal classroom observations using a common assessment tool. During weekly administrative meetings, the administrators discussed the data collected. These weekly meetings helped administrators establish inter-rater reliability. Administrators were required to answer two questions as part of a district-wide informal observation tool. The two questions were

1. Are the students using the laptops for instructional purposes?

2. Can this learning activity be completed without the use of the laptop?

A third data source for research question two was a Likert scale survey that was distributed to the City Connects committee. The survey that required committee members to identify on a scale of 1–5, 1 being poor and 5 being excellent, where the school division performed based on a checklist designed to monitor the effective implementation of a one-to-one computing initiative (Greaves et al., 2012). A copy of the survey can be found in the appendix. Responses for the survey required individuals to respond using the following scale: Please rate on a scale of 1–5 using the following scale for determining the level of quality for implementation:

- 1- Poor
- 2- Fair
- 3- Good
- 4- Very Good
- 5- Excellent

The committee is comprised of building administrators, central office leadership, and instructional technology specialists from all four schools in CSD.

The purpose of research question three is to study the school division's long-range plan to continue the one-to-one computing initiative. Data collected from interviews with district leadership was used to answer this research question. An open-ended question asking what is their vision for the future of the schools one-to-one computing initiative served as the question stem to answer this research question.

Data Analysis

Data analysis for qualitative data involves the ability to identify patterns, themes, and relationships of a vast amount of data collected through interviews and documents (Patton, 1990; Johnson & Christensen, 2012). Using multiple qualitative sources will provide answers to research question one. Quantitative data from the SoCQ, informal observations, and surveys will be used as well.

Documents collected for this research consist of the meeting minutes recorded by the City Connects committee members since 2014. The meeting minutes were reviewed and coded using the five cornerstones that City School District determined as key items in the one-to-one computing initiative: finance, teaching and learning, professional development, infrastructure, and communications (CSD, 2016). Each cornerstone is significant in the school division's transformation to a one-to-one computing environment (City School District, 2016). Using the five cornerstones provides a manageable classification scheme that can be utilized for coding of various other forms of qualitative data. Establishing a manageable system for coding is vital for the analyzation process and without a manageable system for coding in place there would be chaos (Patton, 1990). The coding of the meeting minutes using the five cornerstones provided the ability to determine the areas that required greater amounts of time and discussion during the planning process for the one-to-one computing initiative.

Interviews conducted were recorded and transcribed. The transcriptions were analyzed and coded using the five cornerstones identified by the City Connects committee. The interviews with the superintendent and teachers helped outline the timeline of events that have led CSD to its current reality in a one-to-one computing environment for students in grades 5–12. The

interviews will also be used to answer research question three as it pertains to the vision of the one-to-one computing initiative moving forward for CSD.

The Stages of Concerns Questionnaire (SoCQ) collected data that determined the level of concern for teachers participating in the one-to-one computing initiative. The innovation that was the focus of the SoCQ was the fact that every student had access to a laptop/electronic device capable of connecting to the Internet. The SoCQ has been administered using multiple survey methods to collect the data (George et al., 2006). For this survey, teachers were invited to participate in the survey via an electronic email sent to their school division email accounts. Teachers had the option not to complete the survey. Upon completion of the electronic survey, teachers were categorized in one of the seven stages of concern based on their responses to the survey questions.

Scoring the SoCQ responses can be done manually by the researcher or the data can be entered into a computer system that will plot the results on the SoCQ profile chart (George et al., 2006). I used the online scoring method provided by the American Institute for Research. The SoCQ consists of thirty-five statements that people will rate as being irrelevant to them now, not true of them now, somewhat true of them now, or very true of them now. Each of the 35 SoCQ statements are correlated to one of the seven stages of concern. Participants determined their level of concern based on a Likert scale from 0–7. The higher the number indicates the greater the concern (George et al., 2006). The responses determined to participants' level of concern based on CSD's one-to-one computing initiative.

The Likert scale survey administered to the City Connects committee was provided to participants via an email sent to their school division email account. The survey responses were confidential and did not require the individuals completing the survey to identify themselves.

The responses were analyzed and evaluated to determine areas of strength and weakness with the implementation of the one-to-one initiative within CSD. The survey derived from the Project RED nationwide survey. Each of the survey questions were categorized in one of the five cornerstones of the one-to-one initiative identified by CSD. Areas that score high on the level of quality for addressing were considered areas of strength within CSD's one-to-one implementation. Areas that do not score high on the level of quality were considered areas of weakness and areas that needed to be addressed and corrected in order to help the one-to-one initiative.

Validity and Reliability

A researcher's understanding of methodology, sensitivity, and integrity affect the validity and reliability of a research study (Patton, 1990). Reliability is the ability to produce consistent results over time and validity is the accuracy with which inferences are made based on the data analyzed (Johnson & Christensen, 2012).

Validity

Qualitative research must be able to validate the data and research findings by administering validity tests. Some forms of validity tests include prolonged engagement with the research, sharing data collected with research participants, collecting data from multiple sources, discussing findings with individuals who will provide critical feedback, and completing a reflexivity journal (Marshall & Rossman, 2011). For this research project, multiple validity tests were incorporated throughout the study.

A reflexivity journal was kept and updated on a weekly basis in order for the researcher to reflect on the dissertation process. A researcher's ability to journal notes, ideas, thoughts, and insights provides a unique opportunity to enhance the research process (Marshall & Rossman,

2011). My engagement with CSD's one-to-one computing initiative will also provide a validity test. The researcher has been a part of the City Connect one-to-one computing initiative since 2014. The City Connects committee holds weekly meetings during the school year to discuss the school division's one-to-one computing initiative. I presented parts of the research to the committee members throughout the research process. This allowed peer discussion about the validity of the data collected and analyzed. The multiple sources that used to collect the data will act as a validity test as well. Data were collected through audio recorded interviews, informal observations, surveys, questionnaires, meeting notes, and detailed timelines of key events.

Validity research on the SoCQ has been conducted several times since the inception of the questionnaire. Independent investigations have been conducted and concluded that the fundamental model of the SoCQ is valid (George et al., 2006). Some of the measures that investigators and developers took to determine the validity of the SoCQ included inter-correlation matrices, judgments of concerns based on interview data, and confirmation of expected group differences (George et al., 2006).

Validity for the informal observation tool used by administrators was done through inter-rater reliability checks. Administrators used the tools discussed at City Connects meetings on how each person was interpreting the use of instructional technology during their walk-through observations.

The City Connects survey questions came from a nationwide research study that identified a checklist for school leadership to follow when during a one-to-one computing implementation (Greaves et al., 2012). The Project Red study provided "unprecedented scope, breadth, and depth" (Greaves et al., pg. 3, 2012) on one-to-one computing initiatives from 997

schools in the United States. The implementation checklist used with City Connects survey was created from the findings of the Project Red study.

Reliability

Reliability refers to a research study's ability to provide consistent and stable results (Johnson & Christensen, 2012). City School District is unique, however. School divisions that have similar demographics, student populations, or available resources will be able to take the findings from this research and use it to guide their school division toward a one-to-one computing environment. The reliability of the results from this study may be difficult to duplicate for other school divisions based on size of the school division. However, schools that have a similar population size will be able to learn from the case study of City School District.

Researcher Background

I have worked in education for 14 years. My career as an educator started as an elementary teacher. I taught for two and a half years at an intermediate elementary school. I then became a middle school teacher for history and language arts. I taught for three years at the middle school level. During those three years, I pursued a master's degree in Supervision and Administration from the University of Virginia. My first experience as an administrator was at an elementary school for grades PK–5 consisting of 500 students. I later became an assistant principal at a PK–2 school consisting of 900 students. I was an assistant principal at a middle school for grades six through eight with a student enrollment of 800 students for five years. I am currently a principal at an intermediate school that enrolls nearly 900 students in grades 5 and 6.

I have been passionate about looking for new ways to engage the 21st century learner ever since I began my teaching career in 2004. I believe that student engagement is a vital part to

students experiencing academic success. Technology has been an instructional tool that I have observed as a way to engage students in a variety of learning activities.

Bias

Researchers have unique experiences that they bring with them to research projects that may lead to biases (Herr & Anderson, 2015). As the researcher, it will be important that I establish critical reflexivity in order to examine my bias and subjectivity throughout the research project (Herr & Anderson, 2015). Action research is a reflective process that is completed by or with people within an organization (Herr & Andersen, 2014). I will be keeping a reflexivity journal that will allow me to document my changing perspectives throughout the research.

Furthermore, I worked within the school division that was selected for this case study. I spent two years as a teacher at the intermediate elementary school, three years as a teacher at the middle school, one year as an administrator at the primary elementary school, and four years as an administrator at the middle school. I have participated in the City Connects meetings for three years. I led the middle school technology committee as part of the school leadership team. I have a keen understanding of the process that City School District has followed throughout the planning and implementation stage to the one-to-one computing environment. I no longer work within this school division.

I have professional connections with the people interviewed and invited to participate in the questionnaires and surveys. I was responsible for evaluating teachers at the middle school during the time that the Stages of Concerns Questionnaire was administered to the teachers. I have worked professionally with every individual who was interviewed or completed the Likert scale survey. I have a vested interest in finding out where teachers' concerns currently reside because it will help show how the planning and preparation done by the school division has

helped the one-to-one computing initiative. The research findings can be used to plan the next steps of the digital conversion and one-to-one computing initiative for the school division moving forward.

Summary

School divisions that commit to creating a one-to-one computing environment for their students must understand that the journey to a successful one-to-one computing initiative is long and requires much oversight by school leadership. Successful one-to-one computing initiatives must be willing to plan, act, and reflect throughout the implementation process. The plan and actions of CSD provide an opportunity to reflect and determine best practices for implementing a one-to-one computing initiative for students in grades 5–12. The lessons learned by CSD can prove valuable to other school divisions that look at implementing a one-to-one computing environment for students.

This case study described the early planning stages of City School District's one-to-one computing initiative. Furthermore, the case study analyzed how the current implementation of the one-to-one computing initiative is progressing based on the teacher's level of concern regarding the one-to-one computing initiative and analyzing data collected by school administrators. Finally, this case study analyzed the next steps that the school division plans to take as the one-to-one computing initiative progresses.

In order to answer the three research questions, a mixed methods research design was created. Qualitative data was gathered in the form of archived meeting minutes, interviews, informal observations, and surveys. Quantitative data in the form of the SoCQ was used to determine the current stage of concern for teachers participating in the one-to-one computing initiative.

Chapter 4

The findings for this case study on City School District (CSD) are presented based on the research questions. The three research questions that are the focus for this research study are interrelated through the research as well. Data collected from the archived meeting minutes, questionnaires, surveys, informal observations and interviews were used to answer the questions. How City School District implemented, adapted to and will continue to sustain their one-to-one computing initiative can be answered from each of the qualitative and quantitative data points.

The research answers the following questions:

Research Question 1: How did the school division implement for a one-to-one computing initiative?

Research Question 2: How have educators adapted to the innovative change of a one-to-one computing initiative?

Research Question 3: How does the school division plan to continue and sustain the one-to-one computing initiative?

I will begin by describing the timeline of events that occurred with City School District and its one-to-one computing initiative. The timeline of events and detailed analysis of the planning process conducted by City School District will help answer research question 1. The timeline was created by reviewing archived documents that were provided by City School District personnel regarding the one-to-one computing initiative. The documents include informational fliers, meeting minutes, emails and notes. Along with the archived documents, data from interviews with the superintendent and teachers of CSD were used to help recreate the timeline. Following the timeline of the one-to-one computing initiative will be a detailed analysis of the City Connects meetings that occurred with district leadership and school leadership on a

weekly basis. Finally, I will dissect that data collected from the Stages of Concern Questionnaire and the City Connects survey that studied the implementation of the one-to-one initiative.

Research Question 1: How did the school division implement for a one-to-one computing initiative?

Data collected to answer research question one included archived meeting minutes, interviews, surveys and emails. This section will help show the planning process that City School District followed during the one-to-one computing initiative. The planning and preparing process started in 2013 and continues to this day as CSD continues to provide a one-to-one computing initiative for the students and staff.

Pilot Program Followed by Expansion

The superintendent of CSD planted the seed for what would become City Connects in April of 2013. The superintendent suggested that the school division look into a one-to-one computing initiative (City School District Superintendent, 2013). Less than five years later, in January 2018, CSD provided an electronic device to every student in grades 3–12. This one-to-one computing initiative did not occur overnight. A long and systematic approach led to CSD being able to provide a one-to-one computing environment for their students (City Connects, 2018).

The Early Stages

CSD's one-to-one computing initiative started with an email to the school division's leadership team consisting of central office administrators, principals, assistant principals, and technology specialists. On April 3, 2013, the superintendent emailed an article to the principals, assistant principals, and central office leadership. The article was about Mooresville Graded School District (MGSD) and its one-to-one computing initiative. The article, "10 Lessons from

the Best District,” was from the Spring 2013 edition of Scholastic Administrator.com. The title of the email was “A must read as we think about our future ... More news from Mooresville, N.C., and very topical as we think about textbooks, technology, and 21st Century learning” (CSD, 2013, email). This email served as the catalyst for City School District's one-to-one computing initiative.

During the summer of 2013, a team of administrators and teachers from CSD went to Mooresville, North Carolina, for a two-day conference hosted by MGSD. The conference, MGSD Summer Connection, was designed to help show school divisions how they could design their own one-to-one computing initiative (MGSD, 2017). The group from CSD returned from the conference and the planning for a one-to-one computing environment for students began. The superintendent for CSD had follow-up meetings with the district leadership team to reflect on the conference. The superintendent recalled during the Summer Connection conference the organizers has school sit by areas in which the leadership teams feel they are in the digital transition. CSD sat in the first section. This section was designated for school division who are just starting to think about a one-to-one computing initiative (Superintendent of CSD, 2018). As stated in the interview with the superintendent, this was when he planted the seed of the idea of a personalized learning environment for all students by implementing a one-to-one computing environment.

In the summer and fall of 2013, another group of educators, many of whom attended the MGSD conference, attended a state-sponsored conference for one-to-one computing. While at the conference, CSD staff learned of a new program that their state had designed for schools that did not make state accreditation or were accredited with warning. The initiative was an e-Learning Backpack Initiative. The state designed the initiative to help schools transition to an

electronic learning environment through the incorporation of tablet computers. The e-learning Backpack Initiative also helped schools fund a one-to-one computing initiative for high schools that did not meet state accreditation the previous year. CSD's high school qualified for this program (City Connects, 2014).

During the spring of 2014, CSD worked on testing various electronic tablets to see which would work best for the high school students. The State Department of Education set the criteria and stipulations to get those tablets. CSD identified the tablet computer that would best meet the needs of the students and prepared to proceed with the next step.

This shows that importance that leadership placed on the implementation of a one-to-one computing program. Without the vision and the leadership from the superintendent, the one-to-one computing initiative would have never become an initiative within City School District.

The First Pilot Program and Expansion

According to City Connects meeting minutes from the 2014-2016 school year, City School District officials realized that the district would need to rollout the e-Learning Backpack Initiative in stages to monitor its preparedness for handling the increase in technology. The pilot program included an in-depth look at teachers' needs, infrastructure, policy, and students' needs. Students selected to be in the pilot program were chosen based on a specific class that they were scheduled in. These students began working with the tablets during the fall semester of the 2014–2015 school year. The reason for this decision was to be able to efficiently monitor the students and teachers that were involved in the pilot program. During the February 2, 2015 City Connects meeting the school leadership for the high school addressed expectations for using the electronic tablets prior to rolling out the devices to the entire school.

February 2015 was when the expansion of the one-to-one initiative spread from the pilot program to all students in grades 9–11. Students in 12th grade were excluded due to their impending graduation at the end of the year. The tablets issued to the students would be their tablets for the remainder of their academic careers at City School District.

Feedback that CSD leadership received from teachers during the March 26, 2015 City Connects meetings noted that some classes were using the devices while others classes simply were not using the devices. The leadership realized that they needed to start encourages teachers to implement simple tasks within the classroom. They discussed implementing quick, ongoing professional development for teachers in areas that could be quick and easy wins for teachers implementing the one-to-one computing initiative into their classes.

The 2015–2016 school year brought even more growth to the school division's one-to-one computing initiative. Students in grades 10–12 received Dell Venue tablets that they had during the previous school year. However, students in eighth and ninth grade received Dell laptops. It was determined that the laptops provided a more durable and more capable device than the tablets. This new expansion piloted how the one-to-one computing initiative would look in the middle school. The pilot tested how durable laptops would be in comparison to tablet computers as well.

The early success of the pilot program at the middle school almost led CSD to roll out laptop computers to students in grades 6 and 7. However, after a couple meetings and some discussions, it was determined that it was best to continue the school year with only the eighth grade students participating. City Connects meetings held on September 30, 2015 discussed the simple questions of what classroom should look like as the teachers implement the one-to-one computing initiative into their classrooms.

The 2016–2017 school year would be the first year that both the middle school and high school were fully one-to-one with student computers. During the September 2016 City Connects meetings the school division leadership discussed how they planned on measuring the success of the program. The school division decided that a survey would be administered in the spring of 2016 to the staff.

The next pilot program for the one-to-one computing initiative came during the 2017–2018 school year. Students in fifth grade were included in the one-to-one computing initiative for the first time. The fifth grade students received the Dell Venue tablets that were part of the initial rollout in the 2014–2015 school year. This pilot program focused on how the one-to-one computing initiative would affect the elementary schools within CSD.

Following yet another successful pilot program in which CSD collected data and provided support, the school division determined that it was time to expand the one-to-one computing program. During the 2017–2018 school year, CSD rolled out Chromebooks to students in grade 3–5. The Chromebooks were a new choice, due to decisions made during the pilot program. A Chromebook was far less expensive than a laptop and Chromebooks accessed all the programs that teachers were using with students.

City School District utilized a method of implementing pilot programs followed by expansion in order to roll out their one-to-one computing initiative to the students. This was a controlled process for growing the one-to-one computing initiative and helped the school division to provide a computer to every student in grades 3–5 by the 2017–2018 school year. CSD is currently in the process of planning a one-to-one computing initiative expansion into the PK–2 grade school building.

A key part to City School District's one-to-one computing initiative was the fact that they implemented the one-to-one computing initiative in increments. The school division would start with a pilot and study the good and the negative that would come from the pilot. CSD would then grow the program in one school and implement a new pilot program in the next school that was to be part of the one-to-one computing initiative.

City Connects Meeting Minutes

Data collected from the archived meeting minutes will prove helpful in answering all three research questions. Nearly four years of documented meeting minutes by school division officials who were part of City Connects committee meetings were shared with the researcher. Parts of the City Connects meeting minutes will be used to answer how the school division leadership planned, prepared and implemented a one-to-one computing initiative. CSD administrators understood that a digital conversion is not simply about giving every students and teacher their own digital device. It is essential that the school division had a format and careful plan for implementation (CSD, 2019). Other parts of the meeting minutes will be used in conjunction with teacher interviews to help determine how educators adapted to the implementation of the one-to-one computing initiative. Finally, the City Connects meeting minutes can help describe how the school division's leadership team plans to sustain the one-to-one computing initiative.

City Connects was a term created to help market the school division's one-to-one computing initiative to its stakeholders. The individuals participating in the City Connects meetings included superintendents, principals, instructional technology specialists, and central office directors for finance, information technology, and special programs. City School District officials realized that the school division needed to document the implementation process for its

one-to-one computing initiative. During the e-Learning Backpack initiative, the topics covered during meetings began to expand significantly. School division officials (school and central offices personnel who were part of the City Connects committee) began keeping detailed notes on meetings with administrators regarding the one-to-one computing initiative. These meetings became known as City Connects meetings. During the September 2016 City Connects meetings the participants developed norms to adhere to during the meetings in order to be as productive as possible. The norms included confidentiality, professionalism, keeping engaged in the meeting, staying on task and keeping to a time limit so that all participants can maintain their schedules (City Connects Meeting, 2016).

School officials provided me with the original archived meeting minutes. The City Connects meetings evolved from January 2015 to January 2018 (CSD, 2015-2018). Initial meetings were simple agendas with topics listed numerically. The agendas were labeled e-Backpack meeting minutes. The agendas continued to morph and transform as the years continued. Eventually, the meeting agendas encompassed the five cornerstones that CSD identified for their one-to-one computing initiative: infrastructure, communication, finance, professional development, and teaching and learning.

The following detailed analysis was completed following a thorough review of archived City Connects meeting minutes. The minutes will be presented using City School District's five cornerstones for the one-to-one computing initiative. All information presented in this section was documented in the weekly meeting minutes and provided by CSD school officials shared for research purposes. Each cornerstone will be outlined by the sequence of the academic school years. The City Connects meetings are an important aspect of CSD's one-to-one computing initiative. The meetings provided district leadership with a clear vision of the direction of the

one-to-one computing initiative and assured that leadership was kept up-to-date with the five cornerstones of the computing initiative.

Infrastructure

City School District identified infrastructure as a key component of the one-to-one computing initiative. Infrastructure is composed of hardware, software, and network resources that allow student laptops to be fully optimized for instructional purposes. The information technology (IT) department manages the infrastructure. CSD determined that building a “sustainable infrastructure was a critical first step” (CSD, 2017). The help desk comprises another key piece to the infrastructure, with responsibility for fixing any issues that arise with the computers in the one-to-one computing initiative. I provide a detailed analysis of the City Connects meeting minutes regarding the infrastructure below.

2014–2015 Academic School Year. During January 2015, the City Connects team discussed the results of a survey administered to participants in a pilot program for the one-to-one computing initiative. The students expressed a major concern because the Internet was slow and unresponsive at times. Other issues noted included that the tablets would freeze, keyboards stopped responding, chargers for the tablets did not always work, and students felt a lack of technical support from the IT Help Desk.

The team created a tiered level of assistance address the concerns about the lack of technical support from the IT Help Desk. Level 1 assistance was defined as the device was still working, but the student needed a question answered regarding the tablet. The student would complete a Google Form to place the technical support request. Level 2 technical support required the help desk support staff to remotely connect into the student's tablet via a program called Filewave. The help desk support would then determine what was wrong with the tablet

and correct the issue if possible. Level 3 support was considered when the student's tablet would not work at all. If a student's tablet was not able to operate, the student would use a classmate's computer to submit a request to the help desk via a Google Form.

The January 2015 meeting minutes show that replacing broken screens was becoming an issue with the tablet. Dell, the tablet manufacturer, charged \$319.00 to replace a broken screen. School leadership decided that the school division needed to look for a third party to fix the screens at a cheaper rate and to develop a cost for replacement that could become standard and advertised across the board. An advertising campaign for tablet safety and responsibility was also created during the January meetings. The advertising campaign for tablet safety and responsibility placed posters throughout the school building.

In February 2015, the one-to-one initiative expanded from the pilot program to all students in grades 9–11. Students in 12th grade were excluded due to their impending graduation at the end of the year. The tablets issued to the students would be their tablets for the remainder of their academic careers at City School District. The expansion of the one-to-one initiative increased the demands placed on CSD's information technology department.

During the spring of 2015, the help desk continued to be a focus of discussion within the cornerstone of infrastructure. The help desk support was reporting that issues were manageable. The help desk created chat features to offer quicker response times. The help desk also began to work with student aides and involve students to participate in the troubleshooting aspect of technical issues with the tablets.

Toward the conclusion of the 2014–2015 school year, the discussion of how to address the issues that students had with the keyboards was a topic of discussion, including providing an upgraded keyboard at a cost to the student. Changing keyboards with newer devices was also

discussed. Finally, how to protect the keyboards became the topic of discussion. School division personnel made the decision that it would be best to continue to provide the students a protective sleeve for their tablets. The protective sleeve would help limit the damage done by incidental drops.

2015–2016 Academic School Year. The 2015–2016 academic school years started with the entire high school being in a one-to-one computing environment and the middle school implementing a pilot program for eighth grade students. The infrastructure changes that were occurring for the new school year were plentiful. First, the eighth grade and ninth grade students who were just starting to participate in a one-to-one computing environment were given laptops. Students in grades 10–12 received the Dell Venue tablets that were provided to them during the previous school year. The laptops proved to be a more durable and more capable device than the tablets. The school division personnel also began publicizing to students that the devices that they initially receive will become their devices for the remainder of their academic career at CSD. The students will be responsible for taking care of the devices and returning them at the end of the academic year in good working order. The school division will be responsible for updating and reimaging the software portion over the summer break.

Another infrastructure area that needed addressed was how the school division would handle the multiple log-ins that students would need to access during the school day. The school was using various programs as part of its instruction that required the infrastructure to be prepared for all the programs to run smoothly with one another. The school system invested in Interactive Achievement to monitor students' progress using common assessments. The school division also created student Google accounts for all students and each device had the e-suite that included Google Drive, Google Hangouts, Google Sheets, Google Docs, and Google Slides.

Canvas, a learning management system that helps students organize class materials and the computer programs, was also implemented during the school year.

The information technology department realized that there needed to be a way to connect all these accounts. The IT department decided that they would change the students' usernames to follow a consistent pattern. All spaces and dashes found in students' user names would be deleted. For example, if a student had a hyphenated last name, the hyphen would be deleted and the two names would be combined. This change occurred over a month into the school year on the weekend of October 6, 2015. Moving forward, City School District would use these criteria for creating student accounts.

Filtering issues also continued to plague the IT department. Students were continuing to find ways to work around the Internet filter put in place by the school division. During a September 20, 2015 meeting, the City Connects team realized it did not have a solution to the filter issue, but team members would continue to discuss that and look for better solutions as the year progressed. The information technology specialist for the secondary campus, grades 6–12, created a presentation about Internet filtering. The presentation explained the process of how the school's Internet filter works and this gave teachers a better understanding of the process.

Information technology reported at the December 16, 2015 meeting that Internet usage had increased by 10,000 percent since the one-to-one initiative had been implemented in grades 8–12. The school division went from using an average of two gigabytes of Internet a day to more than two terabytes of Internet a day. The IT department reported that most of the usage was due to YouTube videos. This data on YouTube usage was then discussed during the teaching and learning section of the meeting. The reasoning for moving this discussion to the teaching and learning section of the meeting was because it appeared as if teachers were relying heavily on the

use of YouTube for educating the students and not focusing on other methods of how to use the technology for enhancing instructional practices.

During the January 2016 City Connects meetings, the topic of the help desk model for the 2016–2017 school year was discussed. The team identified a need for the help desk to acquire a management software system to monitor needs. During these meetings, the team began discussing long-term goals for the IT department.

In February 17, 2016, the City Connects team reviewed the new work order system purchased for the help desk. The IT department also installed a new server and software to help the new work order system. The IT department set a timeline for phasing in all technology work orders to go through the help desk.

The IT department continued to address filtering issues based on the May 2016 meeting minutes. The IT department was able to separate students' filtering at home and school. This opened up the avenue that students could access Facebook and Twitter along with other social media sites. The IT department needed to make sure that the filter students' accessed at home continued to provide a safe connection to the Internet. During the May meeting, the team also determined that the Information Technology Specialist at the elementary and secondary campus must grant permission for access to websites. The school division decided that the City Connects team, which includes the information technology specialists for both campuses, must be made aware of any major access changes at school and at home for the Internet filter.

In July 2016, the information technology department reimaged, fixed, and provided regularly needed maintenance for all the laptops in grade 8–12. A topic of discussion during connects meetings leading up to July 2016 revolved around the collection and storage of the devices during the summer months. The school system needed a place large enough to house the

computers and allow the information technology staff members to work on the computers. The solution came in the form of the school division's wrestling center located in the middle school. The room provided the much needed space. The wrestling center would be the staging ground for turning in devices, fixing, reimaging, and then distributing the devices back to the students in August. The wrestling center was reconfigured with additional power outlets, servers, and security features. By the end of August, the wrestling center would be transformed back into an athletic facility.

2016–2017 Academic School Year. Five-hundred additional laptops were purchased by City School district as the one-to-one computing initiative stretch from grades 6-12. Grades 6–12 (the entire secondary campus) were now a one-to-one computing environment and a pilot program was initiated in grade 5 using refurbished Dell Venue tablets from the recent graduating class.

The first City Connects meeting of the new school year had the information technology department presenting to the group about the filters. In the August 2016 City Connects meetings, the team determined that there needed to be consistencies for accessing the Internet. The Internet filter issue also influenced the devices' ability to allow students to access Interactive Achievement, the school division's program for monitoring student achievement. The IT department was given the task of communicating with the entire staff, stating the filter issues and the steps that will be taken to correct the issues along with the anticipated goal and timeline for correcting the filter issues. The filtering issue was causing much distress among teachers.

The IT Help Desk continued to operate during the 2016–2017 school year. This year, the help desk expanded the webpage and created more resources for students and parents. The help desk created a marketing campaign titled "Try 3 Before Me" as a way to decrease the number of

work orders on students' devices that didn't necessarily require a help desk technician. The help desk continued to build the program as well. By the 2016–2017 school year, the help desk was a full-fledged course that high school students could take for a credit. The help desk was run out of the high school media center and had a staff member serve as the lead technician/classroom teacher. Two other full-time school employees assisted within the help desk to deliver the needed support to the laptops.

The IT Department continued to make improvements to students and teachers devices during October 2016. All computers were upgraded to Windows 10. The filter was once again reconfigured during the fall break when students and staff were not in the building to avoid interrupting instruction.

The elementary school's one-to-one computing pilot for the fifth grade students also required the IT department's help. The tablet devices given to students were having a significant increase in broken power port issues. The IT department determined that they would refurbish the laptop carts from the high school and middle school and bring them to the elementary school for the fifth grade students. These carts would improve the storage of the tablet devices as compared to the storage bins that were being used previously.

Also during October 2016, the City Connects team began discussing the five-year replacement cycle for devices and began initial talks about the expansion of the one-to-one computing initiative. The discussion of inventory of Smart Boards in all schools was discussed, as well as evaluating the necessity of replacing Smart Boards at the secondary level since the schools had transitioned to a one-to-one computing environment.

As November 2016 rolled around, the IT department continued to look for ways to improve the wireless Internet infrastructure. The IT department decided to make changes to the

wireless Internet access in order to improve the quality of Internet that the student laptops received. The IT department decided to not allow any device on the wireless network other than the students' school-issued laptops and the teacher computers. Students and staff could no longer connect their personal devices to the wireless Internet service provided. A guest password was created that would only be given to visitors on an as-needed basis. This change greatly decreased the amount of data consumed on the school's Internet.

The IT department completed another survey for students and staff at the middle school and the high school during November 2016. Results showed that still too many students reported that they were being dropped from the wireless Internet two or more times a day. Data also showed that most students had Internet connectivity at home. This was a promising report, as many were concerned about the students' ability to access the Internet from home. A City Connects team member was assigned the task of finding a solution for students who did not have wireless Internet at home.

The December 2016 City Connects meetings regarding the infrastructure focused on the wireless Internet access and the student's misuse of their device. Internet access required further restrictions by the IT department. The IT department had to respond to the school staff and explain why the changes needed to occur. The changes were needed due to the overuse of school Internet for non-instructional purposes that was resulting in a slow Internet connection for instructional purposes.

The City Connects team discussed the issues that were arising from students who were downloading programs to their laptops that were causing the laptops to malfunction. The team discussed notifying students and their parents with a written warning. The notification would inform the student and parents that they were not permitted to download programs that were not

used for instructional purposes. A second offense would require a loss of computer privileges for multiple days while the IT department reimaged the computer. The team also decided that more discussion would be needed for the future.

In January 2017, the City Connects meetings began discussions on how to meet the needs associated with the upcoming state assessments for the high school and middle school students. Due to the one-to-one computing initiative, students were able to complete testing at the high school and middle school level in a significantly shorter time period. The IT department made sure that all IT technicians in the school division were available for the high school and middle school during the testing period. This meant that IT department staff located at the elementary school level would be at the secondary level for the testing period.

The IT department also began discussions about providing students with personal hotspots, a wireless Internet signal. A pilot group of students would be selected to participate, and students would need to check the hotspots out from the library. The device would access the Internet through the school division's Internet filter. This was a result that was driven by the results of the November 2016 survey results.

The demands to meet the needs of the infrastructure for City School's one-to-one computing initiative continued to grow. In February 2018, CSD hired an additional IT Help Desk staff to focus on the technology work orders being submitted at the elementary level. The help desk had identified a small population of students as multiple device breakers. The help desk requested the assistance of the principals to share some of the issues with their staff. The issues included students not plugging in and unplugging their devices correctly, which resulted in broken chargers and students pulling the keys off the keyboards. The City Connects team

decided to define negligence and make sure all schools were on the same page when addressing computer negligence with students.

The IT department provided an update on the improvements to the wireless Internet following the decision to limit wireless access to only school-issued devices. The changes to the wireless Internet resulted in a 42 percent reduction in bandwidth. The IT department also installed an app blocker that stopped school-issued laptops from running any program not been authorized by the school division.

In March 2017, the City Connects team created a new campaign to help educate and make students aware of how to properly use their laptops. The campaign, titled "Love Your Laptop," was in conjunction with monitoring the number of work orders placed by students with the goal of decreasing the number of broken laptops.

The IT department also teamed up with Sprint Wireless and was able to secure mobile wireless Internet hotspots that could be provided to students who did not have wireless Internet at home. This was a huge donation for the school division and provided much needed access for students who may not have the same financial advantages as others do.

As April 2017 rolled around, the City Connects meetings began discussing state testing. Schools needed to begin announcing that students needed to place any work orders on laptops at that time so that they would be ready for testing in May. Students also needed to be reminded about bringing chargers in on a daily basis during testing. The school division would not be able to supply a sufficient number of chargers to students for testing if a large percentage of students forgot their chargers.

The IT department purchased a new Internet filter called Smooth Wall. The IT department determined that it would run the new filter parallel to the current and outdated filter.

The outdated Internet filter was identified as the source for many of the filtering issues that were influencing the one-to-one computing initiative. The IT department would place some devices in a pilot group and run the devices on the new Internet filter. The IT department then would monitor and troubleshoot any issues during the pilot to facilitate a smooth transition to the Smooth Wall filter over the summer.

To conclude the 2016–2017 school year, the IT department began discussing how it would collect and inventory all the laptops over the summer. The City Connects team created a checklist that would be used by the staff members assigned to collect the laptops. All students turning in a laptop would be provided a copy of the receiving receipt completed by the staff member. This slip would document that students were aware of any noticeable issues with their devices.

2017–2018 School Year. The new school year for City Connects saw the expansion of the one-to-one computing initiative. New this school year was a one-to-one rollout of Chromebooks for students in grades 3–5. With the new rollout, students in grades 3–12 were now participating in a one-to-one computing initiative with a variety of devices. The intermediate school provided students with Chromebooks. The middle school provided students with laptops. The high school provided laptops to students in grades 9–11 and for the senior class tablets, as part of the initial e-Learning Backpack Initiative.

The new school year started with another discussion regarding the school division's Internet filter. The City Connects team determined that a protocol needed to be set up for reporting filter issues to create systematic fixes. The IT department was going to relay the protocol for reporting filter issues to the staff. The IT department did report that the Smooth Wall filter was working well. The new filter provided a decrease in bandwidth usage due to its ability

to limit websites and videos that students could access. The new filter was reported as being much more thorough than the previous filter used by the school division.

The IT department reported that the IT staff members closed out 373 work orders in the month of August. The IT department created a campaign to help keep the mobile devices running smoothly. Students were being asked to restart their computer on Mondays. The IT department determined that many of the work orders being placed was due to devices not being updated and restarted for long periods of time. So "Restart Mondays" was a new IT department slogan that was posted throughout the schools.

As the school year progressed, the City Connects team determined that face-to-face meetings with the director of technology and teachers would be beneficial. The director of technology made visit to the buildings and attended grade level meetings to speak with the teachers and hear their concerns. This was a way to reestablish a relationship for the IT department and teachers to work together to make things right with the technology.

Key Ideas and Themes from Infrastructure. A recurring theme noted throughout the infrastructure section of City Connects meetings was the school division's continued issues with the Internet filter. Every year, City Connects meetings focused on how the filter was affecting the implementation of the one-to-one computing initiative. City School District's teachers experienced frustration over the inconsistencies with the wireless Internet and filter. School divisions can learn from CSD's experience and make sure that their wireless technology and filter are up to the task of handling a one-to-one computing environment.

A second learning area for other school division's implementing a one-to-one computing initiative would be CSD's implementation of the IT Help Desk. The IT Help Desk turned into a real-world learning experience for many students. One administrator at the middle school told

the group about a conversation she had had with a local businessperson about the help desk and the fact students were helping troubleshoot IT issues with it. The person was highly impressed with the learning experience that students were having through their classes working with the help desk. This decision, having students work at the help desk as part of their classes, is one that other school divisions can look to implement within their one-to-one initiative.

Communication

Communication is a vital part of the one-to-one computing initiative, according to City School District. City Connects states that keeping open lines of communication is critical (CSD, 2017). It is important that stakeholders understand the effect that the one-to-one initiative is having on the teaching and learning occurring within CSD. City Connects began documenting meeting minutes after the initial pilot program associated with the e-Learning Backpack Initiative. The following is a synopsis of topics discussed at City Connects meetings that were associated with the cornerstone of communication.

2014–2015 School Year. City Connects first documented communication with stakeholders was a frequently ask questions (FAQ) pamphlet that was directed toward parents and students who were about to start the e-Learning Backpack Initiative. For the first semester of the school year, a small group of students were participating in a pilot program for the one-to-one initiative. The announcement for the expansion of the one-to-one computing came via a save-the-date mailed to parents and students. The save the date read:

We are excited to announce the expansion of the eBackpack Tablet Initiative for all students currently in grades 9–11. Beginning the week of February 23rd, City School District High School will be hosting, by grade, tablet deployment nights

for students and parents; please mark your calendar to attend this mandatory evening.

Special gifts for the first 20 students each night!

(City School District, 2015)

A flyer would need to be created to highlight technology resources in today's classrooms.

In March 2015, the City Connects team began developing a public service announcement that would include tablet care, expectations for using the newly issued tablet and proper handling of the tablet.

April 2015 was the month the City Connects started putting out information to stakeholders regarding the laptop deployment days for the 2015–2016 school year. The deployment was aimed at two groups. Group one consisted on returning 10th, 11th, and 12th graders who already had devices. Group two consisted of ninth grade students and new students. Dates for the deployment were publicized as August 13 from 5 to 8pm. Group two was given the deployment dates of August 20 from 6 to 8pm and August 22 from 9am to 12pm.

April 2015 was also the time that the collection of laptops was discussed. Dates were determined following a group discussion with the City Connects members. City Connects members determined that they would begin publicizing two weeks prior to the June 4, 2015 and June 5, 2015 collection days. It was vital that students were notified when the collection would be happening ahead of time so that all the electronics could be collected in a timely and efficient way.

City Connects began to look for instructional highlights from the one-to-one computing initiative to share with the community during their May meetings. The highlights would focus on the technologies integration into instruction, student comments and videos, and specific

examples of how the technology integration occurred. The team realized that communication about the success was vital for the initiative to spread.

It was also during the May meetings for City Connects that school administrators and teachers discussed expanding the one-to-one computing initiative to the middle school and pilot the program. This would stretch the one-to-one computing initiative into the middle school for the first time and allow for all students in grade 8–12 to be part of a one-to-one learning environment.

As June 2015 ended, the communications section of City Connects meetings focused on deployment dates. Confirming dates and giving parents, students and teachers, a sufficient prior notification was vital. City Connects wanted to get computers into the hands of as many students prior to the first day of classes so that instruction could begin immediately with the infusion of technology. Messaging timelines to stakeholders and the forms of communication (i.e. letter from principal, save the date postcards, social media updates) were all focused on during the June meetings.

2015–2016 School Year. Documentation on communication was sparse during the initial part of the 2015–2016 school year. Key notes made during the first semester of the school year was that City Connects realized there needed to be consistent and comprehensive communication. One of the challenges that was mentioned within the infrastructure section was students logging into Canvas, an online learning management system for students, which was implemented during the school year. Student login credentials needed to be adjusted because log-ins to computers, student email, and Canvas were all slightly different and causing confusion. The information technology department communicated to the staff that hard changes would occur to student accounts in October to alleviate the problem.

During the November 2015 City Connect meetings, administrators from the PK–2 grade school and the 3–5 grade school were invited to start attending the meetings. At those meetings, people agreed that the district needed to be more focus placed on the mission, vision, and expectations for the one-to-one initiative throughout the school division. Elementary staff were not feeling as they were part of a one-to-one initiative due to it only occurring within grades 8–12 at the time.

December 2015 City Connects meetings regarding communications began discussing the collection dates at the end of the year. Feedback from teachers was needed to balance teachers' use of the devices for finals, the end of the standardized exams, and dates when students were leaving for the school year. Due to the devices becoming an integral part to instruction, it was important that City Connects received feedback that would allow for instruction to continue through the end of the school year.

During the April 2016 meetings, City Connects discussed how to improve their communication of the one-to-one initiative using video. It was decided that the high school's audio/visual students could work on the video. The A/V student-led video would give the students a learning experience on producing promotional videos while also helping the school division promote its one-to-one imitative with the community.

Also during the April 2016 meetings, the discussion on laptop deployment for the 2016–2017 school year began. The weeklong deployment would be messaged to families using the community center, electronic signs throughout the community, save the date mailers, and end of the year report cards.

City Connects team members determined that the school division also needed to receive communication back from the students and parents participating in the one-to-one initiative.

Surveys to students and parents were distributed to student via an online survey program. Three hundred and 90 students responded to the survey between grades 8–12. Key findings from the survey showed that overall, students enjoyed using Canvas as a learning management system and 84 percent of the student population had access to the Internet when home. More than half the responses, 57 percent to be exact, stated that they were occasionally dropped from the wireless Internet at school. The team also reviewed individual comments made in the open response section.

During the June 2016 City Connects meetings, the team discussed the upcoming communication for laptop deployment in August. Dates were set for when the school administrators would relay information to parents. The notifications were geared toward giving parents and students plenty of time to arrange to attend one of the laptop deployments before the start of the 2016–2017 school year.

2016–2017 School Year. The first City Connects meeting of the school year focused on communicating meeting norms for City Connects meetings. City Connects team members agreed to maintain professionalism and confidentiality based on decisions and discussions in the meeting. The team also decided that City Connects meetings would last no long than one hour and the team was going to be diligent about staying on task throughout the meetings by following the agenda.

One of the first topics that City Connects focused on was developing a follow-up survey that would be administered to students in November 2016. Adjustments to the survey used in April 2016. The main adjustment was to reword the question regarding Internet access at home. The team felt that most students responded yes to Internet at home due to the ability to connect

using their smartphone. The new question would read: "Can you access the Internet at home using your school-issued device?"

October 2016 began the discussion of collection and deployment dates for June 2017 and August 2017. The team felt that the farther ahead they planned and communicated dates, the less confusion occurs.

At the November 2016 City Connects meeting, the team began discussing the marketing aspect of the one-to-one initiative, as well as the overall digital conversion for the entire school division. Do the stakeholders understand what City Connects is working on for the students and community? Do stakeholders in all grade levels feel as if they are part of the bigger initiative of putting a device in the hands of every student or is it simply for grades 5–12? The team stated that as they continue to develop the City Connects brand, agendas moving forward for the meetings must focus on the initiatives' cornerstones of teaching and learning, professional development, finance, communication, and infrastructure.

City Connects began discussing how they were going to communicate the positive changes occurring with the one-to-one initiative during the January 2017 meetings. Video files of classroom instruction, activities, intercession, and special projects were requested from all the schools. Showing preliminary data on student engagement via the walk-through data collected by administrators was also discussed. The City Connects team realized that marketing the initiative in a positive way is a pivotal part of the communication cornerstone.

Another critical piece that City Connects members needed to address the fines being accumulated by the students participating in the one-to-one initiative. Fines for lost or damaged computers were being put on student accounts. If students did not pay off the fine, then events such as graduation and end of the year activities would be in jeopardy for the student.

Communication had to be made to all graduating seniors about fees and fines before prom and graduation at the conclusion of the school year. Returning students still needed to know their dues, but it was not as vital to collect from them since their debt would roll over from year to year.

City Connects discussed looking at possibly presenting their one-to-one initiative at conferences held throughout the state. Discussions followed about topics that City School District could present based on its one-to-one initiative. Titles for topics included Access for All, Non-Evaluative Walk-Throughs, We've Gone One-to-One: Now What?, The 10 Things That CSD Overcame with One-to-One Computing, and How Does CSD Sustain One-to-One? City School District began shifting the discussion from simply notifying people about dates and times of the digital conversion to making the communications more about highlighting the one-to-one initiative.

At the final meeting of the academic school year for the 2016–2017 school year, CSD presented an updated branding for City Connects and the one-to-one computing initiative. The updated branding consisted of a new logo, highlighting the five cornerstones and providing literature to the community and its stakeholders about all the new and exciting things that are occurring within CSD. CSD felt that this rebranding was vital because people were looking the mission and vision of the one-to-one initiative.

2017–2018 School Year. As the 2017–2018 school year began, the first City Connects meeting of the year focused on celebrating the good things that have been accomplished through the entire City Connects initiative. City Connects realizes how much they have grown since the initial pilot program with the high school students during the 2014–2015 school year. Students in grades three through twelve were now in possession of an electronic device.

City Connects planned a visit from a neighboring school division that wanted to study CSD and its one-to-one initiative. The school division that was visiting started their one-to-one computing initiative the same year CSD started. The school that visited noted that it was impressed with the school division marketing of its one-to-one computing initiative.

Key Ideas and Themes from Communication. During 2015–2016 school year, CSD officials realized that they needed to do a better job at marketing the mission and vision of City Connects. I believe that this is a key takeaway from CSD's one-to-one computing initiative. The students, parents, and staff need to understand the reason why a school division is pursuing a one-to-one computing initiative. It was more than simply putting devices into the hands of every student. CSD was looking to revolutionize the learning of their students.

It was also during the communication section of the one-to-one initiative that CSD developed the idea of the five cornerstones. CSD realized that it needed to find a way to categorize all the different components to the one-to-one computing initiative.

CSD spent a lot of time discussing deployment dates and collection dates. This was an area that the school division felt was important because it involved so many stakeholders. The parents and students were involved in the deployment. The better the communication about the time and expectations for deployment led to a better community feel regarding the one-to-one initiative.

Finally, CSD solicited feedback from its stakeholders. They provided surveys to teachers and to students to get an understanding of their feelings regarding the one-to-one computing initiative. This feedback helped the school division develop their vision and plan for moving forward with the one-to-one computing initiative.

Finance

City School District identified financing as another cornerstone to the one-to-one computing initiative. CSD reported that during the initial three years of the one-to-one initiative the budget for technology increased by a mere 1 percent. CSD made a commitment to repurpose budget dollars and refused to concede to the tendency to say that a one-to-one initiative was unaffordable. CSD also determined that financing a one-to-one initiative had benefits that cannot be quantified by a dollar sign. This included increased instructional time, engaged students, and a reduced carbon footprint (CSD, 2017). The following is a detailed analysis of the City Connects meeting minutes that focused on finance.

2014–2015 School Year. The beginning of City School Districts' one-to-one initiative began through a state-issued grant, the e-Learning Backpack Initiative. The goal of the program was to assist schools in the transition to a tablet computer and digital content era. School's that qualified for the e-Learning Backpack Initiative received \$400 per student reported in their ninth grade class. Schools would be able to receive the grant for the next four academic years.

Initial discussions documented during City Connects meetings focused on assessing student technology fees and documenting device damage. For the initial tablet deployment that was happening in February 2015, students were assessed a \$25 technology fee. The technology fee was put in place for non-negligible damages. The technology fee could not be used for negligible damages.

The other topic of discussion during the early stages of the one-to-one initiative focused on damages incurred on the devices. It was determined that students are expected to pay, even if they didn't have the entire cost of the repair. Students needed to show a good faith effort to pay the damaged fee before being provided a day user tablet. By simply making an initial payment on the damage, the student would be given a tablet to be used during the school day and returned

at the end of the day to the library. If a student incurred a fine due to negligible use of the device, then the help desk would notify the school's bookkeeper who would then record the fine in the student's school account.

City School District began to realize the need for an additional level 1 tech support person. Due to the school budget constraint, it appeared as if that need would go unfilled during the school's budget season in April 2015. The school division continued to pursue the level 1 tech support person through a contractor service. The contractor was assigned to the high school help desk and proved the best available option with the limited resources in the school's operating budget.

The final documented City Connects meeting of the 2014–2015 school year that focused on finance revolved around the tracking of student payment. The school division was looking at multiple ways to document inventory, payments for deployment and payment tracking. The high school administration and media specialist decided that this would be a focus to improve during the upcoming school year.

2015–2016 School Year. The new school year brought an additional 250 laptops to the middle school as well as a fully implemented one-to-one computing environment in the high school. The City Connects meetings focused on maintaining a 2 percent inventory of ready to deploy computers. The director of technology believed that a two percent inventory would be able to deal with any influx in student population and be able to keep the one-to-one computing initiative going for all students in the case that their devices becomes inoperable. The high school and middle school provided estimates for their student population growth for the school year.

As the school year progressed through September meeting minutes for finance focused on inventory for new students and documenting fees and payments. It wasn't until the February 2016 meetings that the topic of spending money on digital content became a topic of discussion. The City Connects team determined that it was difficult to look into purchasing digital content when the team was unsure of the budget to spend. The current resources that the school division had were not the easiest to use due to the resources not always being located in the same place. The leaders realized that students were required to memorize multiple passwords and log-ins in order to use a mishmash of technology resources. The team determined that all schools needed to be on the same page in the future when purchasing instructional resources.

Discussions began about lowering the technology fee back to \$25 for the upcoming school year. During the 2015–2016 school year, the school implemented a \$50.00 technology fee. Approximately \$51,000 was collected through technology fees. The funds were added to the school systems operating budget and supported the additional help desk position at the high school. After several discussions as a team and with all stakeholders it was determined that \$50.00 was a steep price to pay for the families within the school division when in reality over 50% of the students were coming from economically disadvantaged homes. The grades participating in the one-to-one initiative would also increase to all students in grades 5–12.

2016–2017 School Year. The start of the new academic school year began with a conversation that had been occurring since the start of the one-to-one computing initiative. How was City School District going to monitor and report student fees? The discussion focused on using the current resources that the school division uses to track attendance, registration, or library checkout. All three programs are different and none of the three programs do exactly what is needed to continually monitor the student fees. The team decided that a committee would

be formed to look at programs available for the school division to purchase that would monitor students' accounts.

The early part of the school year also saw an increase in fines for students who were still using the tablets from the initial high school device deployment during the 2014–2015 school year. Students in grades 11 and 12 were using the original tablet computers that were part of the e-Learning Backpack Initiative. Students in fifth grade were using the tablets left behind by students who had graduated high school. The tablets were not holding charges and screens were beginning to crack on a regular basis. It was noted that the help desk needed to be very thorough with the initial handling of a claim for a damaged tablet. The letters sent home to students when a fine was placed on them for a device repair needed to have better accountability.

During the winter months of the 2016–2017 school year, the City Connects team talked about how the feasibility of expanding the one-to-one computing program. The City Connects team identified three key areas to focus on during the budget season: personnel, capital improvements, and employee compensation. During the previous year's budget season, the one-to-one computing initiative became a lightning rod issue. Staff began to believe that the limited raise percentage for staff was due to the technology and the investment in the one-to-one computing initiative. City School District realized that it needed to do a better job at educating the public about where funding came from for the technology initiative and for employee raises. The two areas do not interfere with each other as they come out of different pots of money.

The director of finance explained the funding for the one-to-one computing initiative further. Each year, City School district received \$154,000 from the state to support technology. In order to receive that money, the school district had to promise to match 20 percent of the funding, for a total of \$30,800. The school division also receives additional funding that is

earmarked for technology. The \$30,800 that the school puts toward technology would not be sufficient funds to offer every school employee a 2 percent raise. City School reiterated time and time again during the school budget season that the funding of the one-to-one computing initiative was not the reason why there could not be a significant raise to teacher compensation.

2017–2018 School Year. For the new school year, City School District implemented a new payment monitoring system for the school division. The program, My School Bucks, is a program that could manage student fees and fines, as well as provide the student with a lunch account. The finance department began working immediately with the school bookkeepers to track and update all lists that were kept on previous systems regarding student fines. The new system would help the help desk document fines on student devices and for each school to be able to monitor students that have existing fines on their accounts. The new system also allowed individual schools to make contact with families who have incurred a significant amount of fines.

City Connects also documented that the 2017–2018 would be the last year that the school division will be collecting funds associated with the e-Learning Backpack Initiative that originally started the one-to-one computing initiative. City School District stated that they would need to be prepared for how the reduction in funding would impact the 2018–2019 school budget. The school division was going to start a “wish list” for the upcoming school year’s budget.

Key Ideas and Themes from Finance. City School District did benefit from a state-aided program that allowed the school division to begin pursuing the one-to-one computing initiative. CSD used the funds from the state to offset the early expenses of the program. CSD also used state funds to continue to expand the program. School divisions must be able to show

that they are fiscally responsible with the taxpayer's money during a one-to-one computing initiative.

The technology fees and fines were a pervasive issue throughout the implementation of the one-to-one computing initiative. CSD decided to reduce the initial fees of \$50 to \$25. These fees were used to support the services within the help desk.

The other area that was important to figure out was how to hold students accountable to damaged devices. Unfortunately, when you place an electronic device into the hands of every student in the school division, there are going to be damages that need repaired and paid for. CSD implemented an online money program that allowed the school division to document student fines in multiple areas.

Professional Development

City School Districts fourth cornerstone for the City Connects one-to-one computing initiative is professional development. CSD believed that teachers needed to be part of the one-to-one initiative and willing to adapt their teaching methods. CSD wanted to make sure that their staff was provided the training necessary for successful implementation and ongoing support as the one-to-one initiative continued. The following is a detailed analysis of the City Connects meetings minutes that focused on professional development.

2014–2015 School Year. During the first year of the one-to-one computing initiative, City School District understood that teachers would need a significant amount of professional development to realize the effect that a one-to-one computing environment had on student achievement. The first professional development offered to the staff participating in the initial deployment of devices occurred on February 2, 2015. The professional development was designed to provide varied levels of support for teachers. The three topics that were to be

covered included the following: blended and flipped learning environments, cool tools, and leading as a digital leader. All teachers participating in the one-to-one computing initiative were required to attend.

As the school year progressed, discussions about upcoming pilot programs began for the 2015–2016 school year. The eighth grade was selected to pilot the one-to-one initiative at the middle school and all the high school would be participating in a one-to-one learning environment. The City Connects team decided that goals had to be set for the next school year and expectations for a full rollout at the high school needed to be set. The eighth grade teachers participating in the pilot program were provided an eight-hour training on how to help the students use the technology in the classroom. The training focused on the takeaways from the high school rollout.

2015–2016 School Year. City School District introduced a learning management system (LMS) to the students and staff for the upcoming school year. The LMS that CSD chose was called Canvas. City Connects understood that proper implementation of Canvas was vital to the success of the one-to-one computing initiative. During the September City Connects meetings, the team designed a tiered user level for Canvas that would be shared with the teachers. This tiered approach created four different levels with descriptors for each level.

Table 4.1 Canvas User Levels

Levels	Description of Levels
Level 1- Beginning User Timeframe for completion- 1st 9 Weeks of School	<ul style="list-style-type: none"> • Log on to Canvas • Add a course template to class page that includes the following: Syllabus, About Instructor, Contact Info, and a Header Graphic • Publish Course so that it is visible to users.

<p>Level 2- Emerging User Timeframe for completion- within the 1st semester</p>	<ul style="list-style-type: none"> • All assignments, tests, projects, etc. are posted to the classroom calendar in Canvas. • Modules created for each unit of study. • Notes, classwork, handouts, etc. are posted within modules using the following file formats (.pptx, .docx, .pdf).
<p>Level 3- Blended User Timeframe- Complete implementation within two years; at the end of year one, staff should be at 50 percent implementation.</p>	<ul style="list-style-type: none"> • Adding video tutorials and interactive content to lessons in Canvas. • Create quizzes and assessments using the Quiz tool. • Adding content-appropriate apps into your course, such as Quizlet, Khan Academy, CK-12, etc. • Add rubrics to assignments and provide feedback on assignments using the Speedgrader Tool. • Create groups within your class. • Embed Google Drive documents into the course.
<p>Level 4- Online Course Facilitator Timeframe- This will be for individuals who teach a class that is online only.</p>	<ul style="list-style-type: none"> • All course content is delivered online. • No face-to-face classroom meetings.

City Connects team members noted that professional development sessions needed to be planned throughout the year to provide the teachers support to achieve the different levels on the Canvas level system.

During the January 2016 and February 2016 meetings, City Connects focused on the specific needs of each of the four schools within the school division. The primary elementary school needed minor support on Canvas training since they were not actively using Canvas with their PK–2 grade students. The intermediate school wanted to begin providing their staff specific support on one-to-one computing since the school was scheduled to pilot the one-to-one initiative for the upcoming school year. The middle school teachers required professional development on instructional practices that incorporated 21st century skills and higher order

thinking skills. The middle school also began to increase their Canvas support to the sixth and seventh grade teachers as they prepared for a school-wide one-to-one initiative the following year. The high school focused their professional development on the classroom management aspect with one-to-one computing.

As the 2015–2016 school year concluded, City Connects began designing professional development opportunities that could be offered to teachers over the summer. Topics that were to be covered with the teachers included an overview of the laptop deployment process, trying to define the blended learning environment with more detail and helping teachers understand how they can utilize Canvas for instruction. The City Connects team invited the eighth grade teachers who just completed their pilot program with the one-to-one initiative to help facilitate some small group sessions.

2016–2017 School Year. City Connects began the school year discussing the professional development opportunities that could be presented to teachers during the fall semester. The professional development opportunities would be developed and delivered based on data analysis, survey results, and school division needs. City School District also invested in a program called iCurio to be used by teachers and students to find curated material that could be used for instructional purposes.

City Connects developed a train the trainer design to help deliver the iCurio professional development. Twenty-five educators between the elementary and secondary campus would be identified to participate in the initial training. The intent was for anyone participating in the initial training would be for them to return to their base school and provide professional development to their colleagues on iCurio.

Along with iCurio training, City Connects pursued additional professional development for staff on Canvas, Rosetta Stone, and Edgenuity. Canvas training would be provided for a cost of \$5,250. Rosetta Stone is a program that the ESOL department uses as an additional support to teach English language learners English. Rosetta Stone provided trainings in two formats: a six-hour face-to-face professional development for \$3,900 or an online professional development for \$500. Edgenuity is an online textbook program that offers several different middle and high school level courses through an online program. Edgenuity would provide a webinar-based model for professional development. City Connects realized that they couldn't fund every professional development opportunity, so it would need to assess which ones would be priorities.

During the spring 2017 semester, City Connects meetings the team decided that all professional development would come under the City Connects umbrella. The team noted that the school division needed to unify the professional development planning and the best way would be to have it as part of the City Connects agenda. The one-to-one computing initiative was such a large part of the school division's vision that the district needed to solidify the professional development offered to all levels of teachers. The effort to offer relevant professional development for all staff was critical.

2017–2018 School Year. City Connects wanted to provide professional development for the leadership team within City Connects that emphasized digital leadership. The administrators at all four schools and the instructional team were signed up to participate in an online course that focused on digital leadership. The goal was to create a learning community for the individuals participating and to learn from people in other school divisions. The school division also found an online course for a group of teachers who have shown an interest in leading change in the classroom using the one-to-one initiative.

The instructional technology staff at the elementary and secondary campuses also prepared to implement the Substitute, Augment, Modify, and Redefine (SAMR) model for all teachers within the school division. SAMR helps provide a framework for changing teaching practices through the use of technology.

Key Ideas and Themes from Professional Development. City School District focused its professional development program based on the teachers' needs. Much like differentiating within a classroom, CSD officials realized that their professional development must be tailored to the specific needs of its staff. CSD showed the ability to understand that all teachers didn't need the same level of support, nor did all teachers require the same growth opportunities. Some teachers were more prepared than others to expand their learning while other teachers still required a more remedial approach to incorporate technology.

City School District also decided to have all its professional development for the school division fall under the umbrella of the one-to-one computing initiative. The district leadership decided that all professional development opportunities provided to staff must be looking at improving student achievement, and since the focus of the one-to-one initiative was to improve student success, then all professional development must connect to their vision. This decision helped bring a focus to the professional development opportunities presented to the staff.

Teaching and Learning

The four previously mentioned cornerstones eventually influence the teaching and learning for staff and students. The one-to-one computing initiative provided teachers with an avenue to personalize and customize instruction that can resonate with all students (CSD, 2017). The one-to-one computing initiative has pushed teachers out of the comfort zone of textbooks and memorization and opened the door for teaching and learning that "allows students to grow

into creative and critical thinkers, collaborators, communicators and compassionate citizens” (CSD, 2017). The following is a detailed analysis of the City Connects meeting minutes that focused on teaching and learning:

2014–2015 School Year. Initial discussions involving the teaching and learning focused on presentations to faculty and staff regarding classroom expectations. City Connects determined that it would be beneficial to brainstorm ideas to present to staff about ways that the new devices could be introduced to into their instructional practices. The expectations for students using devices in the classroom included notetaking, warm-up activities, exit tickets, research, group sharing and collaboration, and “cool tools” that integrate into the content.

Two months into the initial rollout of devices, the City Connects team focused on how the technology integration was going. Informal observations determined that some teachers were using the devices while others simply weren't. The team discovered that the teachers who were not using the devices lacked ideas on how to successfully integrate the technology. It was easier to rely on familiar ways of teaching rather than change instructional practices. The City Connects team decided that quick professional development sessions for teachers needed to be created to help with the teaching and learning aspect of the one-to-one conversion.

2015–2016 School Year. City School District made a significant investment in a new Learning Management System (LMS) that it would use to help enhance the teaching and learning of students and staff. CSD chose to purchase Canvas as its school division's LMS. Canvas helps simplify technology integration for teaching and learning by bringing together all the digital tools used within the classroom into one location (Canvas, 2018). School divisions that CSD studied prior to implementing a one-to-one computing environment all spoke on how finding the right LMS was vital to the success of technology integration.

City Connects created a level system that used a rubric for teachers to understand the expectations for using Canvas. The system was titled Canvas User Levels and consisted of four different levels. All teachers were given the expectation for what level they were to be at by a specific time within the academic school year. The levels for each teacher was differentiated and varied due to the fact that the one-to-one computing environment only existed for students in grades 8–12 during this school year.

Another issue that was affecting the technology used within the classroom was discipline issues. During the early months of the school year, the district had several concerns about students using the devices inappropriately during class time. Inappropriate usage included gaming, visiting online chat rooms, watching movies, cheating, and visiting inappropriate websites. During the September 2015 meeting, it was decided that technology should be a piece added to the school's current level of infraction system. Inappropriate computer usage would be addressed by administration just as other discipline referrals. City Connects team members also discussed purchasing a classroom management program to help teachers monitor laptop/tablet usage in the classroom. Teachers have been requesting this ability as a way to keep students on task throughout a lesson. The program would need to be able to view what students are doing on their devices while in the classroom, lock-down devices to only one program and/or website, and not allow students to visit sites they should not be visiting.

As the school year progressed, the City Connect team continued to monitor technology usage. The City Connects team discussed how the schools were using the informational technology resource teacher (ITRT). The ITRT for the secondary campus setup meetings with each teacher to discuss Canvas levels and instruction. The school division also had its instructional specialist in technology, math, and literacy begin meeting to look for ways to tie

technology and instruction together. The educators had a goal of looking at the curriculum framework and finding ways to integrate technology into the framework that would help teachers.

During the 2015–2016 school year, City Connects meetings focused on providing digital citizenship for students. A committee of teachers was formed to discuss what the students needed for digital citizenship and how it could be provided. The committee would also work with the local police department to determine the appropriate curriculum.

City Connects meetings continued to discuss the changing landscape of the classroom at the secondary level due to the implementation of the new technology. City Connects highlighted that the technology integration provided student independence, more opportunities for collaboration, greater student engagement, the ability to engage students in higher order thinking as a way to improve their critical thinking skills and provided the opportunity to change the physical layout of the classroom.

2016–2017 School Year. For the 2016–2017 school year, the one-to-one computing initiative expanded to include grades 5–12. All students at the secondary level were participating in a one-to-one learning environment and students at the elementary school level began a pilot program for fifth grade students. City Connects began discussing how to best measure the effect that the one-to-one initiative was having on the teaching and learning. City Connects determined that school administrators would begin collecting data using Google Forms. The data collection would focus on technology usage, level of student engagement, and level of questioning using Bloom's taxonomy.

Internet safety and digital citizenship continued to be a topic of discussion during the academic school year. The schools began using commonsense.org as tool for teaching students

how to use technology appropriately. City Connects identified times during the school day that students at all four schools were provided with age-appropriate material on Internet safety and digital citizenship.

As the second semester began, City Connects continued to discuss how the one-to-one computing initiative was being used for teaching and learning. Was the technology being used to transform learning, access higher order thinking skills, or create tasks that were otherwise unable to be completed without the use of technology? The City Connects team understood that there were times during instruction that the use of technology would not be important. It was determined that administrators needed to discuss how they were collecting the data for the walk-through forms as a way to create inter-rater reliability. Weekly instructional updates were created to discuss data collected from informal observations.

During the weekly instructional updates with school administrators, the City Connects team noted that the schools were all seeing an evolution taking place within the classrooms. During the first year of the one-to-one initiative, it seemed that the technology usage was more done for compliance. During year two of the initiative, it was observed that teachers were taking more ownership of the one-to-one initiative. The walk-through data was also turning into meaningful discussions at faculty meetings and other conversations. The increased level of buy-in at the teacher level was noted.

During the April 2017 City Connects meeting, the discussion on instruction again focused on how classrooms looked different than they did prior to the one-to-one initiative. Informal observations detailed how instruction has changed into small group and station work in many classrooms. Kidney tables were being ordered to fulfill teacher requests for changing the

classroom environment. Benchmark assessment scores were higher than previous years in classes that have incorporated the technology and allowed for small group instruction.

During the last instructional meetings of the 2016–2017 school year for City Connects, the district announced that the one-to-one initiative was going to expand to the entire elementary school. The positive results documented through the walk-through data at the secondary level helped determine that this was best for the teaching and learning for all students at the elementary school.

2017–2018 School Year. At the first City Connects meeting of the year, the discussion quickly went right to instruction. City School District wanted to maintain the consistency across all grade levels to have technology deeply embedded into the culture of teaching. Administrators stated that more professional development was needed in order for teachers to utilize technology in an embedded way during instruction.

At the September meeting for City Connects, discussions focused on teachers' recommendation for purchasing devices that could give teachers greater mobility in the classroom. The team determined that this was another example of the evolution of teaching and learning in the classroom. Teachers were looking at how the mobility provided by the laptops was allowing for more sharing and collaboration among students and staff. Learning was starting to take place in areas outside of the traditional classroom.

Another impact on the teaching and learning that was discussed at an October City Connects meeting was an issue that related to cyberbullying. With so much of students' work online and saved to their Google accounts, City Connects members noted that other students could access a student's account and delete valuable information. This could be especially true if students were not practicing Internet safety and good digital citizenship skills. At the City

Connects meeting, school administrators and teachers discussed improving the students' digital citizenship by having them learn to create safe passwords.

YouTube was another topic of debate for teaching and learning during the City Connects meetings. Teachers were trying to use certain YouTube videos and having a difficult time accessing the videos through the school's filter and students were accessing certain video content that they should not be allowed to access. YouTube provides three levels of blocking, according the meeting minutes. City School District chose the middle level for blocking and decided to keep that because it may have had a far greater negative impact on teachers' plans to change it as many lessons were already prepared. Instead, teachers were to report individual students who accessed inappropriate YouTube material to the administration and individual restrictions would be placed on the student.

The final documented meeting for City Connects focused on how students were becoming too distracted by playing games, watching movies, participating in chat rooms, and visiting inappropriate sites while using their devices. The elementary school was piloting a program called GoGuardian. GoGuardian claims that their product allows for more teaching and less managing to take place in the classroom. The elementary school was able to pilot the program because it was using Chromebooks. City Connects determined that teachers at the middle school and high school would visit to elementary school to observe how GoGuardian was being used by teachers at the elementary level.

Key Ideas and Themes from Teaching and Learning. City School District determined that digital citizenship skills were a vital part to the one-to-one computing initiative. Students needed to understand that they were creating a digital footprint with every post and click that they used on their account. Students also needed to learn about setting proper passwords and

protecting their digital materials that they created. Cyberbullying also was a topic that emerged as a point of interest in the teaching and learning stage. Bullying lessons had to evolve from face-to-face bullying occurrences to cyberbullying. This was an area that I did not intend at first to be a theme for teaching and learning because it did not deal with content specific material. However, the meeting minutes show that a significant amount of time was spent discussing how to teacher students about digital citizenship.

Another theme that emerged was the effect that easy access to technology had on a student's ability to focus and concentrate of the academic task provided by the teacher. Students were continually accessing YouTube and other video games by and becoming distracted from completing the given task. CSD started the implementation of GoGuardian during the 2017-2018 school year to help deter students from gaining access to websites that diminished their ability to complete a task.

Interviews

Interviews with the superintendent of CSD and teachers of CSD helped provide data for how the school division prepared for the one-to-one computing initiative. The interviews will help answer research question 1.

Superintendent

The superintendent for CSD was responsible for providing the initial idea of the one-to-one computing initiative. His role with the one-to-one computing initiative started in 2010 when he was initially interviewing for the role of superintendent with City School District. During his interview for the position, he envisioned an individualized education plan (IEP) for every student.

"Because of our size, because we're small, I would envision an IEP for every child."

Therefore, during the initial part of his tenure with CSD, he looked for ways to personalize learning for all students.

The superintendent was intrigued by the events occurring in Mooresville, North Carolina. He learned about Mooresville Graded School District's one-to-one computing initiative after MGSD was named an outstanding school division by *Time* magazine. He knew that the school division was doing some good things and MGSD's superintendent was nominated as the national superintendent of the year. His initial role was to be "the planter of the seed."

"So my role [at CSD] was ... to build the interest, to gauge the interest, and if there were interest, make this idea grow. So, germinate, water it, and make it grow."

Teachers

The teacher interviews will provide valuable data to analyze in order to see how educators were prepared for a one-to-one computing initiative. Data collected from the interviews can provide assistance in answering research question one. Responses from the teachers can help determine areas of support that educators will need in order to prepare for a one-to-one computing initiative.

Teachers who participated in the one-to-one computing initiative with City School District participated in focus groups. The focus group questions that focus on research question 2 included following questions:

1. What is your job position title?
2. How long have you been teaching in a one-to-one computing environment for students?

The teachers participating in the focus group ranged from high school to intermediate school. Their job titles consisted of a family and consumer science teacher, an information technology resource teacher, a math teacher, a history teacher, and a language arts teacher. The

teachers ranged from working with the one-to-one computing initiative from its infantile stages at the high school to working with it at the latest stages at the intermediate school. When the teachers began discuss how long they have worked with the one-to-one computing initiative the discussion revolved around how they were prepared.

Teacher B mentioned how the school division provided teachers with laptops a year prior to the students receiving their own laptop.

Teacher B: *“It was a great surprise when we returned from winter break and were given brand new laptops that were to replace our aging desk tops located in our classrooms and in our offices. The laptops provided us the ability to start testing our mobility with the laptop use.”*

Teacher E focused on the fact that they were able to start practicing their use on a device that would be similar to the ones presented to the students. The teachers could see how the various applications that were currently being used by the district could transfer and help the students once they received their laptops. The laptops even changed how the teachers were able to participate in professional development.

Teacher E: *“As learners, we were no longer tethered to our desktops. We could start having professional discussion and dialogue with our colleagues using our devices...we could start to see how are students could possible benefit from this opportunity.”*

Summary of Findings Research Question 1

Many key findings can be drawn from City School District's implementation process for a one-to-one computing initiative. First, City School District officials were purposeful with the rollout of the devices in the one-to-one computing initiative. The school division's leadership

team learned from other educational institutes about how to prepare teachers to integrate the new educational technology tools into their teaching practices.

Second, City School District officials did a good job at establishing a committee that consisted of leadership from all four schools within the district. The leadership team for the one-to-one computing initiative, known as City Connects, met regularly and documented the meetings as the one-to-one computing initiative grew. The meetings provided a consistent message delivered throughout the school division.

Third, City School District officials identified five cornerstones for the one-to-one computing initiative. These five cornerstones: communication, infrastructure, finance, professional development and teaching and learning, became the focus of City Connects meetings. Establishing the cornerstones ensured the many components of the initiative were provided with equal time and support throughout the planning process.

Additionally, the superintendent of CSD initiated the one-to-one computing initiative with his vision of providing an IEP for all students within CSD. The leadership provided by the superintendent was critical in the initial planning part for the one-to-one initiative. Without a vision provided by the leader of the school division this initiative would have likely never start or become part of the entire school system.

Finally, it appears that it was important for the teachers to be prepared for the one-to-one computing initiative by being provided with a similar device. The teachers got an opportunity to experience what the students were about to have and could see the benefits of participating in a one-to-one computing environment.

Research Question 2: How have educators adapted to the innovative change of a one-to-one computing initiative?

Data collected from archived meetings, classroom observations, interviews, and surveys is analyzed in order to provide answers to research question two. The data from these sources is important in order to provide clarity on how the educators have adapted to the innovative change of the one-to-one computing initiative. Some data from the previous section can on research question one can be used to answer this particular question.

Administrative Classroom Walk-Through Evaluations

Data collected from administrative classroom walk-through evaluations will be used to answer research questions two and three. The data collected from administrator observations will help answer how educators have adapted to the one-to-one computing initiative. The data can also be used to determine areas that CSD must focus on in order to sustain the one-to-one computing initiative.

School-based administrators who work with grade levels participating in the one-to-one computing initiative for City School District began collecting data on computer usage by students during the 2016–2017 school year. Administrators between grades 5–12 conducted 583 informal classroom observations using a data collection form created with Google Docs software. Walk-through observations by administrators averaged five minutes per visit. The walk-through observations were designed to provide a snapshot of the instruction taking place within the schools.

The walk-through form used by administrators differed slightly at each school due to academic and instructional expectations at the various grade levels. However, all administrators

agreed that they would collect data that tracked technology usage. The technology questions for the administrators were the same and focused on four questions:

1. Was there use of instructional technology?
2. If present in the observation, how is technology being used?
3. Are the students using laptops for instructional purposes?
4. Could this activity be done without using the laptops?

Data collected from the informal observation walk-throughs can be found on Table 4.1.

Instructional Technology Use. The first and second questions that administrators answered focused on any form of instructional technology being used within the classroom. Instructional technology could include the use of a SMART Board, student laptops, audio-visual equipment, the Internet, and/or the use of an online student management system. The data collected showed that various forms of instructional technology were being used within the classrooms 71 percent of the time. Out of 583 informal walk-through observations, 414 times the instructional technology was being used.

Data indicates that the SMART Board was used most often. A SMART Board is an interactive whiteboard located in the front of the classroom that provides teachers and students an interactive touch-screen computer that can be used for instructional purposes. Teachers frequently used the SMART Board for presenting information to students.

Other forms of instructional technology were observed as well. Canvas, an online learning management system for students, was actively used during many of the observations. Teachers would store notes, create quizzes, and have students turn in assignments digitally using Canvas. Google Suite, which includes Google Docs, Google Sheets, Google Drive, and Google Slides, was another form of instructional technology that was often used. The Google Suite was

noted for being used for numerous writing assignments. Students would also use the Google Suite to collaborate with classmates on projects. Finally, a third noticeable use of instructional technology included websites used for academic review activities. The websites included IXL and No Red Ink. Both websites offer students the ability to practice skills in a repetitive format. IXL was used predominantly in math classes and No Red Ink was used in language arts classes.

Student Laptop Usage. During the classroom observations, the administrators fine-tuned their focus to start looking at the actual use of student devices. Administrators completed a question on the walk-through form that asked if the laptop were being used for instructional purposes. The observer could either state “Yes” or “No” on the form. The laptops were used by the students 270 instances out of the 583 classroom visits. This equates to laptops being used 46 percent of the time during the informal observations.

As stated earlier, the ways in which the laptops were used varied from classroom to classroom. Administrators attempted to answer the fourth question that focused on whether the activity that students were using for the laptop could be completed without the use of the laptop. In other words, could this activity be completed using paper and pencil, or by having a discussion with classmates, or by using another resource that the school currently had at its disposal?

Data showed that out of the 270 observations that involved students using the laptops for instructional purposes, only 119 of those instructional activities required the student to use the laptop to complete the task. That equates to 44 percent of the instructional activities involving the laptops required the students to have access to the laptop. Furthermore, administrators found that 85 observations out of the 270 observations with students using laptops could have been completed without the use of a laptop. This equates to 31 percent of instructional activities

involving the student laptops consisted of activities that could have been completed using other instructional tools other than the laptop. Administrators documented 66 occasions (25 percent of observations) in which they were unsure how to answer the question because of different circumstances that included questioning whether incorporating various online tools such as Google Docs really changed a student's ability to complete an instructional task.

Table 4.2 Informal Observations of Technology Use

	Total	Instructional Tech. Used? YES	Instructional Tech. Used? NO	Laptop Used? YES	Laptop Used? NO	Is the laptop needed? YES	Is the laptop needed? NO
Totals	583	414	169	270	206	119	85
Percentages		71%	29%	46%	35%	44%	31%

(Note: 66 observations were unclear as to whether the laptop was needed to complete the task.)

Interviews

Next, I will review interviews that occurred with City School District superintendent and teachers that participated in the one-to-one computing implementation. The interviews will help answer research question number 2 on how has participants in the one-to-one computing initiative adapted to the initiative. Interviews took place with key individuals who participated in the one-to-one computing initiative. An interview with the superintendent for City School District occurred because of his key role in the fruition of the one-to-one computing initiative. Interviews with teachers who participated in the one-to-one computing environment occurred as well.

Superintendent

The interview with the superintendent of CSD will provide valuable data that will help answer all three research questions. As the leader of the school division, the superintendent is responsible for providing the leadership for the planning and implementation of a one-to-one

computing initiative. Furthermore, the superintendent is responsible for monitoring the implementation of the one-to-one computing initiative.

The role of the superintendent has changed over the course of the implementation of the one-to-one computing initiative. When asked how his role has changed, the superintendent responded with the following:

“Well, the role has changed over the years, so I would be happy to take you through what I think my role was during the course of the of-of the initiative, because my role today is very different then what it was, when the idea first came to light.”

The superintendent believed that two areas would be difficult to address during the one-to-one computing initiative. There was at times resistance from a skeptical school board, which led to further scrutiny with a small faction on the city's governing body. The skepticism came from school board members who believed the school division could be successful by continuing traditional approaches, such as purchasing textbooks. The dissenting faction of people believed that the one-to-one was a waste of taxpayers' money and struggled to understand that a large percentage of the one-to-one initiative was grant funded. This skepticism then transferred to a few members of the governing body who provided the financial support to the school system. The skeptics believed that a throwback to direct instruction using textbooks and other materials that were similar to their educational experience growing up would be better.

The superintendent also tried to educate the skeptics that much of the one-to-one initiative was funded through state grants and other forms of grants. The one-to-one computing initiative was actually much cheaper than buying textbooks.

The other area of early resistance came from teachers who were not necessarily thrilled with technology. However, this feeling has largely gone away and the resisters have come

around and are on board with the one-to-one initiative. The superintendent most of the staff is supportive of the one-to-one computing initiative.

Some parents, a small group, were also skeptical. They believed that students could receive just as good of an education as they did growing up without the implementation of a one-to-one computing initiative. Parents were also upset with the technology fees. However, with each additional rollout of the initiative, the resistance seemed to diminish.

Another success for CSD has been the journey through the one-to-one initiative. More specifically, watching people transform due in large part to the professional development that was offered. The school division did not just simply hand out devices and wish them well. There was a tremendous amount of professional development that occurred, is occurring, and will continue to occur within CSD. The superintendent is excited about future professional development opportunities for teachers.

"I went to DigiCamp for the first time—there's been two. We had 45 close to 50 teachers that attended two days."

Based on the interview, the superintendent is pleased with how CSD teachers, students and community members have adapted to the one-to-one computing initiative. More data regarding the superintendent's interview will be referred to in order to answer research question three.

Teachers

The teacher interviews will provide valuable data to analyze in order to see how educators have adapted to the implementation of the one-to-one computing initiative. Data collected from the interviews can provide assistance in answering research questions two and three. Responses from

the teachers can help determine areas of support that educators will need in order to sustain the one-to-one computing initiative.

Teachers who participated in the one-to-one computing initiative with City School District participated in focus groups. The focus group questions that focus on research question 2 included following questions:

1. How has the one-to-one computing initiative affected your teaching practices?
2. Your staff has been trained on the SAMR model. What area within the SAMR model do you feel has affected your teaching practices?
3. What advice would you give to another teacher who was about to start teaching in a one-to-one computing classroom?

Teachers participating in the focus group were involved in the one-to-one computing initiative at varying levels that included the high school, middle school, and intermediate school. The teachers' positions ranged from a math teacher, an information technology resource teacher, a social studies teacher, a language arts teacher, and a family and consumer science teacher. Participants in the focus group had worked with the one-to-one computing initiative for several years. All teachers who participated in the focus group were part of the initial rollout of laptops within their school. The interviews will help answer research question 2 on how educators have adapted to the one-to-one computing initiative.

The teachers discussed how the one-to-one computing initiative affected their teaching practices in a variety of ways. One teacher mentioned that the one-to-one computing initiative was able to help provide more direct instruction for students in need.

Teacher A: *"I'm able to provide direct instruction to particular students who need more help. I can see this by looking at the current progress through many different online tools, such as edpuzzle, go formative, Wizer.me, and many more."*

Online tools such as GoFormative, Wiser.me, and Edpuzzle were just a few of the many resources that were presented to staff during professional development activities that were hosted by instructional technology resource teachers and various other classroom teachers.

Another area affected by the one-to-one computing initiative was the teacher's ability to "flip" the classroom. Teachers participating in the focus group mentioned how they were able to record lessons and have students review the lessons outside of the scheduled class time.

Teacher B: *"I found that when I created videos for students to view as a flipped lesson I was not having to explain myself over and over again. My students became more independent with their learning and problem solving than when I used to demonstrate how to perform a task in class."*

This allowed for the students to focus on completing activities once they were in the classroom. For example, a family and consumer science teacher recorded herself sewing and instructing students on how to properly use the sewing machine. With an online resource, students were able to access the video 24 hours a day and seven days a week. That allowed students more time in class to use the sewing machines to work on projects that were the focus of the instruction.

All the teachers who participated in the focus group received professional development on the SAMR model for technology integration. The teachers mentioned how the SAMR model challenged them to look at how the one-to-one computing initiative was providing them an

opportunity to redefine learning opportunities for students. The language arts teacher mentioned how they were most likely using the computers for a substitution to paper and pencil.

Teacher D: *“The SAMR model helped me become a more reflective teacher when using technology. Was I using the technology just for the sake of using technology or was I using the technology for a purpose of challenging the students with a new activity?”*

The teacher mentioned that she felt that students were simply using the technology for instructional purposes that did not necessarily require technology. Students were simply writing essays on a computer. However, after the teacher became more comfortable with the technology and was provided the proper professional development, she began to expand the use of the technology in the classroom. Students edited each other's paper in real time using Google Docs. Students began collaborating with one another on virtual presentations and students started conducting independent research by using their devices.

The language arts and math teachers also agreed that the one-to-one computing initiative allowed for them to better monitor student progress. Students in both classes used online programs such as NoRedInk.com and IXL.com.

Teacher C: *“Using IXL really allowed me to monitor my students' progress with specific topics in class. If I knew a student needed more assistance in one area, I could assign the students extra practice on IXL and work with them individually.”*

Both programs provided students with opportunities to practice skills in English and in math. The teachers were able to monitor the students' progress and assign students tasks that were areas of concern based on the data collected.

Advice for teachers who are starting one-to-one computing initiatives in their classroom varied. One teacher stated that it is important to provide students with crystal clear instructions.

Teacher A: *“If you take the time to explain to students exactly how to use their computer, a program, or a website, then they will have less issues.”*

Students must know exactly how to use their computer, an online program, or a website prior to using it. The explicit teaching of expectations will lead to a greater amount of time for students to complete tasks. Another teacher mentioned that the school division's campaign of “Ask Three Before Me” for fixing computer issues led to greater student independence.

Teacher A: *“I used the ‘Ask Three Before Me’ in combination with one-to-one so that if a student was struggling, I directed them to ask other students, or Google to help them problem solve.”*

All teachers also agreed that it is vital for teachers participating in a one-to-one computing environment to figure a way to monitor student use of the electronic device. All teachers mentioned that students have been able to find ways to access programs that allowed the student to become off task.

Teacher B: *“Monitoring the students and providing the students with digital citizenship lessons is extremely important during the early stages of the one-to-one computing initiative. Students tend not to realize how permanent their digital footprint can be when using the devices.”*

Students were very quick to toggle between screens when teachers would walk around the room and this would keep the teacher believing that students were working on the required material when in reality they were playing video games, participating in group chats not focused on education, or watching videos that were not on topic. City School District eventually purchased a monitoring system that allowed teachers to view the content on students' computers when the student was logged into the school's Internet. This monitoring system allowed teachers

to shutdown students' computers, respond to individual students who were off task, and effectively monitor student use. The teachers participating in the focus group all mentioned that this monitoring system eased their fears of students being off task.

Surveys and Questionnaires

Staff members for City School District were asked to participate in surveys and questionnaires in order to collect data for this study. Members of the school division's district leadership team that included the superintendent, central office administrators, school principals, and division-wide specialist in technology, literacy, and math participated in a Likert Scale survey that studied the school division's implementation process for the one-to-one computing initiative. Teachers for CSD participated in an online questionnaire titled the Stages of Concern Questionnaire (SoCQ).

City Connects Survey

The City Connects survey results will help answer all research questions. The results from this survey will help show how CSD planned, prepared and implemented the one-to-one computing initiative. The results can also be used to determine how educators have adapted to the one-to-one computing initiative. Finally, data collected from this particular survey can help provide areas of focus that CSD needs to work on in order to sustain the one-to-one computing initiative. City Connects is a term used to identify the one-to-one computing initiative for City School District. City Connects is a term that was created to help market the school division's one-to-one computing initiative to its stakeholders. The individuals participating in the City Connects meetings included superintendents, principals, instructional technology specialists, and central office directors for finance, information technology, and special programs. City Connects

oversees the technology initiative and monitored the planning, implementation, and continued use of educational technology within CSD.

Because of the importance of leadership in the one-to-one computing initiative, I believe it was important to survey the members of this group. The members were provided a survey that was developed by Project RED. Project RED is a national survey that was used to assess key actions completed by school divisions completing a one-to-one computing initiative. The survey produced valuable results that were used to create a checklist, the Project RED Roadmap Checklist. The checklist identifies actions that are designed to facilitate proper technology implementation (Greaves et al., 2012). The results from the survey answers research question 1: How did the school division implement a one-to-one computing initiative?

Members of the City Connects committee completed the survey. Nine members of City Connects 15-member team completed the survey. The results of the survey are located in Table 4.3.

Table 4.3 City Connects Survey Results

Question	Poor	Fair	Good	Very Good	Excellent
Identify district committee members and meeting schedule (Communication)	0%	0%	11%	67%	22%
Identify team leadership (Communication)	0%	0%	0%	78%	22%
Schedule district leadership planning sessions (with superintendents, curriculum directors, principals, technology directors, business official, teacher leaders). (Professional Development)	0%	0%	22%	44%	33%
Share and discuss the research on 1-1 and large-scale implementations (Professional Development)	0%	22%	44%	22%	11%
Draft the shared vision (Communication)	0%	0%	33%	56%	11%
Plan the timeline for building the infrastructure (Infrastructure)	0%	11%	33%	44%	11%

Bring district leaders together for technology planning training sessions (Professional Development)	0%	0%	22%	44%	33%
Develop and schedule the professional development plan (Professional Development)	0%	0%	56%	22%	22%
Establish the timeline for building-level training (principals, teachers, technical support, and lead teachers). (Teaching and Learning)	0%	23%	33%	33%	11%
Draft the administrative support plan for classroom teachers in pilot and ensuing years. (Teaching and Learning)	0%	22%	67%	0%	11%
Schedule and implement orientation plans for all stakeholders. (Communication)					
o Students	0%	11%	67%	22%	0%
o Teachers	0%	0%	56%	33%	11%
o Bus drivers	25%	63%	12%	0%	0%
o Support staff	0%	66%	22%	11%	0%
o Parents/guardians	0%	56%	33%	11%	0%
o Community	0%	33%	56%	11%	0%
Plan the outbound communications program to community and parents and guardians. (Communication)	0%	11%	67%	22%	0%
Secure signed acceptable use policies. (Teaching and Learning)	0%	11%	33%	33%	22%
Identify the assessment plan and timeline. (Teaching and Learning)					
o Create program goals	0%	0%	63%	37%	0%
o Collect baseline data	0%	37%	50%	13%	0%
o Develop assessment protocol and tools	0%	13%	75%	12%	0%
Schedule the implementation timeline. (Infrastructure)					
o Wireless network testing	0%	25%	63%	12%	0%
o Bandwidth capacity testing	0%	25%	50%	25%	0%
o Ongoing professional development	0%	11%	33%	45%	11%
o Troubleshooting protocol	0%	25%	63%	12%	0%
Technology support protocol (Finance/Teaching and Learning)					
o Teachers	0%	0%	44%	44%	12%
o Students	0%	0%	44%	33%	23%
o Other personnel	0%	25%	50%	12.5%	12.5%
Plan the distribution of devices to students. (Funding)	0%	0%	12%	44%	44%

Schedule site visits. (Professional Development)	0%	11%	33%	33%	22%
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The survey results from the City Connects committee show that the committee members felt that the school division did a very good job to an excellent job with identifying a committee to lead the one-to-one initiative and then meeting regularly. The City Connects committee met weekly throughout the implementation of the one-to-one computing initiative to monitor and make adjustments when needed.

Another area of success with the implementation of the one-to-one computing initiative was the school division's drafting of a shared vision. Sixty-seven percent of the respondents to the survey rated the school division as doing a very good to excellent job with drafting a vision. City School district focused on the branding of the one-to-one computing initiative by creating the term "City Connects" and all technology fell under the City Connects umbrella.

The City Connects committee members did notice some areas that could benefit from improving. The scheduling and implementation of orientation programs for students, teachers, bus drivers, support staff, and parents all scored lower with ratings falling in the Good, Fair, and Poor categories. The committee also felt that there needed to be a greater emphasis placed on the infrastructure and a timeline put in place for testing the wireless network, bandwidth capacity, and establishing a trouble shooting protocol. The only area of implementation that the City Connects committee members identified as poor was scheduling the orientation for the one-to-one computing initiative for bus drivers.

Stages of Concern Questionnaire

Data collected from the Stages of Concern Questionnaire will be used to answer research questions two and three. The results from this questionnaire can provide insight on how

educators have adapted to the one-to-one computing initiative as well as areas that CSD officials must focus on in order to sustain the one-to-one computing initiative. The Stages of Concern Questionnaire (SoCQ) was administered to teachers in grades 3–12 to determine the level of concern that teachers had regarding the one-to-one computing initiative. The SoCQ is a 35-question questionnaire that participants respond to questions by rating their level of concern. The SoCQ will focus on the innovative idea of students participating in one-to-one computing initiative. The SoCQ will categorize all individuals who complete the assessment into one of the following seven stages of concern: 0- Unconcerned, 1- Informational, 2- Personal, 3- Management, 4- Consequences, 5- Collaboration, and 6- Refocusing.

The SoCQ was administered to educators who participated in the one-to-one computing. The questionnaire was emailed to participants during the last week of school during the 2017-2018 academic school year. The percentage of individuals responding to the questionnaire was under 40%.

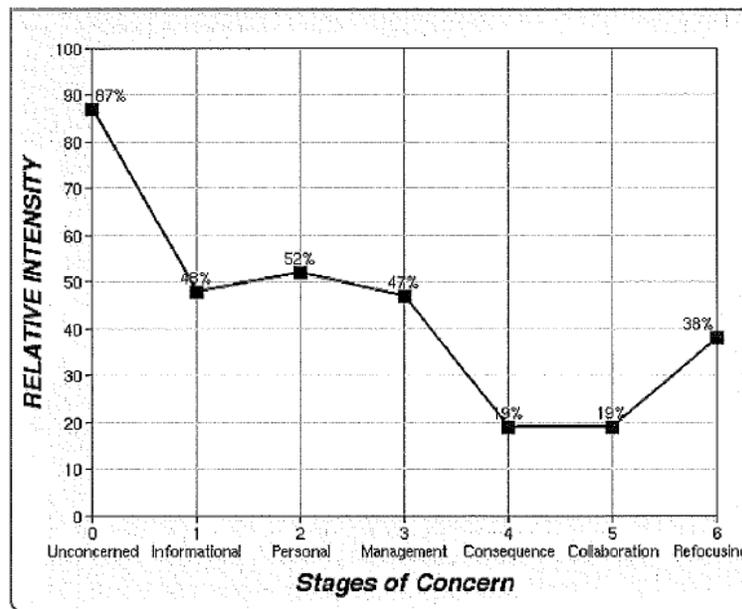
The data will be presented using figures that were created by American Institute of Research's SoCQ program. The percentile score located on the y-axis of the figures will show the relative intensity based on the responses. The higher the score on the relative intensity indicates a higher level of concern for the participants. The lower the score on the relative intensity signifies less of a concern for the participants.

“Scoring is based on converting the item raw score totals for each scale into percentile scores that become the basis for constructing SoCQ profiles, which make interpretation of the results much more holistic” (George et al., 2006, pg. 23). The percentile scores were calculated using a conversion chart that was prepared by the researchers who created the SoCQ. The sum of all raw scores for each school for each stage of concern was found. Then, the average score for

each stage was calculated. The average raw score was used to find the percentile using the conversion chart provided by the SoCQ. The percentiles were then graphed using the relative intensity charts that are found in figures 4.1-4.3. This is how I determined the top concern for each school participating in the SoCQ questionnaire.

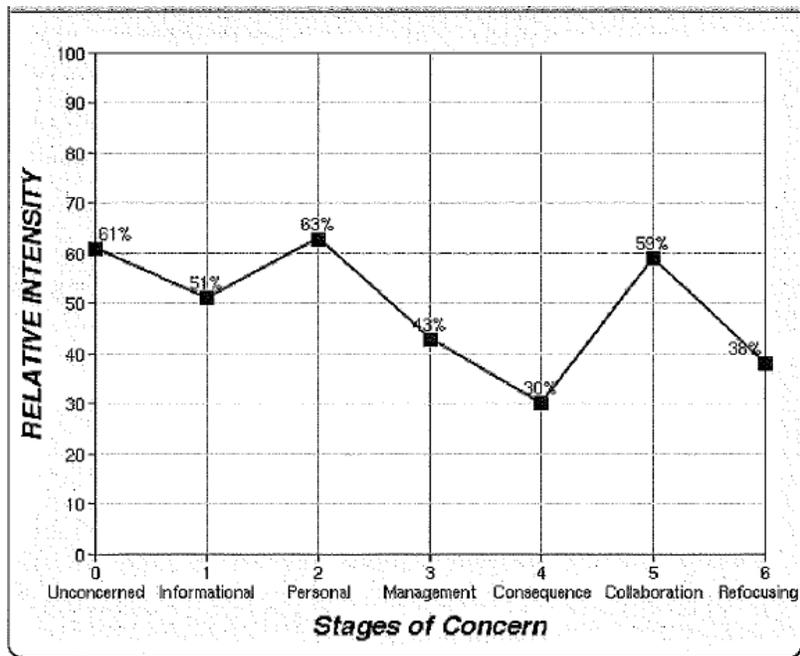
The survey was provided to teachers at the high school (9–12), middle school (6–8), and intermediate school (grades 3–5). The survey was provided to educators at the conclusion of the 2017–2018 academic school year. This followed the fourth year of the one-to-one initiative at the high school, the second year of the one-to-one initiative at the middle school, and the first year of the one-to-one initiative at the intermediate school. Thirty-two teachers participated in the questionnaire. Ten teachers participated from the high school, twelve teachers from the middle school, and ten teachers participated from the intermediate school. Below you will find the figures that depict the various Stages of Concern for each of the three schools.

Figure 4.1 SoCQ High School



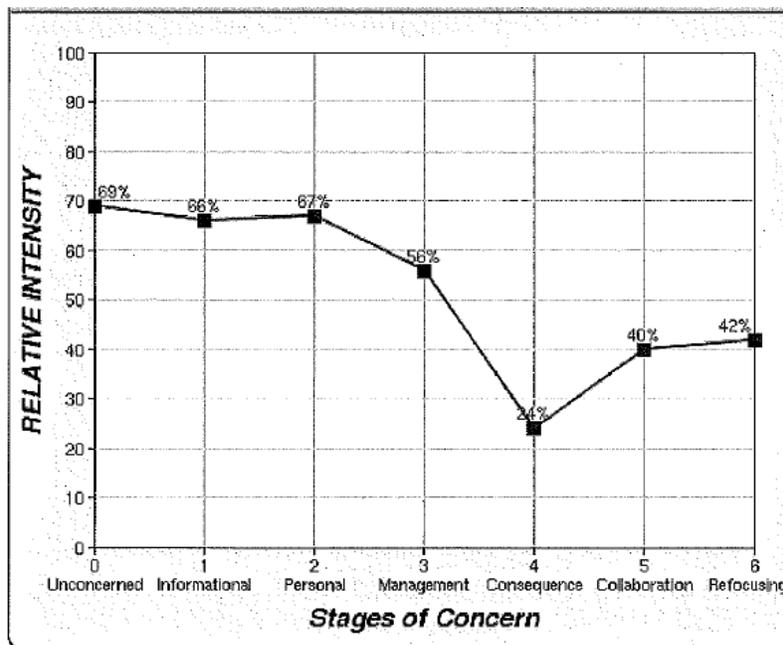
(10 Responses)

Figure 4.2 SoCQ Middle School



(12 Responses)

Figure 4.3 SoCQ Intermediate School



(10 Responses)

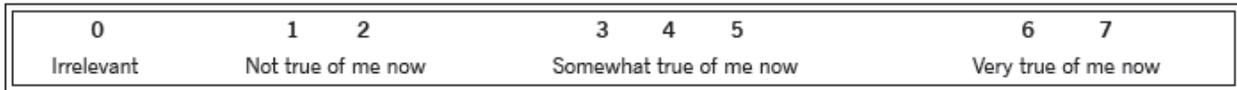
Collectively, the high school study participants scored in the 87 percent percentile for being unconcerned with the one-to-one computing initiative. The second highest percentile score for the high school was 52 percent for Stage 2 and the personal impact that the one-to-one computing initiative has on them. Figure 4.1 is a profile that appears to be non-users of the innovation being analyzed within the questionnaire, according to the authors of the SoCQ. Overall, there is relatively low interest in the one-to-one computing initiative based on the questionnaire results for the high school study participants.

The middle school study participants scored in the 63rd percentile for Stage 2. This was their highest stage score and shows that the study participants from the middle school are concerned about how the one-to-one computing initiative impacts them personally. The second highest concern was Stage 0. Stage 6 was a close second with a percentile score of 59 percent. The results from the questionnaire for the middle school displays that they have teachers that are in a stage of concern where they are focused on how the one-to-one computing initiative affects them as well as teachers who are concerned of the one-to-one computing initiative's impact on others.

Finally, the intermediate school study participants scored highest on Stage 0 falling in the 69th percentile. The personal and information stages were close, as well as the study participants ranked in the 67th percentile for personal and the 66th percentile for informational. The intermediate school's results display the teachers as being more concerned about how the one-to-one computing initiative is going to affect them personally.

Additionally, the results from the SoCQ are analyzed by each question. When study participants respond to a statement on the questionnaire, they use the following rating scale to assess their concern based on the statement in the questionnaire:

Figure 4.4 SoCQ Rating Scale



The scores for each statement were averaged so that the researcher can look at particular statements that had higher levels of concern. The averages found in tables 4.3 to 4.9 can range from 0 to 7.

Unconcerned. Individuals who answer questions and are labeled as unconcerned can be described as having little concern or involvement with the one-to-one computing initiative. Data collected from the teachers showed that teachers in the high school and intermediate school fell into the stage of unconcerned with the one-to-one computing initiative. Table 4.3 shows the questions that were associated with the unconcerned stage and the average score for the high school, middle school, and intermediate school study participants.

Table 4.4 Unconcerned SoCQ

High School: 10 Study Participants Middle School: 12 Study Participants Intermediate School: 10 Study Participants	Average Score for High School	Average Score for Middle School	Average Score for Intermediate School
Question 3: I am more concerned about another innovation.	2.3	1.92	1.0
Question 12: I am not concerned about City School Districts one-to-one computing initiative at this time.	3.1	2.42	2.6
Question 21: I am completely occupied with things other than City School Districts’ one-to-one computing initiative.	2.0	2.58	2.3
Question 23: I spend little time thinking about City School District’s one-to-one computing initiative.	4.2	2.0	3.0
Question 30: Currently other priorities prevent me from focusing on City School District’s one-to-one computing initiative.	3.3	2.5	3.0

High school staff may spend little time thinking about the one-to-one computing initiative because they are in the fourth year of working with the innovation. The lack of concern is an area that the school administrators must address. Principals possess an integral role in implementing a one-to-one computing initiative. Principals must determine if the one-to-one computing initiative is actually in the forefront of instructional conversations with the staff.

Informational. Individuals who fell into the category for informational tend to be people who want general characteristics of the initiative and to know what is expected of them with the implementation of the initiative. The following table shows the questions that were associated with the informational stage and the average score for the high school, middle school, and intermediate school study participants.

Table 4.5 Informational SoCQ

High School: 10 Study Participants Middle School: 12 Study Participants Intermediate School: 10 Study Participants	Average Score for High School	Average Score for Middle School	Average Score for Intermediate School
Question 6: I have a very limited knowledge about City School District's one-to-one computing initiative.	1.0	1.17	1.6
Question 14: I would like to discuss the possibility of using City School District's one-to-one computing initiative.	1.8	2.5	3.1
Question 15: I would like to know what resources are available if we decide to adopt City School District's one-to-one computing initiative.	1.8	3.33	4.8
Question 26: I would like to know what the use of City School District's one-to-one computing initiative will require in the immediate future.	4.0	3.75	4.7
Question 35: I would like to know how City School District's one-to-one computing initiative is better than what we have.	3.0	2.33	3.8

Personal. Individuals that scored high in the personal stage of concern are worried about their own ability to meet the demands associated with the one-to-one computing initiative. This

person may also be concerned about where they fit into the organization once the one-to-one computing initiative is fully implemented within City School District. The following table shows the questions that were associated with the personal stage and the average score for the high school, middle school, and intermediate school study participants.

Table 4.6 Personal SoCQ

High School: 10 Study Participants Middle School: 12 Study Participants Intermediate School: 10 Study Participants	Average Score for High School	Average Score for Middle School	Average Score for Intermediate School
Question 7: I would like to know the effect of reorganization of my professional status.	1.3	2.5	2.2
Question 13: I would like to know who will make the decisions in the new system.	4.1	3.83	4.2
Question 17: I would like to know how my teaching or administration is supposed to change.	2.4	3.58	4.0
Question 28: I would like to have more information on time and energy commitments required by City School District's one-to-one computing initiative.	2.5	3.5	3.4
Question 33: I would like to know how my role will change when I'm using City School District's one-to-one computing initiative.	2.7	3.92	4.5

Management. Individuals who scored high in the area of management on the SoCQ are people who are people who are focused on the process of adapting to the one-to-one computing initiative. These individuals are focused on issues on how to efficiently use and manage the one-to-one computing initiative within their classroom. The following table shows the questions that were associated with the management stage and the average score for the high school, middle school, and intermediate school study participants.

Table 4.7 Management SoCQ

High School: 10 Study Participants Middle School: 12 Study Participants Intermediate School: 10 Study Participants	Average Score for High School	Average Score for Middle School	Average Score for Intermediate School
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Question 4: I'm concerned about not having enough time to organize myself each day in relation to City School District's one-to-one computing initiative.	2.0	1.58	2.5
Question 8: I'm concerned about conflict between my interests and responsibilities.	1.8	1.58	2.6
Question 16: I am concerned about my inability to manage all that City School District's one-to-one computing initiative requires.	1.5	2.08	3.9
Question 25: I am concerned about time spent working with nonacademic problems related to City School District's one-to-one computing initiative.	4.1	4.5	3.4
Question 34: Coordination of tasks and people in relation to City School District's one-to-one computing initiative is taking too much of my time.	3.4	1.92	2.8

An area of concern for all schools was how the one-to-one computing initiative took time away from their focus on academic issues. City School District leadership may want to conduct a survey to gain further information of what non-academic problems with the one-to-one computing initiative consume their time. Perhaps the teachers are concerned about the Internet filter, managing students' behaviors, or issues with the devices that require help desk assistance.

Consequence. Individuals who scored high in the SoCQ for consequence are focused on how the one-to-one computing initiative will impact the school. The individual wants to know how his or her students will respond to the new initiative. This person also wants to know how the performance of the students will be affected by the incorporation of a one-to-one computing environment. The following table shows the questions that were associated with the consequence stage and the average score for the high school, middle school, and intermediate school study participants.

Table 4.8 Consequence SoCQ

High School: 10 Study Participants Middle School: 12 Study Participants Intermediate School: 10 Study Participants	Average Score for High School	Average Score for Middle School	Average Score for Intermediate School
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Question 1: I am concerned about students' attitudes toward City School District's one-to-one computing initiative.	3.4	3.08	1.8
Question 11: I am concerned about how City School District's one-to-one computing initiative affects students.	3.4	4.42	4.6
Question 19: I am concerned about evaluating my impact on students in relation to City School District's one-to-one computing initiative.	3.1	3.0	3.7
Question 24: I would like to excite my students about their part in City School District's one-to-one computing initiative.	2.3	4.67	4.3
Question 32: I would like to use feedback from students to change the program.	3.8	4.75	3.5

A couple questions of interest for City School District to pursue would be why there is such a difference in average levels of concern from the high school staff and the intermediate and elementary staff when it comes to question 11 and question 24. The middle school and elementary teacher are looking for ways to make their students active participants. Perhaps, the high school staff members already see that their students involved in the process.

Collaboration. Individuals who scored high on the SoCQ in the area of collaboration are looking for ways to work with others in order to access the full capability that is associated with the one-to-one computing initiative. The study participants who scored high in this area want to work with others and help coordinate the efforts of the school as they continue to implement this innovative change. The following table shows the questions that were associated with the collaboration stage and the average score for the high school, middle school, and intermediate school study participants.

Table 4.9 Collaboration SoCQ

High School: 10 Study Participants Middle School: 12 Study Participants Intermediate School: 10 Study Participants	Average Score for High School	Average Score for Middle School	Average Score for Intermediate School
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Question 5: I would like to help other faculty in their use of City School District's one-to-one computing initiative.	2.6	4.25	2.0
Question 10: I would like to develop working relationships with both our faculty and outside faculty using City School District's one-to-one computing initiative.	1.6	3.83	3.4
Question 18: I would like to familiarize other departments or persons with the progress of this new approach.	1.3	4.08	3.5
Question 27: I would like to coordinate my efforts with others to maximize the effects of City School District's one-to-one computing initiative.	3.3	4.75	4.1
Question 29: I would like to know what other faculty are doing in this area.	2.8	5.83	5.4

One area of interest to point out based on the average scores in Table 4.7 is how the middle school scores all average higher. This shows that out of the questionnaire participants, the middle school teachers are more interested in collaborating with colleagues. Perhaps, City School District leadership should study why one school is appearing to be in a more collaborative stage while two other scores appear to not be concerned with the collaboration piece of the one-to-one computing initiative.

Refocusing. The individuals who scored high in the refocusing area of the SoCQ are looking for ways to extract the complete benefits of the one-to-one computing initiative within City School District. Study participants who were in the refocusing stage are looking at how they can revolutionize the way they teach and children learn through the use of the one-to-one computing initiative. The following table shows the questions that were associated with the collaboration stage and the average score for the high school, middle school, and intermediate school study participants.

Table 4.10 Refocusing SoCQ

High School: 10 Study Participants Middle School: 12 Study Participants Intermediate School: 10 Study Participants	Average Score for High School	Average Score for Middle School	Average Score for Intermediate School
Question 2: I now know of some other approaches that might work better than City School District's one-to-one computing initiative.	2.50	2.17	1.9
Question 9: I am concerned about revising my use of City School District's one-to-one computing initiative.	2.0	1.92	3.0
Question 20: I would like to revise City School District's one-to-one computing initiative.	2.7	2.92	2.0
Question 22: I would like to modify our use of City School District's one-to-one computing initiative based on the experiences of our students.	3.3	3.58	3.8
Question 31: I would like to determine how to supplement, enhance, or replace City School District's one-to-one computing initiative.	3.5	3.33	4.0

An area to focus on based on the responses for the refocusing stage would be questions 22 and 31. Both questions average higher scores at all three schools compared to the other three questions associated with this stage. The teachers are interested in modifying the one-to-one computing initiative based on the experiences of their students. The teachers are also more interested in supplementing, enhancing, or replacing CSD's one-to-one computing initiative. The school division may want to pursue further, what teachers may want to modify with the one-to-one computing initiative. Why were question 22 and 31 outliers compared to the other questions associated with this stage?

Summary of Research Question Two

Key findings from this section show that teachers throughout the division show little concern for the one-to-one computing initiative. This is a very interesting response due to the level of planning and preparing that took place prior to the implementation of the one-to-one computing initiative. Interviews with the superintendent and teachers show that the teachers have

adapted to the one-to-one computing initiative rather well. However, based on the response collected from the SoCQ, there is little concern for the one-to-one initiative from the educators taking part. It must be noted that only 10 participated in the questionnaire from the high school, 12 participated from the middle school, and 10 participated from the intermediate school. This constitutes less than a 40% response rate based on the number of individuals who were invited to participate in the survey.

Another finding from this section shows the level of technology use within the one-to-one computing environment. Based on classroom observations, instructional technology was used within the classroom 71% of the time. However, laptop usage was reported to be used 46% of the time. This shows that the students were participating in a blended learning environment with instructional practices that incorporated technology as well as instructional practices that included paper and pencil, student discussion and other methods of learning that are not associated with the use of laptops.

Additionally, the SAMR Model helped the teachers interviewed to analyze their own use of technology within the classroom. The SAMR Model provided teachers with a lens in which they could use to study the purpose of the technology used. Was the one-to-one computing initiative providing students enhanced learning opportunities to create, think critically, collaborate and communicate with others? According to data collected by administrative observations, the teachers could improve on the ways that they are utilizing the laptops. Data collected through the observations showed that only 44% of the time were the laptops required to complete the given task. This shows that the technology was being used as a substitute to previous methods of teaching, such as paper and pencil.

The professional development opportunities are a final part to address as a key finding help answer research question two. City School District officials spent a lot of time during City Connects meetings discussing professional development needs of teachers and then devising plans on how to implement the professional development. All teachers interviewed for this case study mentioned that they were appreciative of the professional development offered. The superintendent referenced his pleasure with the professional development provided to the teachers as well. City School District officials understood that teachers needed support fully embrace a blended learning model that could occur with the implementation of a one-to-one computing initiative.

Research Question 3: How does the school plan to continue and sustain the one-to-one computing initiative?

City School District leadership must develop a plan that will allow the one-to-one computing initiative to be sustained for students and staff. City School District officials' hope is that CSD "serves as a model for other school districts seeking to transform their learning environment (CSD, 2017)." In this section data from student achievement and interviews will be used to identify how CSD officials plan to continue and sustain the one-to-one computing initiative.

Academic Achievement

The following section shows student achievement for City School District from 2014-2018. Each figure presented will show the year of the pilot program and the year that the school wide implementation of the one-to-one computing initiative took place. The pilot year will be identified by the use of the asterisk symbol. The double asterisk will identify the year in which all students in the school year provided with a laptop for one-to-one computing.

The state in which City School District resides measures students' academic achievement at the end of the academic year with online-standardized tests in reading, mathematics, science and social studies. The state's Department of Education makes the data collected public via the state's Department of Education website. All student achievement data collected for this research was collected via the state's Department of Education website.

The data presented in the following figures is not intended to show that the one-to-one computing initiative caused the increase in student achievement. Rather, the data is used to show how students were performing prior to the one-to-one computing initiative and after the one-to-one computing initiative was implemented. Again, the following figures are not intended to determine causation for the one-to-one computing initiative and student achievement. The data is part of the story of CSD's one-to-one computing initiative.

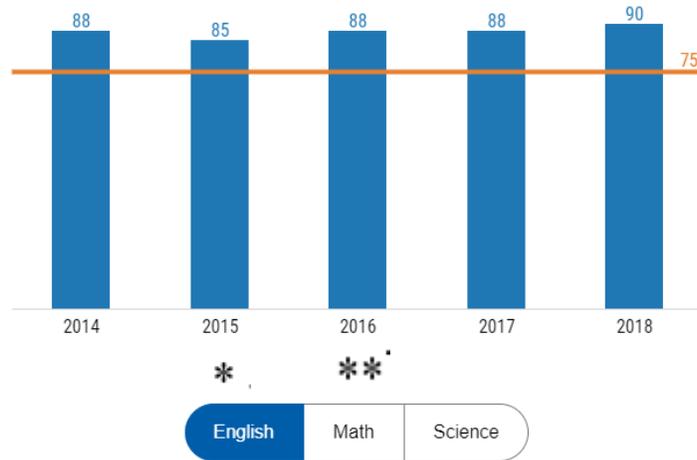
High School Academic Achievement. The high school started the one-to-one computing initiative in the spring semester of 2015. It was during that school year that students in 9th, 10th, and 11th grade were provided Dell Venue laptops as part of the e-Backpack learning initiative. The students' academic achievement based on the state's standardized assessment program shows the overall pass rate from the academic year 2013-2014 to the academic school year 2017-2018.

Schools must have 75% of the students pass the assessment in order to be accredited according to the state. The data for the English academic achievement is displayed in Figure 4.5.

Figure 4.5 High School English Academic Achievement

English Academic Achievement: All Students

The school quality indicator for academic achievement in English provides equal credit for students who pass state English tests and for non-passing students who show significant improvement.



* - Pilot program for one-to-one

** - School-wide implementation of one-to-one

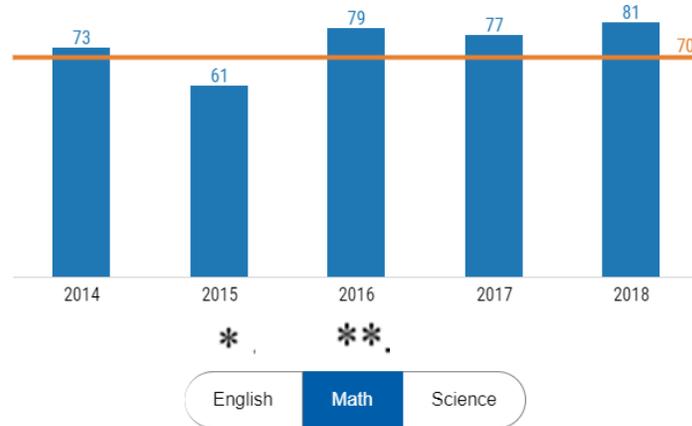
(State Department of Education, 2019)

The high school's mathematics academic achievement has shown a significant improvement since 2015. During the 2015 assessment year, CSD's high school students achieved a 61% pass rate which is below the state's accreditation rate of 70%. In order to be accredited the high school needed to improve the academic achievement of their students in mathematics. As the data in Figure 4.6 shows, the high school showed an 18% increase in the pass rate from 2015 to 2016. The academic year 2015-2016 was the first year that all students in grades 9-12 were participating in a one-to-one computing environment.

Figure 4.6 High School Mathematics Academic Achievement

Mathematics Academic Achievement: All Students

The school quality indicator for academic achievement in mathematics provides equal credit for students who pass state mathematics tests and for non-passing students who showed significant improvement.



* - Pilot program for one-to-one

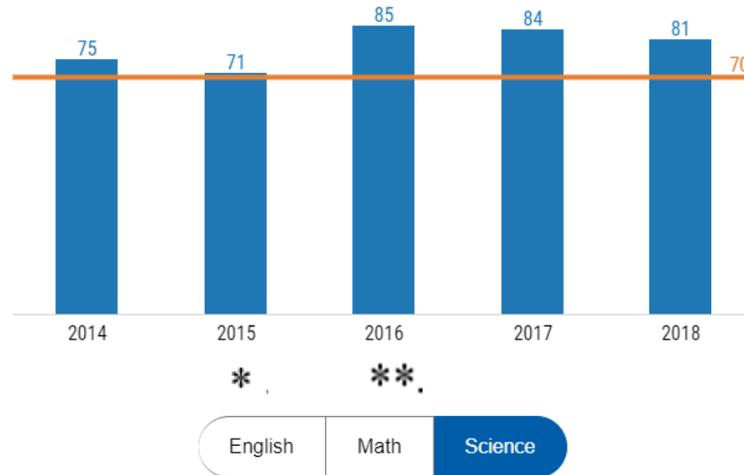
** - School-wide implementation of one-to-one

(State Department of Education, 2019)

City School District’s high school science academic achievement has risen from a low of 71% in 2015 to a pass rate of 81% in 2018. The highest reported pass rate for the high school was 85% during the 2015-2016 school year. Figure 4.7 shows the science academic achievement from the 2013-2014 school year to the 2017-2018 school year.

Figure 4.7 High School Science Academic Achievement**Science Academic Achievement: All Students**

The school quality indicator for academic achievement in science is based on the overall percentage of students passing state science tests.



* - Pilot program for one-to-one

** - School-wide implementation of one-to-one

(State Department of Education, 2019)

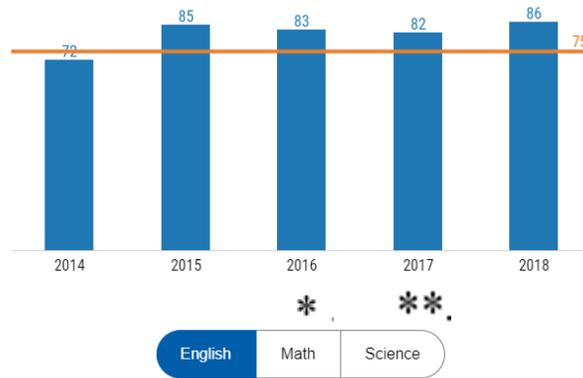
Middle School Academic Achievement. The first year in which all students at the middle school participated in a one-to-one computing environment was the 2016-2017 school year. During the 2015-2016 school year City School District implemented a pilot program for the one-to-one computing initiative only 8th grade students. The academic achievement scores that are displayed in the following figures are from the state Department of Education from the state in which CSD is located.

As the data in Figure 4.8 shows, the middle school has steadily achieved pass rate on the English exam that are in the 80s. The lowest pass rate for the middle school occurred in 2014. That was two years prior to the one-to-one computing initiative entering the middle school.

Figure 4.8 Middle School English Academic Achievement

English Academic Achievement: All Students

The school quality indicator for academic achievement in English provides equal credit for students who pass state English tests and for non-passing students who show significant improvement.



* - Pilot program for one-to-one

** - School-wide implementation of one-to-one

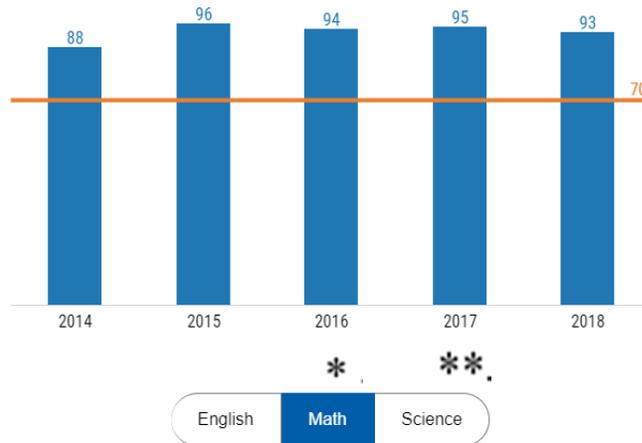
(State Department of Education, 2019)

The middle school's mathematics achievement has continuously been in the 90% area since 2015. The mathematics scores for the middle school are higher than the English pass rates. The math pass rates must stay above 70% in order for the middle school to maintain accreditation. Figure 4.9 displays the mathematics academic achievement since 2014.

Figure 4.9 Middle School Mathematics Academic Achievement

Mathematics Academic Achievement: All Students

The school quality indicator for academic achievement in mathematics provides equal credit for students who pass state mathematics tests and for non-passing students who showed significant improvement.



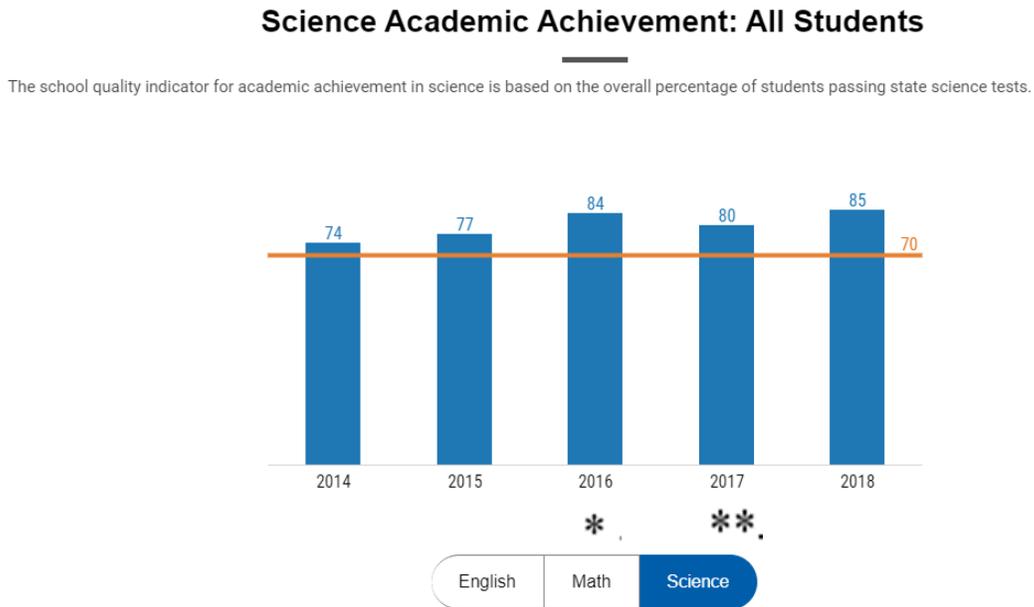
* - Pilot program for one-to-one

** - School-wide implementation of one-to-one

(State Department of Education, 2019)

The last reporting category for the state's academic achievement reporting is science. Science assessments are administered to 8th grade students and are a culmination of science curriculum that is taught in 6th, 7th and 8th grade. The school must maintain a pass rate above 70% in order to receive state accreditation. Figure 4.10 shows the pass rates for middle school science based on the end of year-standardized assessment that is administered to all 8th grade students in the state.

Figure 4.10 Middle School Science Academic Achievement



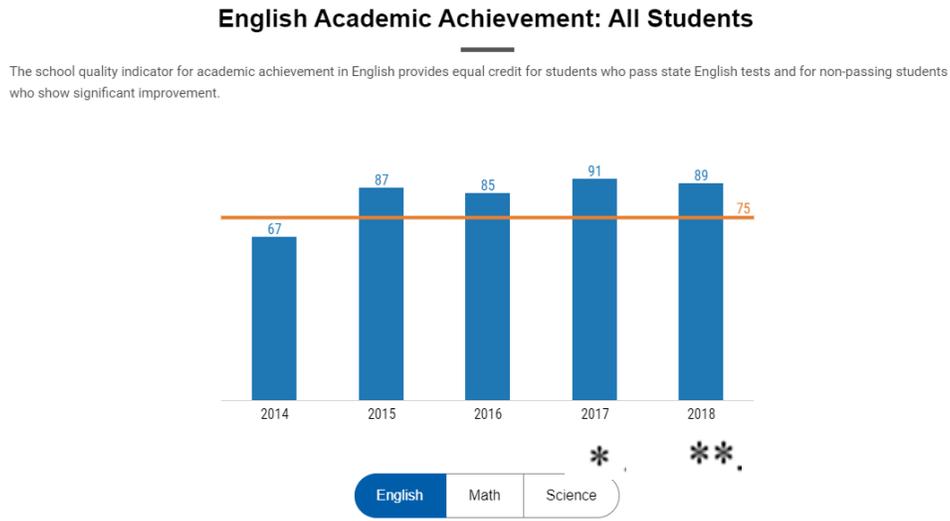
* - Pilot program for one-to-one

** - School-wide implementation of one-to-one

(State Department of Education, 2019)

Intermediate School Academic Achievement. The last school in CSD to participate in the one-to-one computing initiative was the intermediate school. Figure 4.11 shows the English academic achievement for the students are the intermediate school. The 2017-2018 school year was the first year in which all students participated in a one-to-one computing environment. The 2017-2018 school year was the first year for the pilot program for fifth grade students.

Figure 4.11 Intermediate School English Academic Achievement



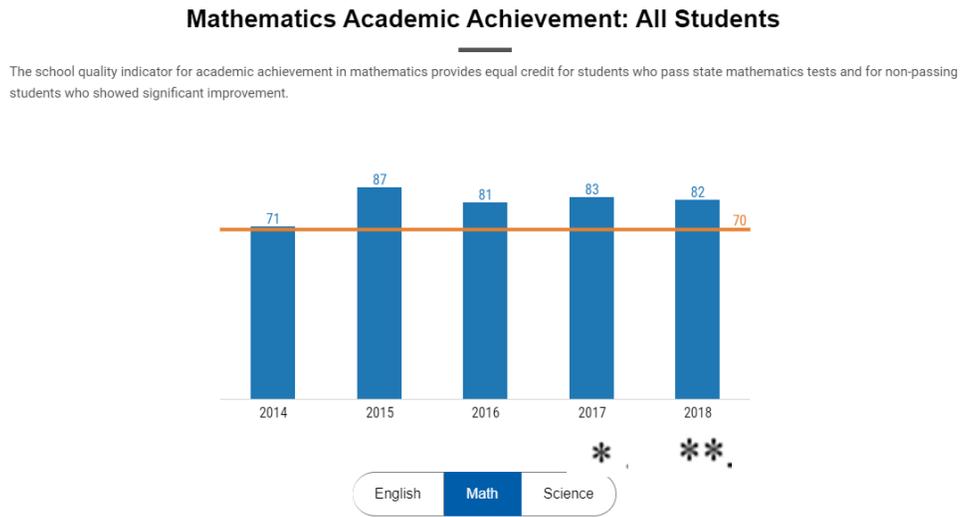
* - Pilot program for one-to-one

** - School-wide implementation of one-to-one

(State Department of Education, 2019)

The mathematics academic achievement reported the lowest pass rate at 71% pass rate in 2014. There as a 16% increase in the pass rate in 2015. The last three years pass rates of 81%, 83% and 82% have been recorded. The school must maintain a pass rate of 70% in order to be fully accredited.

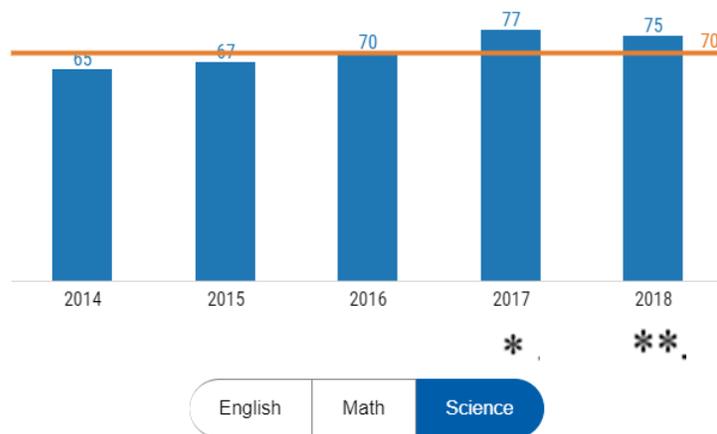
Figure 4.12 Intermediate School Mathematics Academic Achievement



The intermediate school's science academic achievement has steadily progressed since 2014. The school's pass rate has increased by 10% according to the most recent data released by the state's Department of Education. Schools must maintain a pass rate of at least 70% to be accredited by the state. Figure 4.13 displays the science academic achievement.

Figure 4.13 Intermediate School Science Academic Achievement**Science Academic Achievement: All Students**

The school quality indicator for academic achievement in science is based on the overall percentage of students passing state science tests.



* - Pilot program for one-to-one

** - School-wide implementation of one-to-one

(State Department of Education, 2019)

Interviews

The interviews conducted with the superintendent and teachers of CSD provided information on how CSD plans to continue and sustain the one-to-one computing initiative. During the interview with the superintendent, he provided much of his vision for continued improvements to the one-to-one computing initiative. Teachers interviewed also spoke about how they plan to continue to adjust and change their teaching practices in order to be in a state of continuous improvement.

Superintendent

The superintendent of CSD stated in his interview that now he is in more of a supporter role with the one-to-one initiative compared to when he first started with the early planning stages of the one-to-one initiative.

“My role today is to support its continued expansion, to be up on the ledge if you will, and to be certain at the 30,000-foot perch that it continues to grow and flourish.”

The superintendent stated that when he was hired, he wanted to focus on improving the instruction within City School District. He saw that the way to improve the instruction was through the implementation of a one-to-one computing initiative. He wanted to personalize learning for all students.

The superintendent believed that the greatest success of the one-to-one initiative was the ability to transform teaching and learning.

“I think it has delivered on its promise that if implemented properly with fidelity, ... with the proper professional development, that it can transform teaching and learning. So, that's what I see as the greatest success when I walk into a classroom and see those devices being used in ways that no textbook or paper or pencil could do. It truly is transformative.”

He does realize that this is still a work in progress and that in some classrooms the devices are still fancy pencils and electronic textbooks. The superintendent mentioned that there was still room to continue to improve.

The superintendent's personal vision for the one-to-one computing initiative in the future is one of anxiousness. The one-to-one initiative is starting in PK–2 building for the 2018–2019 school year.

“I think Morrisville was two through 12. I don't believe they put devices in the hands of first graders and kindergarteners. So, we'll have to see. I want to take a wait and see attitude on that.”

He does know anecdotally, through his conversations with staff members, that teachers in pre-K are advocating for a one-to-one environment with their students.

He also wants to focus on the refresh cycle for the devices and to make sure that funding is available for the initiative in the future.

“That the money has to be there. Otherwise in a few short years, the whole thing falls apart. The devices become outdated and so on. So, my vision would be to be certain that we can support it financially, continue to offer the professional development that we've been able to offer, and ... just be certain that [the one-to-one initiative] stays front and center.”

He believes that the weekly meetings held for City Connects helps maintain the school division's vision on the one-to-one computing initiative. He also is making the one-to-one computing initiative part of every single school board meeting by placing it on the agenda for each meeting.

The superintendent is also excited about the continual improvement of the initiative. For instance, during the upcoming deployment, the school division is installing a camera that will provide a live feed and inform parents about wait times as they look for the best time to come to school and pick up their child's laptop. He believes that there are always areas to tweak and to make the process better, regardless of how well the one-to-one initiative may be going.

His advice to other school divisions would be to make sure you have a group of people who can lead the initiative and see it through and share your vision.

“You have to have the keeper of the vision, you’ve got to have that—that group of people that believe in it and will see it through and share your vision. We do have a lot of wonderful people who believe in it, so you have to have that-that belief system in place.”

He strongly suggested starting slow and with pilot programs, similar to how City School District conducted pilots in the high school and then expanded pilots in the middle school and then expanded pilots in the elementary school. He said that it is important that the devices are not simply handed out to the teachers and students because it is not fair to the teachers or the taxpayers. Proper plans and professional development need to be in place or else the devices will end up in the back of the room in boxes not used.

Finally, the superintendent said that it is vital that the school division is able to demonstrate to the governing body that the one-to-one computing initiative is an important cause.

“You have to, at the end of the day demonstrate to your governing bodies both the school board and the governing body or the board of supervisors that it’s a good investment and the students are achieving. I think its part our success to move our school division forward. We’ll be fully accredited this year.”

Teachers

The interviews with the teachers provided a lot of insight on how the teachers have adapted to the one-to-one computing initiative. The interviews with the teachers also provided information on how the teachers plan to continue to sustain the one-to-one computing initiative. Teacher E, an information technology resource teacher for the school division, understands that it is extremely important to stay current and up-to-date with the latest technology and educational trends. The devices in the hands of today’s students will be the weakest devices that these

students will use in their lifetime. Teacher E states, *“as an individual who is responsible for helping teachers implement instructional technology into their lessons, it is important that I stay current on how these devices are being used to transform teaching and learning.”*

Teacher D states that teachers must be willing to look for ways to continue to implement laptops into their instructional practices. Teacher D: *“Our students are growing up digitally connected. We can't expect them to come to school and power down because we don't know how to use technology effectively.”* One example of ways that teachers are growing is the recent trend among teachers within CSD to register for Twitter. Twitter is a social media application that connects people. Teachers in CSD have also become active participants using the social media platform to demonstrate ways that students are using the technology within their classes. This is another way that teachers have attempted to make public some of the innovative teaching and learning that is occurring within the classrooms.

Summary for Research Question 3

Key findings from this section that help answer research question three starts with the student achievement data provided by the state's Department of Education. CSD students have shown a gradual increase in the pass rates in all reported testing areas. Although it is difficult to pinpoint the exact reason for the increase in student achievement to the one-to-one computing initiative, it is important to note that scores have improved. Any innovative change that takes place will require data that shows students taking part in the change continue to improve. CSD has the ability to show continued improvement based on standardized assessments.

Additionally, the superintendent must maintain a vision for continuing the one-to-one computing initiative. The superintendent is already planning for the refresh cycle for the laptops originally purchased at the beginning of the initiative. It was interesting to note that the

superintendent has seen his role change during the course of the one-to-one computing initiative. It started with him being the planter of the idea and not he is watching the division-wide one-to-one computing initiative from high on a perch and making sure that it stays at the forefront of the school division's mission and vision.

The teachers must be willing to continue to learn and increase their ability to integrate laptops into their instructional practices in order to sustain the one-to-one computing initiative. If the teacher support for the one-to-one computing initiative fades, then it will be difficult to continue to justify the investment in the one-to-one computing initiative.

Summary

This chapter presented data collected with the intent to answer three research questions.

Research Question 1: How did the school division implement for a one-to-one computing initiative?

Research Question 2: How have educators adapted to the innovative change of a one-to-one computing initiative?

Research Question 3: How does the school division plan to continue and sustain the one-to-one computing initiative?

Data from archived meeting minutes, interviews, surveys, state assessments, questionnaires, informal observations and school personnel documentation helped recreate the events that led to City School District becoming a one-to-one computing environment for students in grades 3-12. This data will be used to answer the three research questions. The next chapter will triangulate all the data collected and present the findings from this case study on City School District.

Chapter 5

Discussion, Implications and Recommendations

The purpose of this study was to provide additional information to the field of one-to-one computing programs that are currently being implemented in school divisions. The planning, preparation, and continued monitoring of a one-to-one computing initiative is important to the successful implementation (Greaves et al., 2012). Studying and analyzing school divisions that are currently pursuing one-to-one computing initiatives is important for other schools to learn how to plan, prepare and monitor such an initiative. The implementation of a one-to-one computing initiative continues to be an area of difficulty for school divisions (Vigdor & Ladd, 2010). Successful one-to-one computing initiatives continue to focus on students and teachers, as well as developing the proper infrastructure for sustaining a one-to-one computing initiative within the schools (Warschauer et al., 2014).

Discussion

In this chapter, I will discuss the findings from the detailed analysis of archived records, interviews, surveys, observations, and school documents. The discussion will focus on answering the three research questions below:

Research Question 1: How did the school division implement for a one-to-one computing initiative?

Research Question 2: How have educators adapted to the innovative change of a one-to-one computing initiative?

Research Question 3: How does the school division plan to continue and sustain the one-to-one computing initiative?

Research Question 1: How did the school division implement for a one-to-one computing initiative?

City School District's one-to-one computing initiative started with a vision created by the school division's superintendent. The superintendent envisioned a personalized learning environment for all students that prepared them to be active participants in a 21st century environment. Studies found that students who participated in a technology-enhanced learning environments were exposed to more student-centered learning and project-based learning that directly supported the skill acquisition required for 21st century learners (creativity, communication, critical thinking, and collaboration) (Lowther et al., 2012).

Without the vision and the desire of the superintendent to pursue a one-to-one computing initiative, there would be little chance for this initiative to be successful for a school division. Establishing a clear vision is critical to the success of a one-to-one program; however, a strong implementation plan set in place by school leadership is key to success (Department of Education, 2016). The superintendent of CSD began organizing districtwide leadership to start pursuing the one-to-one computing initiative. CSD traveled to school divisions that successfully implemented a one-to-one computing environment for their students and studied those school divisions. CSD started small, with simply an idea, and continually expanded the one-to-one computing initiative.

Greaves et al. (2012) found that students need to be offered relevant instruction based on their current life experiences, not that of students born prior to the boom in technology. One-to-one technology-based learning environments could help ensure students are being prepared with 21st century skills (Greaves et al., 2012). The leadership team for CSD worked together to create a vision for a learning environment that was necessary for their students to participate in. The

leaders of CSD understood that their students needed to be supported by a technology rich learning environment that provided a blended learning approach to education.

One area that I believe was a key point in CSD one-to-one computing initiative was the school division's calculated rollout of laptops to the students. Project Red found that successful one-to-one computing initiatives were a mixture of many factors, including hardware, software, and working collaboratively (Greaves et al., 2014). The school division would start small with a pilot program and study the effect that the pilot program had on the students, teachers, and infrastructure. After reflecting on the positives and negatives learned during the pilot program, the school division would make adjustments during the next phase of the one-to-one computing initiative. In the interview with the superintendent of CSD, the pilot programs were one of the keys to a successful implementation of the one-to-one computing initiative. These pilot programs allowed CSD personnel to reflect on the many factors that lead to successful implementation. Teachers mentioned during their interviews that they appreciated the ability to focus on one area of the one-to-one computing initiative and then expand their use of the digital technology to another area. Fifty-six percent of respondents on the City Connects survey said that CSD did a "good" job at scheduling and implementing orientation plans for teachers.

Insufficient professional development on pedagogically sound technology integration, and insufficient time to plan and prepare for technology integration all significantly hinder a one-to-one computing initiative (Ng, 2015). Teachers at CSD mentioned that the school division's professional development plan was helpful. Teacher B's approach, where she focused on small parts of the one-to-one computing initiative within her classroom. She would integrate the technology into the instructional practices in one area and then she would make sure the integration of the technology was working successfully before trying to integrate the technology

into another part of their instructional practices. The professional development plan established by CSD helped this teacher. Again, the City Connects survey shows data that indicates CSD placed an emphasis of developing an orientation plan for teachers during the implementation of the one-to-one computing initiative (Table 4.3). CSD's school personnel continue to look for ways to offer teachers helpful professional development on specific areas that can help the teachers incorporate the technology into their instructional practices based on the continued development and use of Digicamp for educators during the summer months.

An area that City School District was successful in during the implementation process based on the City Connects Survey was scheduling leadership meetings to discuss the one-to-one computing initiative and developing a shared vision for the one-to-one computing initiative. School leaders need to take into consideration the massive scope of a one-to-one computing initiative. One-to-one computing initiatives will have an effect on students, teachers, community stakeholders, and curriculum development (Downes & Bishop, 2015). The weekly City Connects meetings that included the superintendent, principals, department directors, and instructional technology specialist continually monitored the implementation of the one-to-one computing initiative throughout the school division. The City Connects survey indicated that 78% of respondents felt that the school division personnel did "very good" with the task of identifying a leadership team. Furthermore, 67% of the respondents on the City Connects survey felt that the leadership team did a "very good" job at establishing a regular meeting schedule.

An area of concern for teachers regarding the inclusion of technology into their instructional practices is the fact that there are not enough devices for students. Out of 9,279 responses from teachers and administrators it was found that 36.9% of people identified the lack of devices as the largest obstacle to student learning (Schoology, 2019). Teacher A mentioned

that the devices are much more accessible in the one-to-one computing environment. As an elective teacher, the teacher mentioned that it was always difficult to gain access to a computer cart in the pre-one-to-one computing days at the school. CSD's long term planning and implementation of a one-to-one computing initiative alleviates this concern for teachers and permits them to focus on student learning and not the lack of technology.

Based on the City Connects meetings, City School District could have handled the infrastructure demands in a better way. Each year during the beginning of the academic school year, the school's Internet filter and wireless connection had numerous difficulties. Based on evidence from the City Connects survey, the school district could improve their wireless connectivity and bandwidth capacity (Table 4.3). It appears, based on City Connects meeting minutes, that by the 2018-2019 school year the school division had figured out how to adjust the filter to maximize its ability to keep students and teachers connected to the Internet.

Areas of Focus for CSD. The school division will need to continue to focus its priority on the teaching and learning that is occurring within the school division. The planning cannot stop just because laptops are in the hands of all students. Based on the City Connects meeting minutes, there are times during the planning stage that it becomes easy to dwell on the planning of infrastructure, finance and communications. However, CSD officials need to keep the priority on improving the teaching and learning through the incorporation of professional development for teachers. Continuous improvement is important.

I would even suggest CSD's school leadership look for ways to provide professional development lessons to students and to parents. Topics such as digital citizenship, how to access Canvas and information on digital resources that students are using are some great examples of areas of learning for students and parents.

Research Question 2: Educators Adapting to the One-to-One Computing Initiative

One-to-one computing initiatives have changed the way teachers and students communicate with one another during instruction. The lines of communication are continuously open with laptops connected to the internet and access to learning management software and email (Player-Koro & Tallvid, 2015). Technology integration has provided educators the opportunity to motivate their students, provide information in a variety of forms, and to increase the ability to collaborate (Yang et al., 2018).

In order for the full benefits of a one-to-one computing initiative to be achieved, educators must be willing to adapt their teaching practices. School divisions must align their values, goals, and expectations for what engaging teaching looks like (Varier et al., 2017). City School District has started to witness the effects that the one-to-one computing initiative had on the teaching practices of the educators throughout the school division (City Connects Meeting, 2016). According to research, teachers who have participated in one-to-one computing initiatives have changed their view of their classroom dynamics and started to view their class as a group of individual students compared to a group of one (HersHKovitz & Karni, 2018).

One-to-one computing initiatives require strong leadership at the school level to help educators adapt their teaching styles and learn how to meet the needs of their students in a technology driven society. The principal is key at helping teachers learn by being the “teacher’s teacher” (Pautz & Sadera, 2017). The principal is responsible for establishing the vision for teachers to follow and to create a school culture that challenges to status quo and recognizes the benefits of collaboration and motivation in a technology-enriched environment (Pautz & Sadera, 2017).

Changes to Instructional Practices. The implementation of a one-to-one computing initiative led to teachers changing their teaching practices in order to create a student centered learning environment. City Connects meeting minutes from the last meeting of the 2015-2016 academic year mentioned that the one-to-one computing initiative was providing teachers the opportunity to change instructional practices. City Connects highlighted that the technology integration provided student independence, more opportunities for collaboration, greater student engagement, the ability to engage students in higher order thinking as a way to improve their critical thinking skills and provided the opportunity to change the physical layout of the classroom.

Teachers were becoming Google certified through professional development provided by information technology resource teachers in the school division. Teachers within CSD could become a Google Ninja. A Google Ninja is a teacher who completed professional development on how to implement the Google Suite of classroom apps into their instructional practices. This included Google Drive, Docs, Sheets, Calendar, Slides, and Email. The integration of all these tools along with the one-to-one computing initiative changed how teachers could interact with students and provide students with real time formative feedback.

During the interviews conducted with teachers, it was mentioned that the one-to-one computing initiative has challenged the teachers to become more student-centered in their instructional approach. One teacher changed her instructional approach and began flipping her classroom instruction.

Teacher B: *"I found that when I created videos for students to view as a flipped lesson I was not having to explain myself over and over again. My students became more*

independent with their learning and problem solving than when I used to demonstrate how to perform a task in class.”

The flipped lesson approach was one way that teachers changed their methods. The one-to-one computing initiative provided teachers the assurance that students could access recorded videos on their school issued devices. The school even pursued providing students with wireless internet through Sprint Mobile to help students access the internet even if their homes did not have internet capabilities (City Connects Meeting, 2016).

A study conducted by Schoology, a learning management system comparable to Canvas, found that the greatest concern among teachers was how to integrate new educational technology tools into their classroom (Schoology, 2019). There were 6,650 teachers surveyed in the study conducted by Schoology. City School District created Digicamp to help address this concern for teachers. Digicamp has become an annual staple at CSD. Digicamp is held during the summer months when teachers are not under contract with the school division. As mentioned by the superintendent of CSD, Digicamp was created as a summer professional development opportunity for teachers. Instructional technology specialists and teachers from CSD delivered the professional development provided at Digicamp. The goal of Digicamp was to provide teachers with ideas and resources on how to integrate new edtech tools into their classroom to use with the one-to-one computing initiative.

Baltimore County Public Schools (BCPS) focused on transforming instruction using their one-to-one computing initiative. From CSD's visit to BCPS, the school leadership took back the ideas of how to create student-centered learning environments. BCPS focused on what the student is doing, what the physical space looks like, and what the teacher is doing within the learning environment (BCPS, 2015). CSD's focus on student-centered learning led to teachers

analyzing what was occurring within their classrooms. Laptops allowed for learning to become more flexible in time and place. Educators began changing classroom designs. Removing rows of desks and replacing the desks with tables and flexible seating options. Breakout learning sessions in hallways and other locations in the school occurred because of the constant connection that teachers had with students using the one-to-one computing initiative.

During the focus group, Teacher D reported that table acquisition became a top priority for teachers and the middle school. Emails sent by the principal would mention that kidney shaped tables or various types of rectangular tables were available and within minutes, teachers would be claiming the tables for their classrooms. The teachers wanted to remove as many of the individual desks as possible from their room. The tables provided teachers the opportunity to change their learning environments for students and create a much more student-centered and collaborative space for learning.

The language arts teacher interviewed shared that his classroom looked different following the implementation of the one-to-one computing initiative. Due to the ability to provide a more student-centered method of instruction, they started to change their classroom design. Groups were replacing rows and students became more collaborative. The teacher was able to monitor students using the computers using their computer monitoring system and was able to help keep students on task. The teacher became more of a “guide on the side” rather than the “sage of the stage” when it came to instruction. This is similar to the results of 2018 study about the borders of change in a one-to-one computing environment (Hershkovitz & Karni, 2018).

Teacher C mentioned that they were able to monitor student learning and assign students specific areas that they needed to have more instructional help with in order to become

proficient. This is one way that teachers were using the one-to-one computing initiative in order to improve student achievement. The teacher was collecting formative information on students on a more consistent basis and able to transform their teaching for that particular student based on their academic needs.

City School District began utilizing the SAMR model during the 2017-2018 school year. The SAMR model provided teachers a framework for integrating technology into their instructional practices. The school division wanted to implement the SAMR model for the purpose of teacher reflection. Teachers needed to start reviewing the purpose of their technology use. Was the one-to-one computing initiative being used simply for a substitute for paper and pencil? On the other hand, were the teachers and students utilizing the one-to-one computing to redefine the teaching and learning occurring in the classroom? Other school divisions can learn from CSD's approach. After years of collecting data through surveys, informal walkthroughs, and meeting minutes, the leadership team decided to introduce SAMR in order to help teachers reflect on their use of technology.

Teachers mentioned the SAMR model during their interviews as being a beneficial way to reflect on the usage of technology in the classroom.

Teacher D: *"The SAMR model helped me become a more reflective teacher when using technology. Was I using the technology just for the sake of using technology or was I using the technology for a purpose of challenging the students with a new activity?"*

In order to have a one-to-one computing initiative have a positive effect on student learning teachers must adapt their teaching styles.

Informal observations conducted by CSD principals and assistant principals did present data that indicated that teachers were using the digital technology within their classroom for

instructional purposes. After the completion of 582 informal observations completed by the intermediate, middle school and high school administrative teams, instructional technology was determined to be used 71% of the time (Table 4.2). The instructional technology could range from SMART Boards, laptops, the internet, video or any other form of technology.

Administrators noted that the laptops were used 46% of the time by the students. So roughly, half of the time the teachers and students were using the one-to-one computing initiative for instructional purposes. This may be a good indication that the teachers of CSD were implementing a blended learning environment not solely focused on the use of laptops.

One of the highest scores on the Stages of Concern Questionnaire (SoCQ) was in the consequence section. When teachers were asked about their concern regarding the one-to-one computing initiative and their students, all three schools showed high scores. The highest score was reported by the intermediate school teachers, followed by the middle school teachers, and concluded by the high school teachers. This data indicates that teachers are still trying to grasp how students are going to be affected in a digitally connected classroom. Middle school and intermediate school teachers also reported that they are excited about the role that their students will have in the one-to-one computing initiative based on the results in Table 4.8.

The superintendent of CSD mentioned during the interview that many teachers who initially did not buy in to the one-to-one computing initiative have now began to accept it as part of the school system.

Superintendent of CSD: "... some early resistance from teachers who weren't thrilled with technology because they weren't part of the generation that grew up with it. Having said that, that largely has gone away and that's one of the biggest surprises of all of this. We knew that there'd be early adopters like you and others who just grab on to it.

The resisters I'm pleased to report I think have come around and-and you know some of the veterans who-who expressed concern I would think it's fair to say that most of them are on board."

This is another example of how educators have adapted their instructional practices in order to use the laptops within the classroom. Implementing a one-to-one computing initiative is a process of change for people. As depicted in the SoCQ, people go through various phases during change.

The superintendent noted that the greatest success of the one-to-one computing initiative was seeing the change take place among teachers.

Superintendent of CSD: "...the greatest success is to see that it does and can transform teaching and learning and the success is the journey, watching others gradually transform and I think that's due a large part to the PD that we've been able to offer. We didn't just hand out the devices and say, "Go for it. Ah, we wish you well." There was a tremendous amount of professional development that has occurred, is occurring and will continue to-to occur."

This section has shown multiple sources that have depicted how teachers have adapted to the one-to-one computing initiative within CSD. The leadership, teachers, students and community of CSD have shown the ability to adapt to the one-to-one computing initiative. In the following section, I will share areas of focus that CSD officials should monitor as they continue to support teachers with adapting to the one-to-one computing initiative.

Areas of Focus for CSD. The findings from the Stages of Concern Questionnaire show that teachers from all the schools appear to have little concern regarding the implementation of the one-to-one computing initiative. This lack of concern may be due to events that occurred during the planning, preparing, and implementation of the one-to-one computing initiative. As noted during the detailed analysis of the City Connects meeting minutes, City School District made the one-to-one computing initiative part of its mission and vision. CSD branded the one-to-one computing initiative as City Connects and focused on how the one-to-one computing initiative affected the financing, professional development, instruction, communication, and infrastructure of the school division.

A vital piece to the one-to-one computing initiative that was reflective in the interviews with the superintendent and teachers was the need for professional development. The superintendent of CSD mentioned that the school division did not simply give the teachers and students devices. The school division was purposeful with the professional development plan. The school division continues to look for ways to improve the professional development opportunities for the staff. Teachers mentioned how the school would provide real time professional development opportunities that could be implemented into the instructional practices immediately. The school division worked on scaffolding and differentiating the professional development opportunities for their teachers. The school division pursued a summer professional development opportunity for staff members called DigiCamp. This summer professional development opportunity came as a direct result of teachers requesting more assistance on how to implement the one-to-one computing initiative within their instructional practices.

During the teacher focus groups, the teachers mentioned how they were appreciative of the school division's attempt to individualize the professional development opportunities for teachers. The school division focused their professional development of specific pieces of the one-to-one computing initiative and then provided additional growth opportunities to teachers ready to continuing learning. One study found that the top priority for teachers in intermediate, middle and high school educators was the integration of new educational technology tools into their classroom (Schoolology, 2019). CSD's professional development offerings provided teachers the support needed to integrate new technology tools into their instruction in order to improve student achievement.

The school division also gave teachers concrete goals to strive for as the school division implemented the one-to-one computing into the schools. The integration of Canvas, the learning management system, is a great example of how the school division set clear goals for teachers. Canvas integration was identified as an integral part to the successful implementation of the one-to-one computing initiative. CSD learned from studying other school divisions, such as Mooresville Graded School District and Baltimore County Public Schools, that a learning management system was vital to the success of the one-to-one computing initiative. With the scaffolded implementation plan for Canvas, teachers had achievable goals to work toward completing. Administrators could track and monitor the implementation of Canvas into the instructional practices of teachers and hold all accountable for integrating technology into the instructional practices (Table 4.1).

Data from informal observations indicated teachers must continue to revisit the SAMR model as a way to monitor if they are effectively using technology for redefining educational experiences for their students. Table 4.2 showed that only 44% of the time that the laptops

observed being used was for an activity that could not be accomplished without the use of the laptop. This data indicates that teachers could have used other teaching tools and gained the same result. These tools could include but are not limited to, paper and pencil, worksheets, lecture or whiteboards. With this information, CSD technology leaders may want to increase their training using the SAMR model in order to help facilitate teachers using the laptops to access students' creativity, critical thinking, collaboration and communication skills.

Research Question 3: Sustaining a One-to-One Computing Initiative

Sustaining the one-to-one computing initiative will depend on the leadership within the school division. A commitment by all levels of school administration to integrate technology into instructional practices is an important component of successful one-to-one computer implementations (Topper & Lancaster, 2014). As the superintendent mentioned during his interview, all the schools within the school division were fully accredited. In order to sustain the support of the community and the governing body, it will be important for the school division to share the academic success that their students are attaining.

Superintendent of CSD: "So we're going to have some great results to share. I'm really happy about that and so I think the advice is if you commit to it and you're getting some good results, be certain to share the good news."

The superintendent also mentioned that the school division must continually improve. As long as the school division continues to be fully accredited, they will be able to continue to pursue the one-to-one computing initiative. If the accreditation of the school division is denied, it will become difficult for the school's leadership to defend the continued implementation of the one-to-one initiative. CSD has seen an increase in student achievement according to end-of-the-year standardized assessments that are administered by the state's department of education. This

continued increase in academic achievement will be important as CSD continues to sustain the one-to-one computing initiative. CSD's one-to-one computing initiative finished simply because the devices are in the hands of the students. CSD's leadership team must continue to develop and refine the learning experiences that are presented to students on a daily basis. Putting devices in the hands of the students is only a small part of a one-to-one computing initiative. The teaching and learning, the professional development, infrastructure and the funding for the one-to-one computing initiative must continue to be focused on by the school division's personnel.

Continuous improvement is needed to sustain the one-to-one computing initiative. Leaders within CSD would be the first to tell you that they are not perfect with the implementation of the one-to-one computing initiative. They are constantly studying their one-to-one computing program through the lenses of the five cornerstones: professional development, instruction, infrastructure, finance, and communication.

Superintendent of CSD: *"If I sense that folks are getting tired of it or they want to just do the same as what we did last year, I think you can always tweak it and make it better. So that's what I'm going to stay on top of."*

Another sign of continuous improvement are the standardized assessment results for CSD that have been reported by the State Department of Education. The pass rates for all reporting subjects (English, mathematics, science) have increased since the implementation of the one-to-one computing initiative (Figure 4.5-4.13). Although it is difficult to pinpoint the increased academic achievement to only the one-to-one computing initiative, it is worth noting that the students within CSD are showing academic improvement.

Furthermore, for the one-to-one computing initiative to continue within CSD, the teachers must be willing to continue to adapt their teaching practices and learn ways to

incorporate the technology into their instructional practices. Fullan (2014) found that successful technology initiatives require an understanding of how to promote change. All teachers that participated in the interviews focused on how they continue to look for ways to improve their teaching. Technology will continually change as has been displayed during the first 19 years of the twenty first century. The technology in the hands of students today will be some of the weakest technology that they will use during their lifetime. That is a fascinating reality. Every year technology developers are looking for ways to improve and develop the latest and greatest device or technology application.

City School District principals must find ways to leverage their teacher leaders. School administrators provide technology, model technologies' use within educational settings, and are primary motivators for teachers integrating educational technology (Unal et al., 2014). At the middle school, it appears that the teachers are anxious to find ways to help their peers use the one-to-one computing initiative as a way to improve instruction. The middle school teachers scored higher on question five of the SoCQ (Table 4.9) than either the high school or middle school. This indicates that the teachers need to have more opportunities to work together and share ideas because they are ready for that challenge as they continue to change and adapt to the one-to-one computing initiative.

City Connects meetings must continue to focus on the five cornerstones of the one-to-one computing initiative. All school administrators should be involved and need to understand how one-to-one computer initiatives influence a school division's budget, assessment, curriculum, professional development opportunity for staff, and the overall district plan (Topper & Lancaster, 2014). City Connects meetings provide the opportunity to keep school administrators up-to-date with the many pieces of the one-to-one computing initiative. By committing to emphasize

professional development, teaching, and learning during the weekly minutes the leadership team within CSD will be able to continue to push the initiative forward in regards to sustaining the initiative. Without the collective leadership provided by the City Connects committee members, the one-to-one computing initiative may possibly fizzle out and fade away.

As City School District moves forward in the coming years, the school division must find ways to financially support the one-to-one computing initiative. Investments in a reliable network, technical support, time, and professional development for teachers are also necessary for success (Topper & Lancaster, 2014). Between the regular maintenance of the individual computers on a yearly basis, there is also the refresh cycle. As the superintendent mentioned:

Superintendent of CSD: *“That the money has to be there otherwise in a few short years the whole thing falls apart. The devices become outdated and so on so, my vision would be to be certain that we can support financially.”*

The financial support of the governing body for the city and the support of the school board is required in order to sustain a one-to-one computing environment. Without the finances in place for the refresh cycle of the devices and the continued professional development opportunities, then this whole initiative will be unable to continue.

Three major goals have driven efforts to integrate one-to-one computing: to prepare students to enter the future workforce, to improve students' skills and achievement, and to positively influence the instruction that students receive (Lei & Zhao, 2008; Lowther et al., 2003; Penuel, 2006; Zucker, 2004). The City Connects committee needs to look for ways to assess the one-to-one computing program. Based on the responses from the City Connects survey, the school division personnel did a “fair” to “good” job at establishing baseline data and developing an assessment protocol for the one-to-one computing initiative. These two areas were some of

the lowest ratings found on the City Connects survey (Table 4.3). In order to continue to sustain and support the one-to-one initiative the school division's leadership team must develop a method for assessing the effectiveness of the one-to-one computing initiative. This could include the use of data from standardized tests, surveys administered to students, teachers, and community members and interviews conducted with stakeholders throughout the community. CSD must develop a way to monitor if their students are entering the workforce prepared to be active participants and if the instructional practices that are presented to students have changed for the better.

Areas of Focus for CSD. The school division must continue to monitor student achievement throughout the school division and share the results with the teachers, students, parents and community. In order to sustain the one-to-one computing initiative the school division will require the support of the governing body. If student achievement begins to decrease, then the governing body may begin to question the investment in the one-to-one computing initiative. CSD's City Connects committee must develop assessment protocols that can be used to determine the effectiveness of the one-to-one computing initiative. As mentioned earlier, one of the lowest ratings on the City Connects survey mentioned the school division lacking a proper assessment and baseline data for the one-to-one computing initiative.

City School District should look for ways to continue to market the success of the one-to-one computing initiative. One avenue that the school division recently began with many of their staff members is social media. The superintendent and many educators within the school division have created Twitter accounts. The Twitter accounts connect them to the community and provide an opportunity to share the learning outcomes that are happening within the classroom of CSD.

Implications for Practice

City School District has provided a model for other school divisions to follow that has permitted the integration of a one-to-one computing initiative throughout the entire school division. CSD leadership aspired to “serve as a model for other school districts seeking to transform their learning (CSD, 2017).” Other school divisions of the same relative size can study how City School District methodically took an idea from its superintendent and constructed a vision for what all school employees and students could follow. City School District established an incremental rollout of the one-to-one computing initiative. CSD was tempted to rush the implementation of a one-to-one computing environment during the initial pilot program at the middle school. However, district leadership decided that it would be best to continue with the process of providing a pilot program for each school before moving to full implementation.

As the timeline shows for the one-to-one computing implementation, CSD started with small groups of students and teachers participating in a one-to-one computing environment. The school division studied the impact on instruction, infrastructure, finances, and professional development. The school division then communicated its findings to stakeholders that included the school board, parents, students, and teachers. The school division adapted the rollout of the one-to-one computing initiative as it saw fit after each pilot program.

For example, the one-to-one computing initiative started with all students receiving a tablet device with a detachable keyboard. The school division learned from its constant assessment of the program that these devices were not meeting the needs of the students. The school division transitioned to a laptop computer for the remaining high school and middle school pilot programs. After two years of working with computers, the school division again reassessed and determined that Chromebooks could meet the demands of the students and staff

for a much cheaper price. The school division transitioned to Chromebooks for the intermediate school and the elementary school. Schools divisions must be willing to adapt and change throughout the process and not stay too committed to one device because that was how the initiative began.

City School District also showed the importance of identifying key areas of focus for a one-to-one computing initiative. CSD identified five cornerstones to the one-to-one computing initiative that it believed were integral to proper implementation. Understanding how a one-to-one computing program affects a school division's finances, professional development plan, instructional philosophy, infrastructure, and its ability to communicate with community members is critical to the success or failure of such an initiative according to the results of CSD. Identifying the five cornerstones to the one-to-one computing initiative permitted CSD's school leadership team to run weekly City Connects meetings that monitored the one-to-one computing initiative.

Improving the teaching and learning is a key part that other school divisions will look for before moving forward with a one-to-one computing initiative. All the time and money invested in professional development, improving the infrastructure, and purchasing devices will not be beneficial if the one-to-one computing initiative does not have an effect on the teaching and learning. City School District realized from their informal observations and discussion at their City Connects meetings that a greater emphasis needed to be placed on changing instructional practices to improve the incorporation of the one-to-one computing initiative.

As stated earlier in the reflection on the timeline of events for the one-to-one implementation, CSD first qualified for the state sponsored e-Backpack initiative. The high school at CSD was accredited with warning due to low scores on the state's standardized test that

were administered to students in grades 3-12. The superintendent mentioned during the interview *“You have to, at the end of the day demonstrate to your governing bodies both the school board and the governing body or the board of supervisors that it's a good investment and the students are achieving. I think its part our success to move our school division forward. We'll be fully accredited this year.”* Five years after initially qualifying for state money due to low scores on standardized test the school division could report that they were fully accredited in all four schools. The one-to-one computing initiative was one piece of the puzzle that led to improved student achievement. The one-to-one computing permitted teachers to reflect on their teaching practices and develop more student centered learning opportunities.

Data collected from the State Department of Education in which City School District reports to shows that all schools that are participating in the one-to-one computing initiative are achieving higher pass rates in 2018 than they were on the 2014 assessments. I do not believe that this increase in student achievement can be solely given to the one-to-one computing initiative due to other contributing circumstances that were occurring outside of the initiative.

Finally, school division's that are pursuing a one-to-one computing initiative must be willing to invest in the infrastructure and the software required in order to fully benefit from such an initiative. Another area of concern based on the City Connects survey focused on the wireless network, the bandwidth capacity and the trouble shooting protocol. Prior to implementing a one-to-one initiative and placing devices in the hands of students, it would be best practice for school divisions to test the reliability of the wireless network and internet bandwidth. Along with the wireless connectivity and bandwidth, school division's technology directors must address the internet filter that is currently used by the school division. CSD personnel spent several years

troubleshooting issues with the filter and appear, based on City Connects meeting minutes, to have finally figured out the internet filtering issue by the 2017-2018 school year.

Recommendations for Future Research

1. *Determine how students respond to a one-to-one computing initiative within their school.*

This study did not focus on studying the responses of students who participated in the one-to-one computing initiative. This is an area that I believe should be studied. Do students feel that they need to participate in a one-to-one computing initiative in order to be successful in their future?

2. *Study a larger school division that has multiple high schools, middle schools, and elementary schools.* City School District (CSD) is a school system made up of four different schools: a primary elementary school for grades PK–2, an intermediate elementary school for grades 3–5, a middle school for grades 6–8, and a high school for grades 9–12. The school division is located in suburban area in the mid-Atlantic region of the United States. Enrollment for the entire school division as of September 30, 2016 was greater than 3,000 students in grades PK–12. Studying a school division that has multiple high schools, middle schools, and elementary schools may be of interest for future researchers.

3. *Compare and contrast the academic outcomes of students identified as economically disadvantage who participate in a one-to-one computing environment and students identified as economically disadvantaged who do not participate in one-to-one computing environment.* Research regarding how schools with students coming from low socioeconomic homes are trending toward a one-to-one computing initiative while schools in wealthier areas are not pursuing one-to-one computing initiatives as frequently

is another area that could be of study. Why do schools serving students in low SES communities feel that the students need a laptop in order to be successful? Does research support technology increasing the academic achievement of students from homes that are economically disadvantaged?

4. *How do you get teachers to collaborate and share best practices when incorporating best practices?* Based on the results from the SoCQ, teachers within CSD have not entered the stage of collaboration as I had anticipated. Future research could focus on how schools promote teachers to collaborate and share best practices when participating in a one-to-one computing initiative.
5. *How are school administrators prepared to lead schools in a one-to-one computing environment?* Research has shown that school administrators are vital to a successful one-to-one computing initiative. How are school administrators being prepared to lead a one-to-one computing initiative? What are universities and school divisions doing to prepare their school leaders to lead in a digital world?

Researcher Reflection

To be the primary researcher for this case study was a rewarding experience. As both the researcher and a part of the CSD school leadership team that helped implement the one-to-one computing initiative, I felt that it was important that I provide a detailed summary of CSD's one-to-one initiative. The meeting minutes from the City Connects meetings were vital to me being able to share the most detailed description of CSD's one-to-one computing initiative. The documented meeting minutes were able to show areas of strength as well as areas of concern throughout the five-year implementation process.

As I currently transition to a new school division, I am able to reflect at the implementation of CSD's one-to-one computing initiative and look at areas to focus on as my new school pursues a one-to-one computing initiative. I have been working closely with our school's information technology director, making sure that our school's infrastructure is prepared for the implementation of a one-to-one computing environment for the 2019–2020 school year. We have started providing teachers with professional development on how to integrate technology and pursue teaching practices that are more student-centered.

We are also going to have two classes within the school pilot a full one-to-one computing environment in order to work out any kinks in the implementation. The use of pilot programs at City School District helped the school learn and adjust the process before going to a 100 percent implementation.

Conclusion

This study resulted in a detailed analysis of one school division's attempt to provide students a one-to-one computing environment. The study focused on years of meetings regarding the one-to-one computing initiative, interviews with teachers, and the superintendent of the school division, and data collected from questionnaires and surveys provided to teachers and district leadership.

The one-to-one computing initiative has successfully reached all four schools within City School District. The one-to-one computing initiative started small at each school and then expanded to the entire school the following year. This model was used at all four schools within City School District. The model of using incremental growth is definitely a strategy that other school divisions should take from this study. CSD did not simply place electronic devices in the hands of all teachers and students in one year. The school division was systematic in their

approach and studied how the one-to-one computing initiative would affect the infrastructure, finance, communication, professional development, and overall teaching and learning. These five cornerstones were a focus for CSD throughout the implementation process.

The relative small size of City School District may have had a positive impact on the school division's ability to have a complete one-to-one computing initiative in all four schools within a four-year period. The school division could focus on the high school and then progress to the middle school, then the intermediate school and conclude with the primary school. Within four years, the one-to-one computing initiative was able to reach every school within the division.

Project RED identified the school principal's ability to lead as a critical element in any successful one-to-one computing initiative (Greaves et al., 2012). CSD had the superintendent providing a vision for the school district to follow. In order for the one-to-one computing initiative to have an impact at each of the four schools within CSD, it was important that the principals were involved in the one-to-one initiative. CSD had their principals attend City Connects meetings on a regular basis. The middle school had their principal and assistant principal attend the meetings on a regular basis while the high school, intermediate school, and primary school only sent their principal. Based on the data collected from the questionnaire, it appears that including all leadership in the one-to-one computing initiative may be just as important. The principal leads, but the assistant principal provides further support. At the middle school, the one school that had higher results in the collaborative stage of the SoCQ, both the principal and assistant principal attended City Connects meetings regularly.

Further supporting the importance of leadership during a one-to-one computing initiative is the research conducted by Topper and Lancaster. They found that a commitment by all levels

of school administration to integrate technology into instructional practices is an important component of successful one-to-one computer implementations (Topper & Lancaster, 2014).

The superintendent may possess a vision, but the superintendent must be able to include others in the initiative. CSD identified a districtwide leadership group early on during the implementation of the one-to-one computing initiative. The group regularly met and discussed the implementation process.

Furthermore, principals and other district administrators must display their own digital competence in order to lead a one-to-one computing initiative within their school division (Mårell-Olsson & Bergström, 2018). CSD's leadership team placed a commitment to learning the ins-and-outs of the one-to-one computing initiative. Weekly meetings were held with central office administrators and principals from all schools that make up CSD. During the meetings, detailed meeting minutes were kept that showed how school leaders were being prepared for the growth of the one-to-one computing initiative. With this knowledge, the leadership of CSD was able to improve their own digital competence and prepare to lead the one-to-one computing initiative within their own schools. Any school division that is looking to implement a one-to-one computing initiative must be willing to place an emphasis on educating their school leaders so that they can increase their self-efficacy in a digital learning environment.

Goals of one-to-one computing initiatives have included changing teaching practices, adapting instruction to meet the needs of individual students and to prepare students to participate in a modern classroom (Mårell-Olsson & Bergström, 2018). City School District placed an emphasis on professional development and teaching and learning as depicted by their cornerstones for the one-to-one computing initiative. "Teachers don't just teach—they learn. Every student is different, and identifying methods that are most effective may push teachers out

of their comfort zone, encouraging their instructional approach” (CSD, 2017). CSD understood that simply placing devices in the hands of the students would not positively affect the student achievement. Technology integration provides an opportunity to change teaching and learning practices while also mixing in prior practices that proved to be effective (Lawrence et al., 2018). Behind the rollout of devices, there was plenty of professional development and reflection among school leaders and teachers about what effective instruction looks like in a digitally connected classroom.

City School District focused on providing teachers with professional development because the school division leadership realized early on in the one-to-one initiative that simply providing the technology to teachers and students would not be sufficient. This shows that CSD understood that fact that teachers much change their instructional practices in order to receive the full benefits of a one-to-one computing environment. Teachers had to be willing to change their teaching practices and incorporate the technology use in order to get the most out of the students in a one-to-one computing initiative.

One-to-one computing initiatives have also be found to improve the teacher and student relationships within class. The strong teacher-student relationship helps sustain a one-to-one computing initiative. The students were more motivated to learn and the teachers were focused on improving their knowledge of using digital technology when participating in a one-to-one computing environment (Higgins & Bushell, 2018). Importance needs to be placed on the fact that implementing a one-to-one computing environment is a change for leaders, teachers and students. All stakeholders need to change and to adapt their own practices in order to gain the full benefits of a one-to-one computing initiative.

Fullan (2014) found that successful technology initiatives require an understanding of how to promote change. School divisions embarking on a digital conversion must understand how to motivate staff, students, and community members to become active participants in the change process. Research has shown that the school principal plays a vital role in establishing the culture and leading the change in a one-to-one computing initiative (Pautz & Sadera, 2017). However, the data collected from the Stages of Questionnaire survey provided results that showed little motivation from staff regarding the one-to-one initiative. Data showed that a majority of the study participants were unconcerned with the one-to-one computing initiative. Out of the three schools that have fully implemented the one-to-one computing initiative, only one school had a majority of study participants fall into the personal level or higher on the SoQC. The other two schools had teacher responses in the unconcerned level of the SoQC.

City School District must look for ways to engage its staff in order to promote true change in teaching practices. Educators must understand the relationship that exists between teaching, technology, and improving student achievement (Koehler et al. 2014). It appears that CSD understands the importance of providing teachers with meaningful professional development that will help improve the teaching and learning within the classroom. The school division has displayed this understanding by providing professional development opportunities such as Digicamp during the summertime for their teachers to participate in. One-to-one computing initiatives provide teachers and students the ability to extend beyond the traditional classroom and create learning opportunities outside the four walls of a classroom (Higgins & Bushell, 2018)

City School District must study the engagement levels of students. A 2015 study by Downes found that teachers viewed technology as a tool that opened opportunities for creating

lessons that students viewed as purposeful and led to higher student engagement (2015). Seventy-one percent of 583 classroom observations done by CSD administrators showed that teachers used instructional technology. The instructional technology could include the use of the SMART Board, websites, or the laptop. However, only 46 percent of the 583 observations required the use of the laptops. Out of the 46 percent (270 observations) observations, only 119 times the laptop was needed to complete the task. These numbers signify that most tasks given to students could have been completed using other resources rather than the laptop. According to Cuban's research in 2001, in order for one-to-one computer initiatives to avoid failure, there must be an emphasis on helping teachers change their pedagogical practices to better integrate the technology. Data shows that CSD must continue to look for ways that the one-to-one computing initiative can revolutionize current instructional practices.

Harmandaoglu Baz's study also found that SAMR promotes active learning and student autonomy while also providing students the ability to incorporate the four Cs of the 21st century classroom: communication, collaboration, creativity, and critical thinking skills (Harmandaoglu Baz et al., 2018). City School District began utilizing the SAMR model for providing teachers a framework for integrating technology into their instructional practices. The SAMR model has the ability to provide teachers a framework in the difficult phase of incorporating technology but the model may not emphasize enough how teachers must enhance their pedagogical practices (Hamilton et al., 2016). Educators can easily incorporate the SAMR model into their current instructional practices (Harmandaoglu Baz et al., 2018). These two studies show that the use of the SAMR model can be effective, but the SAMR model alone will not improve the teaching and learning. The SAMR model provides teachers a lens to look through and reflect on their

technology use. The educators may need further support on how to enhance their pedagogical practices when participating in a one-to-one computing environment.

School divisions must identify the goals of the one-to-one computing initiative without referring to technology in their statement (Horn and Staker, 2015). City School District states that the mission of City Connects is to embrace a blended learning model for students. “It’s critical to understand that our vision is to supplement, not supplant traditional forms of teaching. But the supplement is substantial—it allows for individualized learning anytime, anywhere (CSD, 2017).” The superintendent of CSD had an initial goal of providing an Individualized Education Plan for all students. A 2018 study found that many principals considered one-to-one computing initiatives as an effective and efficient way to meet the individual needs of the students within their classroom (Mårell-Olsson & Bergström, 2018).

Fullan (2008) found that believing in your employees, connecting with peers, building capacity, continuous learning, transparency, and continuous improvement of the entire system is necessary to effective change. CSD embraced many of Fullan’s ideas during their one-to-one computing initiative. The school division focused on transparency through their detailed meeting minutes and the formation of City Connects. The school division also looked to continuously learn throughout the one-to-one computing initiative as evident from the surveys that were administered regularly to students and staff and the incremental rollout of devices over the course of the implementation. CSD focused on developing professional development opportunities for teachers so that there could be continuous improvement.

In order for CSD to sustain the one-to-one computing initiative, the school division must understand why some initiatives failed. A variety of factors, including funding, technical support, professional development, and lack of pedagogical teaching change, led to unsuccessful one-to-

one computing initiatives (Hero et al., 2013). The superintendent noted that funding will be a factor as the refresh cycle for the laptops comes around. CSD focused on presenting the budget impact that the one-to-one computing initiative had on the overall budget during the 2017–2018 school year. CSD also had regular conversations during City Connects meetings that focused on finance, professional development, infrastructure, and teaching and learning on a regular basis. The development of the five cornerstones to the one-to-one computing initiative appeared to be beneficial for the overall implementation.

School divisions are going to need to show that one-to-one computing initiatives have a positive effect on student performance. Correlating the effect of City School District's one-to-one computing initiative is difficult due to the other instructional initiatives taking place. City School District did not simply hand out electronic devices to their students. The school division was systematic and implemented professional development opportunities, a learning management system and new ways to assess student learning. All CSD schools are fully accredited according to their state's accreditation ratings. CSD must continue to have all schools accredited in order to maintain the support from the community and city government to continue to fund the one-to-one computing initiative. An administrator that is looking at pursuing a one-to-one computing initiative can use the data provided by the State Department of Education. The pass rates on all assessments have improved since the 2014 assessment year. It will be difficult to pinpoint the exact reason for the increase. The incorporation of the one-to-one computing initiative can be one variable for the improved pass rates along with many other variables that have been incorporated by CSD over the years.

City School District's one-to-one computing initiative will carry on as long as district leadership works with all stakeholders and continues to share its vision for a one-to-one

computing initiative. Learning occurs when one reflects on a process of implementation. Much can be learned after carefully studying CSD's one-to-one computing initiative. A school cannot simply provide technology to teachers and students and expect a significant change to occur. Supports must be in place that help staff members, teachers, and community members integrate the technology.

Appendix A: Table 1: Research Questions and Data Sources

Research Question	Data Source
How did the school division prepare for a one-to-one computing initiative?	<ul style="list-style-type: none"> • Interviews • City Connects meeting minutes • Timeline of relevant major events with City Connects one-to-one computing initiative
How has the staff adapted to the innovative change of a one-to-one computing initiative?	<ul style="list-style-type: none"> • Stages of Concern Questionnaire • Interviews • City Connects survey • Informal observation data
How does the school plan to continue and sustain the one-to-one computing initiative?	<ul style="list-style-type: none"> • Interviews • Timeline of major events with City Connects one-to-one computing initiative

Appendix B: Interview Protocol

1. What is your job position title?
2. What role do you have with the implementation of the one-to-one computing initiative?
3. When did you first become involved with the one-to-one computing initiative?
4. What area has been the most difficult to address during one-to-one computing initiative and why?
5. What do you see as the greatest success to date for the one-to-one computing initiative and why?
6. What is your personal vision for the future of the one-to-one computing initiative within this school system?
7. What advice would you give to another school division that is starting a one-to-one computing initiative?

Appendix C: City Connects Committee Survey Protocol

Study Participant:

You have been invited to participate in the City Connects committee survey. The results from this survey will be published as part of the dissertation titled: *Planning, Preparing, and Implementing a 1:1 Computing Initiative in K-12 Education: A Case Study of a School Division's Journey Towards a 1:1 Computing Environment for Students and Staff*. The purpose of the survey is to collect data on the implementation process that City Schools used for the one-to-one computing initiative. I, the researcher for this study, am completing the dissertation through Virginia Tech.

The paper-based survey should take approximately 10 minutes to complete. I will collect surveys once they are completed. Participating in this survey is voluntary. Participants have the right to withdraw at any time or not answer any question. The responses that you provided will be submitted anonymously. Consent to participate in this research study is indicated with submission of the survey to the researcher. Should you have any questions or concerns about the study's conduct or your rights as a research subject, you may contact the Virginia Tech Institutional Review Board at irb@vt.edu or (540) 231-3732.

Thanks!

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PART I

1. Which cornerstone of City Connects do you find yourself most involved with during our 1:1 computing initiative?
 - a. Finance
 - b. Teaching and Learning
 - c. Professional Development
 - d. Infrastructure
 - e. Communications

2. Which cornerstone of City Connects have you found to be the most difficult to manage and maintain during the 1:1 computing initiative?
 - a. Finance
 - b. Teaching and Learning
 - c. Professional Development
 - d. Infrastructure
 - e. Communications
3. What has been the most important lesson learned from our school's 1:1 computing initiative that you would share with another school attempting a 1:1 computing initiative?
4. What do you believe is the greatest success of the 1:1 computing initiative?
5. What do you believe was the greatest challenge facing the 1:1 computing initiative?

PART II

Project RED is a national survey that was administered to identify key actions completed by school divisions completing a 1:1 computing initiative. The survey produced valuable results that were used to create a checklist titled Project RED Roadmap Checklist. The checklist identifies actions that are designed to facilitate proper technology implementation (Greaves et al, 2012). Please rate on a scale of 1-5 using the following scale for determining the level of quality for implementation:

- 1- Poor
- 2- Fair
- 3- Good
- 4- Very Good
- 5- Excellent

1 indicating that the actions was not addressed, 5 indicating that the action was effectively addressed by City Connects has during the school division’s transition to a 1:1 computing environment for students and staff.

The following leadership actions are designed to facilitate proper technology implementation (Greaves et al, 2012).	Level of Quality for Addressing the Action
Identify district committee members and meeting schedule (Communication)	1...2...3...4...5
Identify team leadership (Communication)	1...2...3...4...5
Schedule district leadership planning sessions (with superintendents, curriculum directors, principals, technology directors, business official, teacher leaders). (Professional Development)	1...2...3...4...5
Share and discuss the research on 1-1 and large-scale implementations (Professional Development)	1...2...3...4...5
Draft the shared vision (Communication)	1...2...3...4...5
Plan the timeline for building the infrastructure (Infrastructure)	1...2...3...4...5
Bring district leaders together for technology planning training sessions (Professional Development)	1...2...3...4...5
Develop and schedule the professional development plan (Professional Development) Establish the timeline for building-level training (principals, teachers, technical support, and lead teachers). (Teaching and Learning)	1...2...3...4...5

Draft the administrative support plan for classroom teachers in pilot and ensuing years. (Teaching and Learning)	1...2...3...4...5
Schedule and implement orientation plans for all stakeholders (Communication)	
○ Students	1...2...3...4...5
○ Teachers	1...2...3...4...5
○ Bus drivers	1...2...3...4...5
○ Support staff	1...2...3...4...5
○ Parents/guardians	1...2...3...4...5
○ Community	1...2...3...4...5
Plan the outbound communications program to community and parents and guardians (Communication)	1...2...3...4...5
Secure signed acceptable use policies (Teaching and Learning)	1...2...3...4...5
Identify the assessment plan and timeline (Teaching and Learning)	
○ Create program goals	1...2...3...4...5
○ Collect baseline data	1...2...3...4...5
○ Develop assessment protocol and tools	1...2...3...4...5
Schedule the implementation timeline (Infrastructure)	
○ Wireless network testing	1...2...3...4...5
○ Bandwidth capacity testing	1...2...3...4...5
○ Ongoing professional development	1...2...3...4...5
○ Troubleshooting protocol	1...2...3...4...5

<ul style="list-style-type: none"> ○ Technology support protocol (Finance/Teaching and Learning) 	
<ul style="list-style-type: none"> <ul style="list-style-type: none"> ▪ Teachers 	1...2...3...4...5
<ul style="list-style-type: none"> <ul style="list-style-type: none"> ▪ Students 	1...2...3...4...5
<ul style="list-style-type: none"> <ul style="list-style-type: none"> ▪ Other personnel 	1...2...3...4...5
<ul style="list-style-type: none"> <ul style="list-style-type: none"> ▪ Online 	1...2...3...4...5
<ul style="list-style-type: none"> <ul style="list-style-type: none"> ▪ Help desk 	1...2...3...4...5
Plan the distribution of devices to students (Funding)	1...2...3...4...5
Schedule site visits. (Professional Development)	1...2...3...4...5

Appendix D: Stages of Concern Questionnaire

Stages of Concern Questionnaire

Dear colleague,

You have been invited to participate in the Stages of Concern Questionnaire. The results from this survey will be published as part of the dissertation titled: *Planning, Preparing, and Implementing a 1:1 Computing Initiative in K-12 Education: A Case Study of a School Division's Journey Towards a 1:1 Computing Environment for Students and Staff*. The purpose of the questionnaire is to determine what people are concerned about at various times during the process of adopting an innovation. I, the researcher for this study, am completing the dissertation through Virginia Tech.

The online questionnaire should take approximately 5-10 minutes to complete. Participating in this questionnaire is voluntary. Participants have the right to withdraw at any time or not answer any question. The responses that you provided will be submitted anonymously. Consent to participate in this research study is indicated with submission of the survey. Should you have any questions or concerns about the study's conduct or your rights as a research subject, you may contact the Virginia Tech Institutional Review Board at irb@vt.edu or (540) 231-3732.

The survey is available online at:

<https://www.sedl.org/concerns/>

Enter the password: ***** to log on.

Thanks!

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0	1	2	3	4	5	6	7
Irrelevant	Not true of me now		Somewhat true of me now			Very true of me now	

Circle One Number For Each Item

1. I am concerned about students' attitudes toward the innovation.	0	1	2	3	4	5	6	7
2. I now know of some other approaches that might work better.	0	1	2	3	4	5	6	7
3. I am more concerned about another innovation.	0	1	2	3	4	5	6	7
4. I am concerned about not having enough time to organize myself each day.	0	1	2	3	4	5	6	7
5. I would like to help other faculty in their use of the innovation.	0	1	2	3	4	5	6	7
6. I have a very limited knowledge of the innovation.	0	1	2	3	4	5	6	7
7. I would like to know the effect of reorganization on my professional status.	0	1	2	3	4	5	6	7
8. I am concerned about conflict between my interests and my responsibilities.	0	1	2	3	4	5	6	7
9. I am concerned about revising my use of the innovation.	0	1	2	3	4	5	6	7
10. I would like to develop working relationships with both our faculty and outside faculty using this innovation.	0	1	2	3	4	5	6	7
11. I am concerned about how the innovation affects students.	0	1	2	3	4	5	6	7
12. I am not concerned about the innovation at this time.	0	1	2	3	4	5	6	7
13. I would like to know who will make the decisions in the new system.	0	1	2	3	4	5	6	7
14. I would like to discuss the possibility of using the innovation.	0	1	2	3	4	5	6	7
15. I would like to know what resources are available if we decide to adopt the innovation	0	1	2	3	4	5	6	7
16. I am concerned about my inability to manage all that the innovation requires.	0	1	2	3	4	5	6	7
17. I would like to know how my teaching or administration is supposed to change.	0	1	2	3	4	5	6	7
18. I would like to familiarize other departments or persons with the progress of this new approach.	0	1	2	3	4	5	6	7

0	1	2	3	4	5	6	7
Irrelevant	Not true of me now		Somewhat true of me now			Very true of me now	

Circle One Number For Each Item

19. I am concerned about evaluating my impact on students.	0	1	2	3	4	5	6	7
20. I would like to revise the innovation's approach.	0	1	2	3	4	5	6	7
21. I am preoccupied with things other than the innovation.	0	1	2	3	4	5	6	7
22. I would like to modify our use of the innovation based on the experiences of our students.	0	1	2	3	4	5	6	7
23. I spend little time thinking about the innovation.	0	1	2	3	4	5	6	7
24. I would like to excite my students about their part in this approach.	0	1	2	3	4	5	6	7
25. I am concerned about time spent working with nonacademic problems related to the innovation.	0	1	2	3	4	5	6	7
26. I would like to know what the use of the innovation will require in the immediate future.	0	1	2	3	4	5	6	7
27. I would like to coordinate my efforts with others to maximize the innovation's effects.	0	1	2	3	4	5	6	7
28. I would like to have more information on time and energy commitments required by the innovation.	0	1	2	3	4	5	6	7
29. I would like to know what other faculty are doing in this area.	0	1	2	3	4	5	6	7
30. Currently, other priorities prevent me from focusing my attention on the innovation.	0	1	2	3	4	5	6	7
31. I would like to determine how to supplement, enhance, or replace the innovation.	0	1	2	3	4	5	6	7
32. I would like to use feedback from students to change the program.	0	1	2	3	4	5	6	7
33. I would like to know how my role will change when I am using the innovation.	0	1	2	3	4	5	6	7
34. Coordination of tasks and people is taking too much of my time.	0	1	2	3	4	5	6	7
35. I would like to know how the innovation is better than what we have now.	0	1	2	3	4	5	6	7

Please complete the following:

1. How long have you been involved with the innovation, not counting this year?
Never ___ 1 year ___ 2 years ___ 3 years ___ 4 years ___ 5 or more ___

2. In your use of the innovation, do you consider yourself to be a:
non-user ___ novice ___ intermediate ___ old hand ___ past user ___

3. Have you received formal training regarding the innovation (workshops, courses)?
Yes ___ No ___

4. Are you currently in the first or second year of use of some major innovation or program other than this one?
Yes ___ No ___

If yes, please describe briefly:

Thank you for your help!

Appendix E: Teacher Focus Group Protocol

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
Informed Consent for Participants
in Research Projects Involving Human Subjects

Title of Project: *Planning, Preparing, and Implementing a 1:1 Computing Initiative in K-12 Education: A Case Study of a School Division's Journey Towards a 1:1 Computing Environment for Students and Staff*

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I. Purpose of this Research Project

Thank you for participating in the following interview. This interview is going to be used as part of the dissertation titled: *Planning, Preparing, and Implementing a 1:1 Computing Initiative in K-12 Education: A Case Study of a School Division's Journey Towards a 1:1 Computing Environment for Students and Staff*. You have been invited to participate in this focus group because you have been participating in a one-to-one computing environment within your school division. Each child that enters your classroom has been provided a laptop that can be used for educational purposes.

II. Procedures

The focus group will be recorded using a digital recording device. The focus group data will be transcribed following the interview and available for you to review to check for accuracy. Your name will not be shared in the research findings. During the focus group you will be asked 5 questions and you and your colleagues will be provided time to discuss how the one-to-one computing initiative has affected your teaching and the students' learning. The focus group should take 15-20 minutes to complete.

The focus group will take place at a location and time that is convenient for the participants. There will be no need for a follow up meeting for focus group participants.

III. Risks

The risk that focus group participants have with participating is that other members of the focus group may share information that a member of the group shared during the

discussion with people outside of the focus group. This would affect the confidentiality of the persons participating in the focus group.

IV. Benefits

The study will analyze the planning and preparation that went into a kindergarten through twelfth grade school division's one-to-one computing initiative. The study will be a detailed analysis of the implementation process for distributing digital devices to students, the monitoring process of the one-to-one digital initiative, the current perception of teachers on their concern with the one-to-one computing initiative and the school division's plan for continuing the one-to-one computing initiative. The anticipated findings will contribute to literature on change processes and the integration of technology into instructional practices in third through twelfth grade classrooms.

No promise or guarantee of benefits has been made to encourage you to participate.

V. Extent of Anonymity and Confidentiality

The extent of anonymity and confidentiality depends on the focus group participants. Other members of the focus group may share information that a member of the group shared during the discussion with people outside of the focus group. This would affect the confidentiality of the persons participating in the focus group.

The school division involved in the study will be referred to using a pseudonym. Data collected during the interview will be stored on a password protected computer and an encrypted USB drive.

At no time will the researcher release identifiable results of the study to anyone other than individuals working on the project without your written consent.

The Virginia Tech (VT) Institutional Review Board (IRB) may view the study's data for auditing purposes. The IRB is responsible for the oversight of the protection of human subjects involved in research.

VI. Compensation

Subjects will not be compensated for their participation in the study.

VII. Freedom to Withdraw

It is important for you to know that you are free to withdraw from this study at any time without penalty. You are free not to answer any questions that you choose or respond to what is being asked of you without penalty.

Please note that there may be circumstances under which the investigator may determine that a subject should not continue as a subject.

VIII. Questions or Concerns

Should you have any questions about this study, you may contact one of the research investigators whose contact information is included at the beginning of this document.

Should you have any questions or concerns about the study's conduct or your rights as a research subject, or need to report a research-related injury or event, you may contact the Virginia Tech Institutional Review Board at irb@vt.edu or (540) 231-3732.

IX. Subject's Consent

I have read the Consent Form and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent:

_____ Date _____
Subject signature

Subject printed name

(Note: each subject must be provided a copy of this form. In addition, the IRB office may stamp its approval on the consent document(s) you submit and return the stamped version to you for use in consenting subjects; therefore, ensure each consent document you submit is ready to be read and signed by subjects.)

Focus Group Questions

1. What is your job position title?
2. How long have you been teaching in a one-to-one computing environment for students?
3. How has the one-to-one computing initiative affected your teaching practices?
4. Your staff has been trained on the SAMR model, what area within the SAMR model do you feel has affected your teaching practices?
5. What advice would you give to another teacher who was about to start teaching in a one-to-one computing classroom?

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