A TRANSCENDENTAL PHENOMENOLOGICAL STUDY OF THE EXPERIENCES OF HIGH SCHOOL STUDENTS ENGAGED IN AN ESTABLISHED 1:1 TECHNOLOGY PROGRAM

by

Kevin Michael Mathes

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

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ABSTRACT

The purpose of this qualitative transcendental phenomenological study was to seek understanding as to the impact of an established 1:1 technology program on the educational experiences of high school students. The theories guiding this study were constructivism, based on the works of Lev Vygotsky and Jean Piaget, and connectivism, based on the work of George Siemens. Three high schools in a mid-Atlantic state with established 1:1 technology programs were identified as sites for this study. Participants included five high school students from each school site. The sequential data collection process began with one-on-one interviews with the participants, then a focus group discussion, and concluded with participant journals. Data analysis was conducted by following a simplified version of Moustakas' guidelines for organizing and analyzing data of transcendental phenomenology. The five main themes that emerged from the data analysis process were: (a) access, (b) skills, (c) communication, (d) challenges, and (e) attitudes.

Keywords: connectivism, technology, technology integration, 1:1 technology.

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List of Abbreviations

Institutional Review Board (IRB)

International Society for Technology in Education (ISTE)

Technological Content Knowledge (TCK)

Technological Pedagogical Knowledge (TPK)

Technological Pedagogical Content Knowledge (TPACK)

CHAPTER ONE: INTRODUCTION

Overview

Technology has infiltrated every aspect of modern life, and classrooms are no exception. Schools are increasingly integrating technology with instructional practices to improve students' learning experiences and better prepare them to be successful in a technology-driven world in the 21st century. Schools have invested in various types of technology such as computers, mobile devices, Internet access, and interactive whiteboards to integrate in the 21st century classroom (Cheung & Slavin, 2013). Technology integration in education promotes higher order thinking skills that prepare students for a technology-driven world in the 21st century (Khan, 2012). Due to technology integration with classroom computers, mobile devices, Internet access, and interactive whiteboards, classrooms and learning environments are changing; therefore, students' educational experiences are also changing (Aagaard, 2015).

Although schools are implementing 1:1 technology programs to develop 21st century skills and promote higher order thinking skills, more research is needed regarding students' learning experiences within implemented 1:1 technology programs (Bebell & O'Dwyer, 2010; Carver, 2016; Flutter, 2006; Montrieux, Vanderlinde, Schellens, & De Marez, 2015). This study sought to better understand the lived educational experiences of high school students in established 1:1 technology programs. This chapter includes background information, my interest in this study, statement of the problem and purpose, research significance, guiding questions, and key terms with definitions, all of which provide the foundation from which the study is developed.

Background

The prevalent theoretical premise postulates that increasing student access and use of technology in education would lead to improved teaching instruction, student motivation for learning, student attendance, and the development of critical thinking skills (Bebell & Kay, 2010; Carver, 2016; Zheng et al., 2016). For these reasons, educational leaders and policy makers have invested their resources in educational technologies that include 1:1 technology programs (Bebell & O'Dwyer, 2010).

Initial 1:1 technology programs' research reports positive educational experiences with the integration of technology in the classroom; however, more research is needed regarding how technology in the classroom affects students' overall educational experiences (Grundmeyer & Peters, 2016; Montrieux et al., 2015). While the literature reports positive outcomes for inclusion of 1:1 programs, a void is noted regarding the voices of students as they have changed from traditional learning to the integration of technology in their learning environments. The results of this study contribute to this gap in the literature by articulating the stories of students' perceptions, adjustments, and challenges as they assimilated into this setting. School administrators, technology directors, and teachers could use the results from this study to make decisions regarding the implementation of a 1:1 technology program and to help students adjust to the change in instructional methodology. The feedback from students who use technology in education could provide a more constructivist, student-centered learning environment approach to increase engagement and achievement (Incantalupo, Treagust, & Koul, 2013). This research study adds insight into the understanding of the educational experiences of students in established 1:1 technology programs and provides valuable information to administrators and educators seeking to improve or implement a 1:1 technology program.

Situation to Self

This study is significant to me as a school administrator because my school launched a school-wide 1:1 technology program in the fall of 2014. Prior to the official launch, my school spent three years researching and preparing to implement the 1:1 technology program. Administrators sought program aspects that would maximize the benefits of 1:1 instruction, including hardware investigations and teacher training for professional development. In addition, the school's technology infrastructure was updated in order to support the 1:1 technology program. Due to thorough planning, the implementation of the program was well received by both teachers and students. With the preparation work completed and the program moving forward, I am curious to understand how effective 1:1 technology affects the learning needs of the students and how it enhances their overall educational experience? As technology continues to improve and 1:1 technology programs continue to develop, I wonder how 1:1 technology has impacted the overall educational experience for high school students. Through this research, I gained valuable insight into the perceptions, challenges, and adjustments students experience as they engage in 1:1 technology programs.

As I pursued this qualitative research, I studied the phenomenon through both a constructivist and connectivist lens. A constructivist lens helped me understand how students acquire new knowledge and build upon their existing knowledge through the use of a technological device in a learning environment (Andersson et al., 2016; Mbati, 2013). A connectivist lens helped me understand how students adapt and develop new ways to learn and understand content being taught through the process of assimilation or accommodation to make sense of their learning experiences with a technological device (Dunaway, 2011). From this work, I tested previously touted axiological assumptions by representing the voices yet unheard,

the educational experiences of high school students in an established 1:1 technology program.

Problem Statement

The problem that this study addresses is that as technology integration in education continues to advance and more schools implement 1:1 technology programs, there is a need to understand the educational experiences of students using technology to determine its value as a viable learning tool and a foundation for life in a technology-driven world. Most specifically, how do students' perceptions impact their transition from traditional modes of instruction to the use of technologically integrated pedagogical methods? What adjustments and challenges do students face as their learning environment changes?

Technology has infiltrated every aspect of modern life, and classrooms are no exception. Schools have invested in various types of technology, such as computers, mobile devices, Internet access, and interactive whiteboards (Cheung & Slavin, 2013). As technology integration changes learning environments, students' educational experiences are also changing (Aagaard, 2015).

Argueta et al. (2011) reported positive relationships between 1:1 technology programs and the teaching and learning process. Zheng et al. (2016) added that student learning qualities such as engagement, motivation, and persistence appear to be higher in schools using 1:1 technology programs than those without the technology. While reports have been encouraging, Flutter (2006) and Montrieux et al. (2015) postulated that the research has often focused on ease of integration, but it is lacking with regard to the lived educational experiences of students and how technology integration impacts their ability to learn.

Purpose Statement

The purpose of this qualitative transcendental phenomenological study was to seek understanding as to the impact of an established 1:1 technology program on the educational experiences of high school students. The central phenomenon of high school students experiencing technology integration was generally defined as the educational experiences of high school students in an established 1:1 technology program. The main theory guiding this study was connectivism, which Bell (2011) determined is a viable learning theory that finds effective application as a fundamental learning theory for the digital age.

Significance of the Study

Carver (2016) reported that when technology is integrated in the classroom environment, students come to class ready to learn. Carver added that technology integration increases student motivation, attitude toward learning, engagement, and self-confidence, while improving organization and study skills. The impact of the use of technology appears to have an impact on student learning experiences, but what lived adjustments and possible barriers reside within those outcomes? For perpetuity of the technology integration in education movement, educators and technology developers could benefit from eliciting such input from students. This feedback could help educators provide a better, more constructivist, student-centered learning environment that will lead to an increase in student engagement and achievement (Incantalupo et al., 2013).

Initial research of 1:1 technology programs report positive relationships between 1:1 technology programs and various aspects of the learning process include the following: student engagement, motivation, and persistence (Arugueta et al., 2011; Zheng et al., 2016). Although the reports have been encouraging regarding student use of technology in classrooms, Flutter (2006) and Montrieux et al. (2015) postulated that the lived educational experiences of students

have not been thoroughly examined. Hearing the voices of these students may lead to an improved understanding of the effect that 1:1 school technology programs have on students' educational experiences. Such knowledge could benefit school leaders contemplating initial 1:1 technology program development and implementation as well as benefit administrators of existing 1:1 technology programs as they seek to assess and improve students' educational experiences.

Research Questions

The following research questions were used to guide this qualitative study by providing information missing in the literature regarding high school students' perceptions and experiences as they engaged in a high school 1:1 technology learning environment. The format for the research questions was designed following Creswell's (2013) model that questions be few in number and open-ended in design. "Qualitative research questions are open-ended, evolving, and non-directional. . . restate the purpose of the study in more specific terms. . . start with a word such as 'what' or 'how' rather than 'why'. . . and are few in number" (Creswell, 2013, p. 138). Therefore, the three research questions below are appropriate for this qualitative study.

Research Question One: How do high school students describe their overall educational experiences in an established 1:1 technology program? The first research question provides an opportunity for high school students to describe their perceptions of their overall educational experience in a school with an implemented 1:1 technology program. Both constructivism and connectivism learning theories suggest that learning takes place through the individual experiences of students who make connections between ideas composed from information resources and technologies (Dunaway, 2011; Ultanir, 2012). This guiding question

was used to gain a rich description of students' personal educational experiences through the use of technology in a 1:1 technology learning environment (Creswell, 2013; Moustakas, 1994).

Research Question Two: What are high school students' perceptions of how 1:1 technology is integrated in their school learning environment? The second research question was used to shift from the overall perceptions to more specific information about students' experiences as to how technology use as a pedagogical methodology impacts the learning environment. Windschitl and Sahl (2002) noted that educators have moved toward a more constructivist or collaborative pedagogy due to being challenged to integrate technology in their instructional practices.

Research Question Three: What benefits and challenges do high school students encounter as a result of being educated in a school with an established 1:1 technology program? This question focuses students' input on the change factors encountered as they adapt from traditional modes of learning to the integration of technology in the learning environment. The prevailing view is that there is a need for a pedagogical paradigm shift from emphasizing memorizing content to developing 21st century skills where students think for themselves, solve problems by doing, and collaborate in learning in groups (Kivunja, 2014). Connectivist learning theorists propose that students must adapt and overcome challenges as they develop new ways of learning and understanding content being taught. Students must engage in the learning process of assimilation to make sense of their learning experiences (Siemens, 2005).

Definitions

In order to help in the understanding of the research study, this section contains important definitions of key terms that were used throughout this study.

1. 21st Century Skills *(TFCS)* – For the purpose of this study, 21st century skills are defined as a combination of traditional and emerging skill sets coupled with the realities of the Information Age that are necessary to successfully contribute to today's technology-driven world (Stone, 2016; Warschauer, 2006).
2. Connectivism – For the purpose of this study, connectivism is defined as the use of networks in understanding learning and addressing students' (1) intrapersonal view of learning, (2) failure to address the learning that happens with technology, and (3) lack of contribution to value judgments that need to be made in knowledge-rich environments. (Bell, 2011).
3. Technology – For the purpose of this study, technology is defined as a technological device to include the following: a laptop computer, smart phone, or a tablet computer because this study focuses on students' experiences using technology and not on the technology itself (Kroksmark, 2016).
4. Technology integration – For the purpose of this study, technology integration is defined as the incorporation of technology into the curriculum for instructional purposes in a learning environment to promote learning (An & Reigeluth, 2011).
5. 1:1 Technology program – For the purpose of this study, a 1:1 technology program is defined as a program in which every student and teacher has a technological device that would include the following: a laptop computer, smart phone, or a tablet computer that is integrated in teaching and learning in the classroom environment (Kroksmark, 2016).

Summary

With the opening of the 21st century, the prevailing educational theorists touted the need for technology's integration as an educational learning tool so that pedagogical practices would

better connect student learning with their natural tendency to gain knowledge through a digital format. In doing so student motivation for learning and the development of critical thinking skills should improve (Bebell & O'Dwyer, 2010). Successful technology integration in education requires an integrated and collaborative effort among administrators, teachers, and students (Fu, 2013). The problem is that as technology integration in education continues to advance and as more schools implement 1:1 technology programs, there is a need to understand the educational experiences of students using technology to determine its value as a viable learning tool and a foundation for life in a technology-driven world. The purpose of this qualitative transcendental phenomenological study was to seek understanding as to the impact of an established 1:1 technology program on the educational experiences of high school students. While the literature reports positive outcomes for inclusion of 1:1 programs, a void is noted regarding the voices of students as they have changed from traditional learning to the integration of technology in their educational environments. The results of this study contribute to this gap in the literature by articulating the stories of students' perceptions, adjustments, and challenges as they assimilated into this constructivist trust. School administrators, technology directors and teachers could use the results from this study to make decisions regarding the implementation of a 1:1 technology program and to help students adjust to the change in instructional methodology.

Chapter two reviews the current research, evidencing the gap in literature concerning high school students' lived educational experiences in an established 1:1 technology program. This research study was guided by both past and present learning theories related to the integration of technology in education.

CHAPTER TWO: LITERATURE REVIEW

Overview

As technology integration changes learning environments, students' educational experiences are also changing (Aagaard, 2015). The purpose of this qualitative transcendental phenomenological study was to seek understanding as to the impact of an established 1:1 technology program on the educational experiences of high school students. This chapter is comprised of four sections that include the following: overview, theoretical framework, related literature, and a chapter summary.

Theoretical Framework

Argueta et al. (2011) reported that the implementation of 1:1 technology programs shifted instructional pedagogy from teacher-centered instructional practices to more student-centered instructional practices. Because 1:1 technology programs provide an improved means to individualize instruction, one of the critical issues for the planning and implementation of a 1:1 technology program is the importance of understanding students' educational experiences (Argueta et al., 2011). With a primary emphasis on students' educational experiences, a qualitative transcendental phenomenological study design is appropriate and was used for this study because the focus is on the lived educational experiences of the participants and not on the interpretations of the researcher (Moustakas, 1994). The study's theoretical framework is grounded in constructivist and connectivist learning theories. Mobile technologies promote constructivist teaching and learning philosophies. Mobile technologies also utilize learner-centered and situated learning experiences to help students shape their knowledge (Kissinger, 2013). Connectivism takes into account the means students use to assimilate knowledge while

accommodating to changing learning environments, thus applicable to this study's focus on the integration of the 1:1 technology in the school environment (Siemens, 2005; Dunaway, 2011).

Constructivism

Constructivism is an educational learning theory developed by theorists Piaget and Vygotsky. Fox (2001) defines constructivism "as a theory of learning, its central claim is that human knowledge is acquired through a process of active construction" (Fox, 2001, p. 24). In theory, constructivism purports that truth is relative and thus best found through active learning. While disagreement may be had regarding whether truth is absolute and independent of human knowledge or whether truth is relative to personal understanding, the fundamental maxim that knowledge can be acquired through active constructivism holds wide support. It is beyond the scope of this project to discuss these issues related to constructivism and relativism. This study takes into account that knowledge can be acquired through active constructivism. Fox identified seven assumptions that help define constructivism:

1. Learning is an active process.
2. Knowledge is constructed, rather than innate, or passively absorbed.
3. Knowledge is invented, not discovered.
4. All knowledge is personal and idiosyncratic.
5. All knowledge is socially constructed.
6. Learning is essentially a process of making sense of the world.
7. Effective learning requires meaningful, open-ended, challenging problems for the learner to solve (p. 24).

According to Baviskar, Hartle, and Whitney (2009) the learning theory of constructivism has four elements:

- all new knowledge is acquired in relation to prior knowledge
- being aware of the differences between prior knowledge and new knowledge
- the application of the knowledge with feedback
- reflecting on learning to integrate the new knowledge permanently

These four elements of constructivism were taken into consideration throughout this study.

Dewey (1916) explained that there are two major pillars for education: continuity and interaction. According to Dewey (1916), continuity refers to the experiences of students which influence their learning, and interaction refers to how past experiences interact with the current learning experience. Dewey's premise takes a constructivist approach and suggests that students will learn something through every experience. Therefore, every experience will affect future learning, which makes the learning experience unique to the individual (Andersson, Wiklund, & Hatakka, 2016). Constructivism emphasizes hands-on, activity-based teaching and learning in which students develop their own frames of thought and knowledge based on their own unique learning experiences (Keengwe, Onchwari, & Agamba, 2014).

The constructivist theory suggests that learning takes place when students use pre-existing knowledge to problem solve through hands-on activities or projects, developing individual learning experiences (Ultanir, 2012). Piaget (1952) proposed that learners construct new knowledge from their own experiences through the processes of assimilation and accommodation. Learners use the process of assimilation to incorporate their new experiences into their existing framework, but learners use the process of accommodation to adapt their existing framework to fit their new experiences (Tobias & Duffy, 2009).

The field of education has seen a shift toward a more collaborative pedagogy with the introduction of technology in the classroom, and teachers are being challenged to support

collaborative learning while implementing technology in their classrooms (Windschitl & Sahl, 2002). Bell (2011) stated that constructivism emphasizes a collaborative learning environment in education that promotes social interactions regarding knowledge or facts about the world. Kissinger (2013) asserted that mobile technologies promote constructivist teaching and collaborative learning, and mobile technologies allow for learner-centered and situated learning experiences to take place.

Constructivists hold to the premise that students' learning habits affect the way future learning advances. Teachers, therefore, need to understand the collaborative learning practices in 1:1 technology programs in developing learning objectives for classroom assignments that support a constructivist learning philosophy (Andersson et al., 2016). Teachers need to be aware of the specific challenges involved in a 1:1 technology learning environment in order to support collaborative learning. Ramsden (2003) stressed the importance of understanding the unique learning experiences of students and argued that the differences in learning experiences are due to the differences in the ways that students experience learning. Ramsden (2003) believed that these differences in learning could be explained in terms of students' learning experiences based on their teacher's teaching. The constructivist approach to learning suggests that previous learning experiences will influence current learning experiences. According to Anderson et al. (2016) depending on the previous teaching approaches associated with the previous learning experiences, the implementation of new teaching approaches could influence current learning experiences. Based on the constructivist theory of learning, the teaching approaches associated with 1:1 technology programs, such as collaborative and cooperative learning, should be introduced earlier in order for students' learning experiences to be established for future learning experiences in 1:1 technology programs (Andersson et al., 2016).

Connectivism

Connectivism was characterized by Siemens (2005) as a successor to behaviorism, cognitivism, and constructivism. Connectivism identifies and addresses the following three limitations that behaviorism, cognitivism, and constructivism seem to be missing;

- their intrapersonal view of learning
- their failure to address the learning that happens with technology
- their lack of contribution to value judgements that need to be made in knowledge-rich environments.

Connectivism addresses the limitations of its predecessors, including constructivism, by taking into account that learning takes place when the learner makes connections between ideas composed from information resources and technologies that make up a student's personal learning network (Dunaway, 2011).

Siemens (2005) reported that the emergence of technology in education has impacted learning so significantly that a new learning theory was required. Established learning theories, including constructivism, only suggest that learning occurs within a person or brain-based learning and ignore the idea that learning could occur as networked elements outside of human beings (Dunaway, 2011). With the integration of technology in classrooms, students must adapt and develop new ways to learn and understand the content that is being taught. Students engage in the process of assimilation or accommodation to make sense of their experiences of learning with the integration of technology in the classroom.

The constructivist theory of learning emerged prior to the revolutions in technology that created the Internet and prior to the implementation of technology in education (Dunaway, 2011). Connectivism takes into account that learning takes place when the learner makes

connections between ideas composed from information resources and technologies that make up a student's personal learning network (Dunaway, 2011). Knowledge is therefore attained from students' personal learning networks as they recognize connections between concepts, opinions, and perspectives that are gathered by the learner through technology via the Internet through web search engines, electronic databases, and online information resources (Dunaway, 2011).

Connectivism takes into account the ever-changing educational environment due to technology integration (Siemens, 2005). The following are the major principles of connectivism (Siemens, 2005):

- Learning and knowledge rest in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- The capacity to know more is more critical than what is currently known.
- Nurturing and maintaining connections is needed to facilitate continual learning.
- The ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision making is itself a learning process. Choosing what to learn and meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate that impacts the decision.

The above connectivism principles provide a new perspective of how learning takes place within a 1:1 technology learning environment. Therefore, the connectivist perspective takes into account the need for making connections to acquire knowledge. The foundations of

connectivism align with learning objectives found in technology education and can help teachers better prepare lessons that take into account how students learn in a technology-rich environment (Dunaway, 2011). According to Thota (2015) connectivism has been advanced as an accepted learning theory for the digital age. Therefore, connectivism was used as a theoretical framework guiding this qualitative study.

Related Literature

An and Reigeluth (2011) defined technology integration as the use of technology for instructional purposes in a learning environment to promote teaching and learning. The review of related literature focuses on both teacher perspectives as well as student perspectives regarding technology integration in education.

Need for 21st Century Skills

Kaufman (2013) stated that the purpose of a school comes from a combination of three different perspectives. A student's perspective would be to get good grades. A parent's perspective is for a school to educate students. A teacher's perspective seeks to prepare students for their futures. Kaufman proposed a fourth purpose: school should focus on contributions to society. Kaufman (2013) developed the following list of 21st century skills that all students need in order to be able to successfully contribute to a 21st century society.

- global awareness,
- creativity,
- environmental and civic literacy,
- health and wellness awareness,
- leadership skills,
- social responsibility,

- critical thinking,
- financial and economic literacy awareness,
- contextual learning skills,
- ethics,
- adaptability,
- business and entrepreneurial literacy,
- problem-solving skills,
- communicative skills,
- media literacy skills,
- collaboration skills and people skills,
- information and communication technology skills,
- accountability,
- personal productivity,
- personal responsibility and self-direction,
- and innovative capability.

The International Society for Technology in Education (ISTE) was developed to help schools focus on educating students to make contributions to society in a technologically driven world. ISTE developed a list of standards for technology integration for students, teachers, and administrators that pertain to the 21st century skills and knowledge students need to learn effectively and to live productively in an increasingly global and digital world (ISTE, 2016a). The ISTE Standards for Students (ISTE, 2016b) emphasizes the 21st century skills and qualities needed for students to engage and thrive in a connected, digital world. The ISTE Standards for Students include:

1. Empowered Learner – Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences.
2. Digital Citizen – Students recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical.
3. Knowledge Constructor – Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.
4. Innovative Designer – Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.
5. Computational Thinker – Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.
6. Creative Communicator – Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.
7. Global Collaborator – Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally (ISTE, 2016b).

The above ISTE Standards for Students go beyond foundational content knowledge and technical proficiency to describe what is required for students for productive participation in a digital-age world (Dondlinger, McLeod, & Vasinda, 2016).

Prior to the 21st century, schools emphasized the three "r's" of education; reading, writing, and arithmetic. However, 21st century schools must teach their students 21st century skills that emphasize the new three "r's": rigor, relevance, and real-world skills (McCoog, 2008). The main reason many schools across the United States have implemented 1:1 technology programs is to assure students develop 21st century skills that have been deemed necessary for success in the digital age (Stone, 2016; Swallow, 2015). Stone (2016) defined 21st Century skills as a combination of traditional and emerging skill sets coupled with the realities of the Information Age. Technology skills are necessary for students to be successful in today's global society.

Larson and Miller (2011) reported that 21st century skills should include the following: creativity, innovation, communication, collaboration, teamwork, critical thinking, decision making, research fluency, and problem solving. Educators are tasked with the challenge of educating 21st century students while integrating technology into their learning experiences (Boles, 2011). The above factors have set the stage for a very different type of learner than schools have been accustomed to serving, therefore schools will have to adapt to meet the needs of the 21st century student in order for them to succeed (Lemely, Schumacher, & Vesey, 2014). In an effort to meet the 21st century students' high technological demands, schools have implemented 1:1 technology programs where each student has their own technological device.

Educators agree with business leaders that 21st century skills are needed for students to succeed in today's world of global communication, social networking, and constantly changing technology (Moylan, 2008; McCoog, 2008). Kong et al. (2014) reported that there are three emphases in the learning process for developing 21st century skills in students. The first emphasis is skills development for students in both formal and informal learning contexts. These

students will be engaged in a formal learning environment that develops general skills that are teacher-initiated in a digital classroom. Students will also be engaged in an informal, after-school, learner-initiated learning process using social platforms that meet individual student needs (Kong et al., 2014). The second emphasis is skills development through both individualized and collaborative learning approaches. The 21st century student will take responsibility to develop and apply skills for planning goals, implementing tasks, monitoring progresses, and evaluating outcomes throughout their learning process (Kong et al., 2014). The third learning emphasis is skills development that is supported by evidence of improvement and awareness of progress. Students' learning processes can be specifically designed to meet their learning needs within a 21st century learning environment. Evidences of learning and areas of needed improvement could be collected for the student's performance throughout the learning process, which can be indications of applying 21st century skills for processing real-life information, reflecting on problem-solving ways, articulating knowledge and applying a personal perspective of knowledge construction (Kong et al., 2014).

Technology in a 21st century learning environment plays a crucial role in helping schools achieve their desirable learning goals, learning processes, and learning outcomes in developing 21st century skills (Kong, et al., 2014). The 21st century student has access to technology, access to digital resources, and use technology to communicate and collaborate with peers throughout their learning process. This exposes the 21st century student to many opportunities to apply 21st century skills within the 21st century learning environment (Kong et al., 2014). The need to develop 21st century skills in students should motivate schools to create 21st century learning environments and implement 1:1 technology programs. The use and integration of technology in education is an appropriate and natural way to help students develop 21st century skills to prepare

them for a computerized society and provide a major advantage for both teachers and students (Gaitanaru, 2014).

The learning process in 21st century learning environments should consider three key elements for maximizing learning opportunities conducive to developing 21st century skills (Kong et al., 2014). The first element is to blend formal and informal learning approaches in order for schools to bridge the existing gap between school curriculum and society awareness. The second element is to balance individualized and collaborative learning in order to help students increase awareness of learning achievement and increase students' motivation to learn with peers. The third element is to collect evidence of students' improvement and build awareness of students' progress in order to help teachers and students to understand the levels of learning outcomes on the formative basis and then make informed decisions on the next step of teaching and learning in a 21st century learning environment (Kong et al., 2014). Kong et al. (2014) reported that 1:1 technology programs that provide students and teachers with technology tools for tracking and storing learning data are technological supports favorable to the realization of these three key elements in the learning process for developing 21st century skills inside and outside the 21st century learning environment.

Students in schools with implemented 1:1 technology programs shared that they felt that they had developed 21st century skills that better prepared them for the future in college and the workforce (Argueta et al., 2011; Lowther, et al., 2007; Shapley, et al., 2008). Argueta et al. (2011) studied and evaluated seven major 1:1 technology programs in schools across the country. Their findings showed that students developed 21st century skills after the implementation of a 1:1 technology program in their school.

Background of 1:1 Technology Programs

Technology integration in education has the potential for improving both teaching and learning (Baytak, Tarman, & Ayas, 2011; Kong et al., 2014; Grundmeyer & Peters, 2016). Since the late 1970's there has been an increase in the use of computers and other technological devices in education. With technological advances in personal computers in the 1980s, educators began using computers for instructional purposes in education to improve teaching and learning (Grunmeyer & Peters, 2016). Initially, the Internet, accessed by classroom computers, was the main technological resource for both students and teachers in the classroom learning environment. Students have used the Internet as a supplemental resource for learning material that is being covered in the classroom. Teachers have used the Internet as a resource for creative teaching ideas that can be used in teaching new concepts to students (Galluch & Thatcher, 2011). Today, the Internet has become an essential learning tool that has been used by student and teachers not only to gather information as a resource, but also to contribute information and communicate on it (Oum & Han, 2011). Educators are now using technology in the classroom, and with the implementation of 1:1 technology programs, students are also using technology in the classroom learning environment to enhance their overall educational experiences (Collins & Halverson, 2010). Schools that effectively implemented 1:1 technology programs have taken the limitations off the teachers, textbooks, and curriculum by giving students digital resources and access to the information of the Internet to improve the learning process and students' overall learning experience (Grundmeyer & Peters, 2016; Tang & Austin, 2009).

Betrus (2012) reported that the advancement of instructional technology has resulted in changes in the delivery methods teachers use in the classroom. As the advancement of technology has increased and technology has become smaller, more portable, more powerful,

and increasingly interactive, educational technological devices are being implemented into 21st century classrooms for the purpose of increasing student engagement and promoting the motivation for students to learn (Bebell & O'Dwyer, 2010). Dr. Betrus' (2012) research shows the changes over time, in the advancement of instructional technology and classroom resources from books, worksheets, chalkboards, overhead projectors, TV/videos to classroom computers, SMART Boards, and mobile devices. In addition, Dr. Betrus' (2012) research shows the progression in advancement of the instructional delivery methods in education related to the changes in classroom resources from lecture and discussion instructional delivery to other various instructional delivery methods that include the following: differentiated instruction, flipped classrooms, distance education, blended learning, and eLearning (Betrus, 2012). The advancements in both the areas of instructional technology and classroom resources as well as the delivery methods for instruction will likely continue to change over time given that technology and teaching pedagogy is continually changing and updating. Technology is a part of students' everyday experiences and 21st century students have instant access to virtually unlimited information via the Internet (Grunmeyer & Peters, 2016). These 21st century students have been included in most major decisions regarding their upbringing including their education (Lemley, Schumacher, & Vesey, 2014). Ten years ago, 25% of school districts in the United States had the foresight to implement 1:1 technology programs. Five years ago, nearly 50% of the school districts in the United States were expected to implement 1:1 technology programs for their schools (Bebell & Kay, 2010).

A recent survey performed by Pegrum et al., (2013) revealed that mobile tablets were the most commonly used educational device in a classroom setting around the world. The survey also indicated that tablets are being regarded as the most promising educational technology tool

that supports both teaching and learning. Mobile technology, such as tablets or laptops, is considered to be the most cost-effective way to integrate technology into the classroom learning environment (Lemley et al., 2014). As schools continue to implement 1:1 technology programs in the classroom, technology will continue to change and improve. As technology improves, it will create new learning opportunities for students (Collins & Halverson, 2010). In order to comprehend technology's impact on society and on education, regarding teaching and learning, it is important to understand students' experiences with using technology (Cilesiz, 2010).

Kroksmark (2016) defined a 1:1 technology program as a program in which every student and teacher has a technological device that would include a laptop computer, a smart phone, or a tablet computer that is integrated in teaching and learning in the classroom environment. Zucker and McGhee (2005) conducted one of the largest 1:1 technology program studies involving more than 25,000 Virginia public school teachers and students. The results from Zucker and McGhee's (2005) study found that the 1:1 technology program benefited both students and teachers. The benefits to students from Zucker and McGhee's (2005) study of the 1:1 technology program included the following:

- Students had easier and greater access to the most up-to-date information.
- Student engagement and motivation to learn was increased.
- Students were more self-directed and organized in their learning.
- Student interaction was increased.
- Students had greater communication with their teachers.

The benefits to teachers from Zucker and McGhee's (2005) study of the 1:1 technology program included the following:

- Teachers productivity increased.

- Teachers collaboration with colleagues increased.
- Teachers had more flexibility during their instruction time.

Other studies of 1:1 technology programs also found increases in student learning and student engagement as a result of implementing 1:1 technology programs (Bebell & Kay, 2010; Keengwe, Schnellert & Mills, 2012).

The use of 1:1 technology by students is meaningful and is based on the intended learning outcome. Students have the opportunity for individualized learning using their technology through inquiry and problem solving. Technology in 1:1 technology programs is used for reflective practice as well as formative assessment in the 21st century classroom (Donovan, Green, & Mason, 2014). When every student in an established 1:1 technology program is equipped with a technological device, there is equal access available to information for all students (Franklin, 2011; Sprenger, 2010; Zucker & McGhee, 2005). The implementation of 1:1 technology programs offers many benefits to both students and educators in a digital world (Schnellert & Keengwe, 2012; Stone, 2016). The implementation of 1:1 technology programs in a 21st century learning environment can catapult the use of technology in education from occasional, supplemental use of computers by teachers for instruction to more frequent, integral use of technology across a multitude of settings and a wider array of resources (Grundmeyer & Peters, 2016).

Learning Environments for 1:1 Technology Programs

The impact technology has on the 21st century learning environment has dominated conversations in the field of education, where technology integration is seen as a vital resource in the classroom (Ramey, 2016). Winn (2002) identified the current age to be the "Age of Learning Environments", an age in which researchers study 21st century learning environments that are

comprised of all the various elements of previous ages such as carefully designed instructional content presented through a variety of formats to reach diverse learners, as well as interactive simulations of real-world phenomenon and problems (Winn, 2002). In order for 1:1 technology programs to be successful, the 21st century classroom necessitates a learning environment that is rich with technological devices and technology integration. Formal teaching centers alone within a classroom no longer meet the educational needs of the 21st century learner (Cervera & Johnson, 2015).

The 21st century students expects their learning environment to provide opportunities to develop their 21st century skills. These types of learning environments provide opportunities for students and teachers to work together to solve educational problems and generate appropriate learning outcomes for the student (Lemley, Schumaher, & Vesey, 2014). Galloway and Lasley (2010) declared that teacher-centric educational practices involving classroom lectures are ineffective for 21st century students within a 1:1 technology program. Learning environments with implemented 1:1 technology programs are no longer dependent on the school as a building or the learning environment as a classroom, but rather open a whole new world of learning possibilities that involves an unlimited amount of information and data from the Internet (Kroksmark, 2016). Because technology is abundant in the 21st century students' lives, schools could benefit from technology-based activities that can occur outside the classroom which will allow more class time to be focused on content. In addition, 1:1 technology programs meet the needs of 21st century students, who prefer not to have learning confined to just the classroom, but would rather have the freedom to learn at any time and any place (Kolb, 2011).

Lee and Hung (2012) proposed that there are five zones related to 21st century learning. The five zones include the following:

- zone of instruction,
- zone of practice,
- zone of interaction,
- zone of tinkering, and
- zone of metacognition.

The learning experiences across these five zones are more consistent to meeting the needs of the 21st century learner. Through the use of technology across the five zones, learning becomes flexible and personalized because it is not constrained by time and place (Lee & Hung, 2012). A flexible learning environment is a characteristic of a 21st century learning environment with a 1:1 technology program. A flexible learning environment promotes communication and collaboration that can be accomplished with clusters, dyads, or groups where students form groups based on the unique learning activity that is occurring (Donovan, Green, & Mason, 2014). Teamwork among students is also stimulated with technology integration through collaborative learning, through social learning, and through social networking (Gaitanaru, 2014).

Anderson et al. (2016) conducted a study that observed 36 classrooms in schools that have implemented 1:1 technology programs. Their study identified six broad strands of activities that occur in classrooms with 1:1 technology integration. The activities include the following: group work, individual work, teacher lecturing, student presentations, setup time, and watching movies. The classroom activities included times when 1:1 technology was used and times when 1:1 technology was not used. The study found that although individual work has increased since the 1:1 technology was implemented, group work was still more common than individual work during the observations and found that all six activities observed contributed to the learning process in the 1:1 technology learning environment (Anderson et al., 2016).

The learning environment in the 21st century classroom is constantly changing due to the changes of instructional tools that include technology. However, 21st century teaching and learning goes beyond technology integration in the classroom; it is also about fostering a new way of thinking and promoting dispositions that support success in an age driven by rapidly changing and expanding technologies. Therefore, 21st century teaching requires educators to create a learning environment that provides experiences to 21st century learners that encourage exploration and inquiry, and nurture creativity and curiosity (Ramey, 2016). According to Gallow and Lasley (2010) classroom learning environments are changing due to the integration of technology, therefore teachers and students must adapt in order to keep pace with the changes in education caused by technology. However, the changes that are occurring within the learning environment do not have to result in a negative learning experience for the students. Careful planning on the part of the teacher can ensure that learning experiences in the 21st century classroom are positive (Montfort & Brown, 2013). It is imperative that schools adapt the classroom learning environment to reach 21st century students (Gallow & Lasley, 2010).

Although there is research that explores student achievement, there is little research that explores students' perceptions of 21st century learning environments that meet the unique learning needs of 21st century students at the secondary level. The lack of research on student perceptions of 21st century learning environments and their effect on learning necessitates further research that addresses which learning environment meets the needs of 21st century students (Flutter, 2006). This research study helps fill this gap in literature related to students' perceptions of their educational experiences in established 1:1 technology programs.

Pedagogical Shift

Current educational practices such as teacher-centric lectures and classroom learning environments designed for students to absorb and regurgitate information are ill-suited for 21st century students (Gallow & Lasley, 2010). Technology makes information and educational content more readily available to teachers and students. Therefore, instructional goals for students must now incorporate application in real-world situations. Teachers must incorporate technology into their instructional goals and objectives in addition to changing their instructional materials and instructional strategies to accommodate classroom technology (Kearney, Schuck, Burden, & Aubusson, 2012).

In order for teachers to integrate technology in their classroom, they must first consider why they are using the technology in the classroom and also how the technology will contribute to the learning outcomes (Brooks, 2015; Kroksmark, 2014). Galloway and Lasley (2010) reported a paradigm shift in pedagogy is necessary for teachers to help 21st century students reach their full academic potential in a 1:1 technology program. However, teachers must have the pedagogical knowledge and skills to be able to make the paradigm shift to make a 1:1 technology program successful.

Implementation of 1:1 technology programs will lead to several changes in pedagogy as well as classroom practices. Teacher and student roles tend to shift after the implementation of a 1:1 technology program (Kroksmark, 2014; Lemley et al, 2014). Teachers will shift away from traditional pedagogical approaches and become more of a facilitator or coach, and students will become more engaged in student-centered learning activities (Argueta et al., 2011). Stone (2016) reported that traditional pedagogical teaching methods will no longer be the primary teaching methods used by teachers, but instead they will need to incorporate a more

collaborative, inquiry-based approach in which students will assume responsibility for their own learning while working collaboratively with other students.

Burkhardt and Cohen (2012) described the use of technology in the classroom as a deliberate pedagogical approach toward integrating technology in their classroom. Teachers are challenged to create a 21st century learning environment in which students can collaborate, communicate, and construct knowledge through the use of technology. For many teachers using technology in their classroom requires more than just learning how to use the technology; it involves a complete change in lesson preparation, teaching pedagogy, as well as classroom management (Larson et al., 2009).

The original Bloom's taxonomy is a framework for classifying statements of what teachers expect or intend for their students to learn as a result of the teacher's instruction. The original Bloom's taxonomy classifications are as follows: knowledge, comprehension, application, analysis, synthesis, and evaluation. Teachers have been trained to use the original Bloom's taxonomy when developing learning objectives for their instructional goals (Skiba, 2013). Krathwohl (2012) stated that the original taxonomy allowed teachers to classify curricular objectives and assessment items in a specific order to show breadth, or lack of breadth, of the objectives and items across the spectrum of categories from knowledge to evaluation. However, Skiba (2013) reported that there was a need for a revised version of Bloom's taxonomy to allow for the integration of technology in education in order for students to develop 21st century skills. A revised version of Bloom's taxonomy was developed by Anderson and Krathwohl in 2001 (Skiba, 2013). The revised Bloom's taxonomy classifications are as follows: remember, understand, apply, analyze, evaluate, and create.

There are many resources for educators that have been developed and adapted for educators regarding technology integration in the classroom (Skiba, 2013). A digital version of Bloom's taxonomy has been developed that can be associated with the use of technology in 1:1 technology programs. A specific example is the Bloom's Digital Taxonomy Pyramid that gives specific examples of technology integration that correspond to the revised Bloom's taxonomy classification. The Bloom's Digital Taxonomy Pyramid was developed for the 2010 Illinois Education and Technology Conference to give teachers an idea of what Web 2.0 applications apply at each level of Bloom's revised taxonomy (Skiba, 2013). This pyramid is just one example of an educational resource for teachers to use in developing their curriculum that integrates technology and corresponds to Bloom's taxonomy that promotes higher order thinking skills.

There is a significant increase in the quality of education when technology is interwoven with traditional educational resources, and there is a balance between traditional teaching methods and teaching methods that support technology integration (Gaitanaru, 2014). Additionally, TPACK, which stands for the combination of Technological Pedagogical Knowledge (TPK) with Technological Content Knowledge (TCK), provides educators with a framework for understanding how the implementation of technology in the classroom relates to pedagogy and content knowledge. The TPACK framework allows teachers to link technology, pedagogy, and content knowledge to be integrated in lesson plans and classroom instruction. In order for teachers to use the TPACK framework effectively, teachers need to have a working knowledge of how technology can be used to access and process information by students and an understanding of how technology can support and enhance a student's learning experience (Koh, Chai, Benjamin, & Hong, 2015).

A teacher's role in the 21st century classroom has evolved into a more guided and facilitated approach to student learning. Classroom instruction sets the learning goals and objectives while facilitating the learning activity. However, learning is now driven by students' feedback about their successes and challenges regarding their own learning experiences (Lee & Hung, 2012). Teacher expectations for students include an increasingly active classroom role and the utilization of knowledge and problem-solving skills that encompasses a broad range of academic interests (Galloway & Lasley, 2010). The combination of technology integration with traditional pedagogical methods represents a paradigm shift with implications for knowledge in 21st century society and for learning; therefore, the study of pedagogy needs to be modified according to the new reality that includes technology (Gaitanaru, 2014).

Adjusting to Learning in a 1:1 Environment

As teachers change their pedagogy to accommodate technology integration in the classroom learning environment, students must also adapt and change the way they learn while using technology in a 1:1 technology learning environment. Kroksmark (2014) reported that students will change their learning as a consequence of being educated in a 1:1 technology program. Since the integration of technology in education, his study noted that there are two different aspects to learning. The first is called analogue learning which implies learning from a more traditional learning environment using paper and pencil. The second is called digitalized learning which implies learning in a technology rich learning environment. According to his study, students adapt to the way they learn from analogue learning to digitalized learning as a result of working in a 1:1 technology learning environment (Kroksmark, 2014).

The learning environment in a 1:1 technology program allows for different learning styles in an optimal way because teachers and students can utilize technology in different ways to meet

their own learning styles (Kroksmark, 2014). However, learning is not only related to a student's innate ability, but also is a result of the student's experiences in the analogue and digital learning environment. All students are different and learn in different ways as an effect of having different learning experiences; however, it is these differences that allow students to adjust their learning styles in a 1:1 technology program's learning environment (Kroksmark, 2014).

Advantages of 1:1 Technology Programs

In order to maximize student learning outcomes of 1:1 technology programs, it is important to identify advantages to the implementation of 1:1 technology programs (Stanhope & Corn, 2014). Educators are always searching for ways to enhance high school graduates' preparedness for college and career readiness. Therefore, the implementation of 1:1 technology programs in high schools is being considered for improving preparedness and readiness for enhancing teaching and learning (Grundmeyer & Peters, 2016). There are several advantages for schools to implement 1:1 technology programs. The educational process gains independence and flexibility, while students take ownership of their education and achieve autonomy and self-determination in their own learning (Gaitanaru, 2014).

Stone (2016) reported the expectation of implementing a 1:1 technology program is that the program will benefit both teachers and students. Teachers will benefit from a 1:1 technology program because it will provide the opportunity to employ modern instructional practices that support the program, and students will benefit from 1:1 technology program because it gives them greater access to knowledge, technological tools, and they will receive both collaborative and individualized instruction from the 21st century learning environment (Stone, 2016). The results from Zucker and McGhee's study (2005) reported that the 1:1 technology program had many benefits that included the following:

- Students in the 1:1 technology program had easier and greater access to current information.
- Student engagement increased and students had more of a motivation to learn.
- Students are more organized and take more initiative in the learning process.
- Students communicate and interact more with teachers and peers.
- Teachers have an increase in professional productivity.
- Teachers collaborate more and are engaged more with other teachers.
- Teachers have more flexibility during their instruction time in the classroom learning environment.

In addition, 1:1 technology facilitates formal and informal learning through the use of mobile learning, social networks, discussion forums, and live news platforms that allow students and teachers access to information anytime and anywhere (Gaitanaru, 2014).

Warschauer (2006) reported that there are five primary benefits for schools to implement a 1:1 technology program. The five primary benefits to a 1:1 technology program according to Warschauer (2006) are:

- to help students develop needed 21st Century Skills;
- to promote greater student engagement in the 21st Century Learning Environment;
- to allow students to build their writing skills;
- to encourage deeper student learning through the availability of multiple viewpoints and access to more information through the technology; and
- to facilitate easier integration of technology into day-to-day instruction within the 21st Century Learning Environment.

In addition, Muir, Manchester, and Moulton (2005) and Penuel (2006) indicated four additional benefits to technology in education, which are:

- Technology facilitates individualized learning, making it personalized to the needs of the individual student.
- Undeserved students tend to learn basic skills better and faster if they practice those skills using technology.
- Students who use technology show a higher level of comprehension and a greater likelihood of applying what they learn later in their lives.
- Technology access can decrease absenteeism, lower dropout rates, and motivate more students to pursue education beyond high school.

North Carolina State University conducted a study concerning 1:1 technology program initiative across multiple states that produced authentic feedback from educators who were involved in the 1:1 technology program. Participants from the study reported generally positive relationships between the 1:1 technology program's learning environment and the teaching and learning process. The findings also indicated a shift from traditional, teacher-centered instruction to a more student-focused learning environment which led to a more positive learning experience from the students. The overall findings of the study indicated increased student motivation and engagement due to the 1:1 technology program initiative and resulted in subsequent increases in achievement (Argueta, Huff, Tingen, & Corn, 2011). Technology integration in education leads to a higher level of academic performance and an increase in a student's motivation for learning (Gaitanaru, 2014).

Challenges and Barriers for Teachers

Teachers are an integral component in the learning process for students, and their needs should be taken into consideration when educational leaders are deciding whether or not to implement a 1:1 technology program (Shieh, 2012). Despite all the potential benefits and advantages of a 1:1 technology program, there are challenges and barriers for teachers who do not always have the skills, time, training, or resources necessary to employ technology effectively to benefit students and improve student learning (Grundmeyer & Peters, 2016). Unfortunately, the lack of teacher skills, time, training, and resources necessary to implement technology effectively results in technology being improperly used in the classroom (Alsafran & Brown, 2012). The research regarding the challenges and barriers for technology integration involving teachers include: lack of professional development, classroom time constraints, and teacher buy-in (King, 2002). One of the greatest barriers for a 1:1 technology program has been in the area of professional development for teachers. Providing teachers with professional development in technology integration and professional development in supporting students with remediation who lack technology access and skills is essential to the success of a 1:1 technology program (Gulek & Demirtas, 2005). Hughes (2013) reported that pre-service teachers that graduated from a 1:1 technology pre-service program developed the necessary technology skills, but they lacked the pedagogy and content knowledge needed to implement future technology. Teachers are charged with integrating technology into their classroom and curriculum, especially in schools with a 1:1 technology program. Unfortunately, the lack of professional development for teachers in the area of technology integration has created a challenge for many 1:1 technology programs. However, King (2002) reported professional development for teachers in the area of technology integration should be much more than just training them on how to use the

technology. Larson et al. (2009) proposed ongoing professional development opportunities for teachers regarding technology integration that is needed to help teachers change their pedagogy and classroom management successful technology integration in a 1:1 technology program. Teachers need support and encouragement in order to accept their new role in a 21st century classroom in a 1:1 technology program. "Classroom change greatly relies on teacher change" (Shieh, 2012, p. 208). Given how quickly the uses and types of technology change in a 21st century classroom, a long-term professional development plan for teachers is essential (Larson et al., 2009).

In addition to the lack of professional development for teachers regarding technology integration, there is a potential problem technology can take away time in the classroom used for teaching and learning. Klaus (2013) claimed if teachers and students are not experienced with the use of technology in the classroom, then classroom time is often wasted on technical difficulties. Teachers must integrate technology in their classroom for a specific purpose. The random use or the integration of technology at the wrong time in the lesson may lead to student boredom, monotony, inefficiency, and result in failure to complete the learning objectives (Gaitanaru, 2014). In order for teachers to be effective with integrating technology, it is important for teachers to understand the framework of how the implementation of technology in the classroom relates to pedagogy and content knowledge. The TPACK framework is effective in helping teachers understand how technology can support and enhance a student's learning experience (Koh, Chai, Benjamin, & Hong, 2015). A multiple case study that examined 1:1 technology programs in five different school districts demonstrated that the schools that provided teachers professional development and ongoing support saw a positive impact in the implementation of the 1:1 technology program (Topper & Lancaster, 2015). In addition, time

used for teaching and learning can be limited if the teacher or students are not fully trained in using the technology. Students' skill levels in using technology are different, and teachers are tasked with the difficult challenge of implementing technology in the classroom when not all students have the same skills and ability in using that technology. While it is important to educate students to use technology and develop 21st century skills, it must be done at a pace that is appropriate for all students' skill level, otherwise more teaching and learning time will be wasted in the classroom (Klaus, 2013).

A third barrier for teachers regarding 1:1 technology programs is that there is a challenge for school administrators regarding teacher buy-in when it comes to technology integration in 1:1 technology programs. Teacher buy-in and their attitudes toward the implementation of technology in the classroom vary greatly. Although teachers' perceptions and attitudes toward technologies may start out skeptical or negative, after thorough training and more frequent use of the technology the teachers' perceptions and attitudes will improve over time (Rehmat & Bailey, 2014). Teachers need to become comfortable with being able to effectively model and promote 21st century teaching and learning in a 1:1 technology program. Teacher buy-in also improves when teachers have a clear understanding of what is involved and expected in teaching within a 1:1 technology classroom environment, both formally and informally as facilitators of learning (Donovan, Green, & Mason, 2014).

Challenges and Barriers for Students

Not only are there challenges and barriers for teachers in technology integration in 1:1 technology programs, but also there are also challenges and barriers for students. One of the greatest challenges for students in a 1:1 technology program is simply staying on task. Although technology can be an extremely useful tool in the learning process, it can also be a distraction. A

quantitative study by Donovan et al. (2010) explored configurations of technology use in a 1:1 learning environment showing a range of off-task behaviors as a result of technology use concluding that increased access to technology does not always equate to increased student engagement (Donovan, Green, & Hartley, 2010). According to Storz and Hoffman (2013) students who grew up playing video games and had access to social media via the Internet found mixed results when implementing educational technologies to increase academic achievement. However, current research has shown that today's students experience a much more positive attitude toward learning while using technology rather than using traditional approaches with paper, pencils, and textbooks (Zhengm Warschauer, Lin, & Chang, 2016).

Armstrong (2014) and Short and Greer (2002) credited technology as the primary method to empower students to take control of their own learning, making students in a technologically rich learning environment explorers and teachers as their guides. However, educators must be careful not to overuse technology. Klaus (2013) warned that the overuse of classroom technology could lead to a variety of problems for many students. Students learn best by physically and mentally engaging whatever they are studying. If most of the teaching and learning is being accomplished through the use of technology, then students' needs are not being met. Technology should be used to enhance teaching and learning and should be used as a supplement to the classroom curriculum; however, technology in the classroom should not be used as the sole source of teaching and learning (Klaus, 2013).

Another challenge for students is that their perception regarding technology is associated with game play. Klaus (2013) reported 21st century students often use technology for games. Although some teachers can use a student's association of technology to games to their advantage while implementing technology in their classroom, if a student's association of

technology with games is not addressed properly some students may get distracted and off task quickly.

As more schools implement a 1:1 technology program, teaching digital etiquette to students and teachers regarding digital communications will be an additional challenge for schools. Teaching digital communication etiquette is necessary in teaching students 21st century skills and is also a natural extension of the schools' 1:1 technology program in having students apply 21st century skills within the learning environment. (Grundmeyer & Peters, 2016). The excessive use of technology in education in the context of individualized learning can lead to the deterioration of student-teacher and/or student-student relationships and cause isolation regarding social relationships (Gaitanaru, 2014).

Addressing the Challenges and Barriers in 1:1 Technology Programs

Studies that have focused solely on the challenges and barriers regarding the negative implications of a 1:1 technology program are limited (Swallow, 2015). Although the implementation of 1:1 technology programs in high schools have shown positive results both in the academic achievement of students and the overall learning experiences of students, several challenges and barriers exist and must be addressed in order for 1:1 technology programs to reach their full potential (Argueta, Huff, Tingen, & Corn, 2011; Gulek & Demirtas, 2005). Zheng, Warschauer, Lin, & Chang (2016) conducted a meta-analysis and research synthesis to examine the effect of a 1:1 technology program on teaching and learning. The meta-analysis indicated that factors such as professional development, technical support, teachers' beliefs about technology in education, instructional design, and the learning environment were all important in contributing to the success of the 1:1 technology program implementation. Prior to implementing a 1:1 technology program, school administrators must gain support from students,

teachers, parents, and all stakeholders. Effective leadership is important to the successful implementation of a 1:1 technology program. School leadership that promotes a shared vision for the program can greatly influence the overall success of the implementation of the 1:1 technology program (Argueta et al., 2011). All stakeholder groups must support and understand their roles in the 1:1 technology program and see the benefits of implementing a 1:1 technology program. They must see that the benefits are great enough to change from existing educational practices and embrace new pedagogical models that include technology (Stone, 2016). Given the benefits of implementing a 1:1 technology program, it is important for school administrators to take steps to reduce the challenges and barriers in support of 1:1 technology programs and provide all students with technology access and skills (Gulek & Demirtas, 2005). Proper planning for the implementation of a 1:1 technology program requires school leaders to have reasonable timelines. Faculty and staff training in the use of technology is essential in order to meet the school's overall educational goals for the implementation process. Appropriate time for teachers to learn, understand, and model sound pedagogical practices as well as 1:1 technology integration model should be scheduled prior to the implementation (Bebell & O'Dwyer, 2010).

It is important for schools and educational leaders to understand the benefits that implementing a 1:1 technology program will have on the overall learning experiences of students in order to make the financial decision to commit to the implementation of a 1:1 technology program (Means, 2010). The implementation of a 1:1 technology program requires a significant investment for schools to be equipped with advanced technology and software (Gaitanaru, 2014). Prior to the implementation of a 1:1 technology program, schools must invest in an IT infrastructure that is capable of supporting the needs of a 1:1 technology program (Stone, 2016). Technical issues in a 1:1 technology program that are associated with issues with technology

devices, wireless network reliability, and timely access to IT support staff can all be a barrier to a 1:1 technology program implementation. These technical issues can cause frustration among both teachers and students in a 1:1 technology program (Tatar et al., 2003). The lack of funding and infrastructure implementation causes a significant lag time between the supply and integration of technology in education (Gaitanaru, 2014).

Another step to addressing challenges and barriers to the implementation of a 1:1 technology program is to review and revise current school vision statements that 21st century skills students need upon graduation (Larson et al., 2009). The International Society for Technology in Education (ISTE) has developed standards for educational technology for students, teachers, and administrators that reflect "the standards for learning, teaching and leading in the digital age" to help schools identify skills and knowledge students need to learn (ISTE, 2014a). ISTE developed their set of standards because "technology has forever changed not only what we need to learn, but the way we learn. The ISTE Standards set the bar for excellence and best practices in learning, teaching and leading with technology in education" (ISTE, 2014a). ISTE (2014b) reported a goal of the integration of educational technology is to foster digital-age intellectual competencies such as creativity, communication, and collaboration, research and information fluency, critical thinking, problem solving, and decision making, which are all 21st century skills that students need in this digital age (Dondlinger, McLeod, & Vasinda, 2016). The effective use of technology must be a prerequisite in establishing standards that result in a positive educational outcome when implementing a 1:1 technology program (Bebell & O'Dwyer, 2010).

Summary

Zheng et al. (2016) noted that with the falling price of hardware, software, and wireless access; the increasing digital literacy in teachers, students, and parents; the growing sophistication of educational technology applications; and the rising need for technology to be used in student assessment all suggest that 1:1 technology programs are going to continue to expand in schools across the country. This, in turn, should encourage increased funding for educational technology and more research studies conducted to systematically identify what works, what does not work, for what purposes, and for whom in the 1:1 technology program's learning environment (Zheng et al., 2016). Therefore, due to the availability and affordability of technology, 1:1 technology programs will continue to be implemented without the research to support or validate how these programs improve student learning.

Although the research regarding the effectiveness of a 1:1 technology program on learning outcomes is lacking, there are an increasing number of studies investigating the trend of schools implementing 1:1 technology programs in their educational settings and classroom learning environments (Bebell & O'Dwyer, 2010). Current research in the area of technology in education has made important contributions to understanding the relationship between the use of technology and teaching and learning (Cilesiz, 2011). Although initial findings show that students have had positive educational experiences with the integration of technology in the classroom; more research is needed regarding learning experiences of students in a 1:1 technology program (Montrieux et al., 2015). The impact of educational technology on students' experiences in the classroom is an area that is presently understudied; this need is highlighted by reviews of the field and recommendations for future research (Cilesiz, 2011). The implementation of a 1:1 technology program and 21st century learning environments is an area of

research that needs to be studied more (Hew & Brush, 2007). Liu and Lan's (2016) quantitative study on collaboration and constructivism affirmed the need for more qualitative studies to further investigate technology's impact on student learning. This study provides researchers and educators information that addresses the gaps in the literature by examining high school students' experiences on their use of 1:1 technology in their 1:1 technology programs resulting in the improvement of the educational experience for secondary students in 1:1 technology programs. The following chapter describes the research design and methods chosen for this study.

CHAPTER THREE: METHODS

Overview

The purpose of this qualitative transcendental phenomenological study was to seek understanding as to the impact of an established 1:1 technology program on the educational experiences of high school students. This chapter provides an overview of the design for the research study, research questions, setting for the study, participant information, the researcher's role in this study, data collection methods, and data analysis procedures for this study. Additionally, concerns of trustworthiness and ethical considerations are addressed.

Design

This qualitative transcendental phenomenological study sought to better understand the educational experiences and perceptions of high school students in an established 1:1 technology program. A qualitative transcendental phenomenological research design was used for this qualitative study. A qualitative study was chosen because qualitative research is useful for researchers to gain a better understanding of a phenomenon (Creswell, 2013). A qualitative research study is appropriate because it emphasizes the process of research flowing from a philosophical assumption to an interpretive lens, and then on to studying the phenomenon.

A transcendental phenomenological approach is appropriate for this qualitative research study because participants shared their educational experiences in a high school with an established 1:1 technology program (Creswell, 2013). Since technology integration in education is different than traditional teaching methods, a transcendental phenomenological research approach is necessary because it "provides a suitable framework for research on experiences in educational technology and can advance the field by complementing and unifying existing research" (Cilesiz, 2011, p. 488). One of Moustakas (1994) principles for phenomenological

study says that “phenomenology is concerned with wholeness, with examining entities from many sides, angles, and perspectives until a unified vision of the essences of a phenomenon or experience is achieved” (p. 58). “The basic purpose of phenomenology is to reduce individual experiences with a phenomenon to a description of the universal essence” (Creswell, 2013, p. 76).

Transcendental phenomenology is a scientific study of a phenomenon that focuses on descriptions of experiences instead of explanations or analysis (Moustakas, 1994). A transcendental phenomenology study was chosen because I wanted to research the lived educational experiences of high school students in established 1:1 technology programs through the lens of the participants’ educational experiences rather than simply interpreting their educational experiences. The process of eliminating the researcher’s own bias and experiences about the phenomenon being studied is called bracketing (Moustakas, 1994). I bracketed out my own views and experiences regarding 1:1 technology programs in order to gain a “fresh” perspective from the lens of the high school students (Creswell, 2013). The process of bracketing is very important in phenomenological research in order to gain an authentic description of the phenomenon being studied (Moustakas, 1994).

Research Questions

The following research questions were used to guide this qualitative study and to provide information to describe high school students’ perceptions and experiences throughout high school in a 1:1 technology learning environment:

Research Question One: How do high school students describe their overall educational experiences in an established 1:1 technology program?

Research Question Two: What are high school students' perceptions of how 1:1 technology is integrated in their school learning environment?

Research Question Three: What benefits and challenges do high school students encounter as a result of being educated in a school with an established 1:1 technology program?

Setting

Using convenience sampling methodology, I researched public and private high schools in a desired mid-Atlantic state. The private schools in this region appeared to be further developed in the use of 1:1 technology compared to the public schools in the same region. By 2014, the private schools in this region reported fully implemented 1:1 technology programs in their high schools, whereas the public schools in this area were just beginning to implement rudimentary "Bring Your Own Device" programs. Students' experiences in a fully implemented and established 1:1 technology program will be richer due to the private schools' program being implemented and established longer than four years.

The targeted city located in the desired mid-Atlantic state has consistently been among one of the fastest growing cities in the United States according to Forbes (2014). One of the reasons this city is one of the fastest growing cities in the country is because of the job opportunities in the field of technology (Sperling's Best Places, 2018). This region is known to attract major technology corporations. These large corporations attract individuals and their families from all across the country. The jobs in this region pay very well which allow families to be able to afford private education. Nearly half of residents of the city have college degrees and post graduate degrees, placing a high value on technology and education (Sperling's Best Places, 2018). Based on the information gathered from the three targeted private schools' websites, all three schools offer grades PreK to 12. The three targeted schools are governed by a

school board and have similar leadership and organizational structures. Graduation and college acceptance rates for all three targeted schools are similar, at nearly 100 percent. All three targeted schools have similar student populations that are comprised of 75 to 85 percent Caucasian and 15 to 25 percent minority students. Pseudonyms will be used for all site schools for this qualitative research study to protect the identity of the site schools and their students.

Participants

Potential participants included fifteen high school students, five from each of the three targeted school sites. The sample size is more than adequate for this qualitative study because the participant number is more than ten and allowed for the possibility of participants withdrawing from the study. In addition, the sample size is appropriate because the participants shared their lived educational experiences about the phenomenon of being educated in a high school with an established 1:1 technology program (Creswell, 2013). Purposeful sampling is an approach in qualitative research to select participants based on decisions of the researcher specific to their study (Creswell, 2013; Moustakas, 1994). This sampling method was used to identify participants who have the most experience with the phenomenon being studied and allowed the researcher to select participants that are likely to be able to contribute information-rich data with respect to the purpose of this transcendental phenomenological study (Creswell, 2013; Gall, Gall, & Borg, 2010).

In order to identify participants that have the most educational experience with the phenomenon of being educated in a high school with an established 1:1 technology program, high school students with the most years of attendance in the same school were targeted because they would be able to give the most information regarding as to how the 1:1 technology program has benefited their overall educational experience. A participant intake survey (Appendix A)

was used to identify potential participants to ensure they met the inclusion criteria. Once potential participants were identified, a randomization strategy was used to narrow the participant pool to five participants from each school, to include both boys and girls, who have attended their high schools for the longest period of time. Informed assent/consent and parental permission was obtained for all participants. Pseudonyms were given to all participants for this qualitative research study to protect the identity of the potential participants. Participation in this study was voluntary and participants were able to quit at any time throughout the study. All 15 participants completed the study from start to finish.

Procedures

Procedures for conducting this qualitative study included approval of the study proposal prior to applying for Institutional Review Board (IRB) approval. This approval was obtained prior to seeking participation approval from potential site schools or potential participants. After receiving IRB approval (Appendix A), I contacted each potential site school via a formal email to the administration seeking permission to conduct this qualitative study with their students. After seeking and receiving administrative permission from the targeted site schools, I distributed participant intake surveys (Appendix B), using closed-response questions to identify potential candidates. The participant intake surveys were distributed and received electronically via email. The participant's responses to the closed-response questions on the intake survey ensured all potential participants met the criteria of having attended the same private high school with an established 1:1 technology program. Potential participants were identified and informed assent/consent forms (Appendix C) were obtained from each participant prior to collecting data.

Prior to data collection, field testing was conducted to ensure journal prompts and interview questions are clear to the participants and would generate authentic responses that

address the study's research questions. Seven high school students from my own school, enrolled in our 1:1 technology program, were asked to field test the journal prompts and review the interview questions for validity and clarity. Field testing the journal prompts and interview questions helped me identify and reduce potential bias in their phrasing and helped me bracket out my own views and experiences. The three methods of data collection that were used for this qualitative study included: interviews, a focus group, and participant journals. First, participants were asked to schedule and participate in a one-on-one interview with the researcher. All interviews were audio recorded and then later transcribed by the researcher for coding purposes. Following the transcription a copy of each transcribed interview was emailed to the corresponding participant for member checking. This provided participants the opportunity to review their responses and clarify or elaborate on any points made during the interview. For clarification purposes participants were asked to email any changes made to the transcription to the researcher within a week of receiving the transcription. Next, participants were invited to attend a focus group for further discussion in order for students to dialogue with each other regarding their personal educational experiences. The focus group was audio recorded and then later transcribed by the researcher for coding purposes. The focus group discussion continued until no new information was presented regarding their educational experiences in an established 1:1 technology program. Lastly, participants were asked to keep a daily journal over a period of no less than one week while using the journal prompt and template (Appendix D) provided by the researcher. Each participant journal was completed electronically using either a Google Document or Word Document. Participants needed either a Google account or Microsoft Office 365 account in order to access the participant journals. If participants did not have either a Google account or Microsoft Office 365 account, the researcher worked with the participants in

establishing one or the other. The participant journals were used as a means for participants to reflect on their school day and give feedback as their educational experiences using the 1:1 technology. The purpose of using three methods of data collection was to triangulate the data until no new information was presented in order to reach full saturation of their stories (Creswell, 2013; Moustakas, 1994).

Data analysis was conducted by following a simplified version of Moustakas' (1994) guidelines for data analysis of transcendental phenomenology. The steps that were followed included: bracketing out my own perceptions and experiences to gain a better understanding of the lived experiences of the participants, identifying significant statements of the participants through coding, combining significant statements into common themes, developing textural and structural descriptions that answer the "what" and "how", and developing a synthesis of meanings and essences of the lived experiences of the participants being educated in an established 1:1 technology program. Ethical considerations regarding data materials were followed using IRB policies and procedures including using pseudonyms for all participants and their schools, storing electronic data on a password protected laptop and a password protected external hard drive, and storing all hard copy data in a locked file cabinet.

The Researcher's Role

Although I am currently an administrator at a private school with a 1:1 technology program, I did not conduct research for this study at my school, and I did not have any prior relationship with the participants. I was a non-participant interviewer and data collector as I researched the lived experiences of high school students attending a private school with an established 1:1 technology program. Through the use of one-on-one interviews, a focus group

discussion, and participant journals, I was the human instrument for data collection (Creswell, 2013).

In order to avoid reporting my own experiences and presuppositions with the phenomenon, the method of bracketing was utilized. According to Creswell (2013), the process of bracketing involves the researcher setting aside personal experiences and viewing the phenomenon from a fresh perspective. As an administrator in a school with an established 1:1 technology program, my current experiences are with teachers using and integrating technology in their classrooms. Although my current role is overseeing teachers' experiences with technology, I bracketed my own thoughts related to my experiences with teachers throughout the study via journaling in order to view the data from the perspective of high school students engaged in a 1:1 technology program.

Data Collection

I collected data from three sources for this qualitative study: in-depth, semi-structured interviews; a focus group discussion; and participant journals. These three data collection methods are appropriate for collecting data about their lived experiences in the phenomenon (Creswell, 2013). In addition, these three data collection methods provided triangulation and improved the validity of the results of the study (Creswell, 2013). In order to gather experiential data relevant to the phenomenon, the data was collected in the following sequential order: one-on-one interviews, a focus group discussion, and participant journals. The sequence of the data collection was chosen because the one-on-one interview time allowed the researcher to fully explain the data collection process and functioned as a time for the researcher to introduce the participants to the study so they can understand their role in participating in the focus group discussion and providing a participant journal. The one-on-one interviews provided the

researcher specific data that helped answer the three research questions regarding the participants' individual educational experiences in an established 1:1 technology program. The focus group discussion was conducted following the one-on-one interviews in order for students to engage in dialogue with each other regarding their personal educational experiences for the researcher to develop richer descriptions of the phenomenon. The focus group discussion continued until no new information was presented regarding their educational experiences in established 1:1 technology programs. Lastly, the participant journals allowed the participants to give specific data related to their daily use of technology as it relates to their school's 1:1 technology program. The purpose of using three methods of data collection was to triangulate the data until no new information was presented. (Creswell, 2013; Moustakas, 1994). The purpose of using these multiple methods was to keep asking for information from the participants until saturation of the data is reached. Saturation was reached when no new information was being received and additional questions only received previously stated responses (Creswell, 2013).

Interviews

Creswell (2013) stated that conducting interviews allows participants to share stories about their lived experiences of the phenomenon being studied. Interviews are appropriate for this study because the researcher was able to engage each participant in meaningful dialogue that produced qualitative data about their educational experiences in a 1:1 technology program (Creswell, 2013). Interviews were conducted on the campus of the site school in order for the participants to feel more comfortable in the interview environment. Participants were interviewed face-to-face and asked open-ended questions about their educational experiences in a high school with an established 1:1 technology program. The interviews were no longer than

one hour each and were recorded using a primary recording device and a backup recording device. All digital recordings were downloaded onto a password protected laptop, which was backed up and stored on an external hard drive. The original recordings were deleted from the original recording devices. I conducted all of the interviews. Interviews were semi-structured to allow for follow-up questions and discussions (Merriam & Tisdell, 2016). All participants were asked the same interview questions in the same order, but follow up questions were asked as needed to gain additional insight into the participant's educational experiences. Follow-up questions were necessary in order to gather additional information and data to see if there was any perceived differences and commonalities of their educational experiences (Creswell, 2013). Interviews were recorded and transcribed then member checked for credibility and trustworthiness.

Open-ended questions are appropriate for a transcendental phenomenological study because they allow participants to tell their story about the phenomenon being studied (Creswell, 2013). The following participant interview questions were designed to gain a rich, thick description of students' experiences as they engaged in their high school's established 1:1 technology program and were developed using the study's research questions as a guide. Following field testing of an initial set of proposed questions with non-participants to ensure clarity and depth of initial responses, the following list of interview questions was used in the one-on-one interviews.

1. How would you describe your educational experience in an established 1:1 technology program?
2. How would you describe the day-to-day usage of technology throughout your educational experience in an established 1:1 technology program?

3. What would you describe as the major differences in learning in a traditional learning environment versus the learning environment in a 1:1 technology program?
4. How would you describe the ways you use technology to communicate with your teachers and collaborate with your classmates?
5. In what ways do you think attending a school with an established 1:1 technology program may help you prepare for a 21st century world after graduation?
6. How does 1:1 technology impact how your teachers teach content and thus improve or not improve your educational experience?
7. What challenges did you encounter as you transitioned to using 1:1 technology in your learning?
8. Considering your experiences of attending a private high school with an established 1:1 technology program, if something could have been done differently, what would it have been?
9. What frustrations and problems have you encountered as a result of the 1:1 technology program at your private high school?
10. How would you describe your experience in the orientation and training of the use of 1:1 technology program at your private high school?
11. What advice would you offer to a potential student considering attending a private high school with an established 1:1 technology program?
12. Is there anything else you would like to share with me about your experiences of attending a private high school with an established 1:1 technology program?

Questions one through five were developed to gain a better understanding about the participants' educational experiences in an established 1:1 technology program. These open-

ended questions allowed the participants to share their educational experiences in an established 1:1 technology program so that the researcher could gain an in-depth view into their shared lived educational experience of the phenomenon being studied. The first five interview questions were designed to help the researcher gather data to answer research questions one and two. Questions six and seven were developed to gather information on factors that influenced the participants' decision of being educated in a high school with an established 1:1 technology program. These two interview questions were designed to help the researcher gather data to answer research question number two. Questions eight through 11 were developed to gain a better understanding of the participants' frustrations and problems with their high school's established 1:1 technology program. These questions were designed to help the researcher gather data to answer research question number three. The final interview question provided the opportunity for participants to share any additional information regarding their educational experiences in a high school with an established 1:1 technology program that may not have been addressed through the other interview questions.

Focus Groups

A focus group is a method of collecting qualitative data through interviewing a group of people at once (Creswell, 2013). A focus group is an appropriate data collection method for this study because the interaction among the participants, who experienced the same phenomenon of attending a high school with an established 1:1 program, is likely to yield qualitative data that is beneficial in answering the research questions (Creswell, 2013). The focus group provided dialogue among the participants that brought to mind additional information that participants did not share in the initial interviews, which allowed the researcher to develop richer descriptions of the phenomenon (Patton, 2002).

A focus group was conducted following the initial individual interviews at a neutral location that was convenient for all participants. The focus group was no longer than one hour and was audio recorded using a primary recording device and a backup recording device. All digital recordings were downloaded onto a password protected laptop which then was backed up and stored on an external hard drive. The original recordings were deleted from the original recording devices. Discussion prompts for the focus group were developed based on the information gleaned from the interviews and were used to address the research questions not addressed in the individual interview process (Creswell, 2013).

Participant Journals

Journaling is a researcher-generated data collection method of documentation in which the researcher requests participants to keep a record or log of activities over a specified period of time during the study to help the researcher gain insight to the phenomenon being studied (Merriam & Tisdell, 2016). Transcendental phenomenological studies require multiple data collection methods that describe the shared experience of the participants. Participant journals are appropriate for this study because journaling allows the participants to reflect and document their thoughts and feelings regarding their educational experiences in their established 1:1 technology program (Creswell, 2013). The participant journals allowed for an in-depth analysis regarding high school students shared educational experiences in established 1:1 technology programs.

The participant journals were maintained and collected via an online format using a secured, shared platform between the participant and the researcher. Participants were asked to keep a daily journal for a period of no less than one week by using a journal prompt and template (Appendix D) provided by the researcher. Each participant journal was completed electronically

using a protected shared Google Document or Word Document, maintained by the researcher. The participant journals were used as a means for participants to reflect on their school day and give feedback as to their educational experiences using the 1:1 technology. Participant journals allowed the researcher to gain insight regarding high school students' educational experiences in an established 1:1 technology program. Participants from each school completed the participant journal for a period of no less than one week in order for the researcher to gain insight about how technology is being used in the learning environment and how the participants were engaged with the 1:1 technology program physically, intellectually, and emotionally. A journaling template and participant journal prompt was given to each participant to provide additional data to the researcher not collected from the one-on-one personal interviews and the focus group discussion.

Data Analysis

Data analysis was conducted by following a simplified version of Moustakas' (1994) guidelines for organizing and analyzing data of transcendental phenomenology. The steps that were followed included: bracketing out my own perceptions and experiences so the actual experiential voices of the participants were heard; developing textural and structural descriptions; identifying significant words and phrases of the participants through coding; using coding to develop common themes that answer the "what" and "how"; and developing a synthesis of meanings and essences of the lived educational experiences of the participants at a private school with an established 1:1 technology program. The researcher used memoing by writing down thoughts and ideas of what was being learned about the phenomenon as data was collected. The process of memoing is important in qualitative research in order for the

researcher to reflect on all the transcribed data to gain a better understanding of the phenomenon (Creswell, 2013).

Bracketing

Moustakas (1994) defined bracketing as a "systematic effort to set aside prejudgments regarding the phenomenon being investigated" (p. 22). The process of bracketing is very important in transcendental phenomenological research in order to gain an authentic description of the phenomenon being studied (Moustakas, 1994). Because my current high school has an established 1:1 technology, I attempted to bracket out my own views and experiences regarding 1:1 technology program in order to gain a "fresh" perspective from the lens of high school students (Creswell, 2013). Prior to data collection, field testing was conducted to ensure journal prompts and interview questions were clear to the participants and would generate authentic responses that address the study's research questions. Field testing the journal prompts and interview questions also reduced potential bias in their phrasing and helped me bracket out my own views and experiences. I bracketed my own thoughts by journaling about preconceived notions, opinions, and reflections throughout the study, including data collection and analysis. The bracketing process helped me identify bias so that I could seek to move my notions aside and view the data from an honest and fresh perspective (Creswell, 2013).

Coding

Coding is the process of aggregating the data into smaller categories of information and then assigning a label to the code (Creswell, 2013). Moustakas (1994) suggested a process of data analysis called horizonalizing, which regards "every horizon or statement relevant to the topic and questions as having equal value" (p. 118). The horizonalized statements were coded and used to develop common themes in order to describe the phenomenon being studied. The

purpose of coding is to develop a sequential system that identifies common terms and then groups the common terms into general concepts. Themes then emerged from those concepts. Creswell (2013) recommended using open coding to identify major categories within the data that is collected. Therefore, the researcher used open coding to review the data to identify common terms and grouped the terms into common categories. After open coding the researcher used axial coding to review the data from the open coded categories to identify key concepts related to the phenomenon. Lastly, selective coding was used by reviewing the data from open coding and axial coding to identify and develop common themes in which the core categories interrelate. The results from selective coding were used to develop a unified story of the participants regarding their lived educational experiences in an established 1:1 technology program.

Textual and Structural Descriptions

Creswell (2013) stated that textural and structural descriptions answer the "what" and "how" of the lived experiences of the participants attending a private school with an established 1:1 technology program. Textural descriptions were developed from the themes, answering the question of what the participants experienced as they attended a high school with an established 1:1 technology program. Structural descriptions were developed from the themes and answer the question of how the participants experienced the phenomenon in relation to the established 1:1 technology program at their high school (Creswell, 2013).

Synthesis of Meanings and Essences

The final step in the data analysis was to develop a complete synthesis of meanings and essences of the lived experiences of the participants attending a private school with an established 1:1 technology program (Moustakas, 1994). The synthesis of meanings and essences

of the phenomenon was developed from the combined textual and structural descriptions. The synthesis of meanings and essences provided answers about what the participants experienced and how they experienced it regarding attending a private high school with an established 1:1 technology program (Creswell, 2013).

Trustworthiness

Creswell (2013) described trustworthiness as an attempt to validate for accuracy the findings of the research as best described by the researcher and the participants. Validation by the researcher is a distinct strength of qualitative research through time spent with the participants, the thick detailed descriptions of the phenomenon being studied, and the closeness of the researcher to the participants in the study all add to the accuracy of the findings (Creswell, 2013). Creswell (2013) suggested using multiple validation strategies in qualitative research to achieve trustworthiness. This qualitative research study followed Lincoln and Guba's (1986) model for establishing trustworthiness by focusing on credibility, dependability, transferability, and confirmability.

Credibility

Credibility for this research study was achieved by triangulation. Triangulation is achieved by using multiple data collection sources and comparing the data collected through observations at different times and places or from participants with different perspectives on the phenomenon being studied (Merriam & Tisdell, 2016). Triangulation of data was achieved in this study from the use of three different data collection methods that will include: in-depth and semi-structured interviews; a focus group discussion; and participant journals. Comparisons were made among the participants' educational experiences in an established 1:1 technology program (Creswell, 2013).

Dependability and Confirmability

Dependability was achieved through the use of an audit trail. An audit trail describes in detail how data was collected, how categories were derived, and how research decisions were made throughout the study (Merriam & Tisdell, 2016). An audit trail makes it possible for other researchers to determine the trustworthiness of the study and to use the audit trail to conduct additional research to either replicate or continue the study (Gall et al., 2010). An audit trail was established and maintained throughout the course of the research study. I recorded all research activities, data analysis procedures, and data collection chronology for the purpose of establishing and maintaining an audit trail to ensure dependability and trustworthiness for this research study.

Member checking was used to ensure the confirmability of the study. Member checking is the process of having participants of the study review research procedures and statements collected through the interview process for accuracy and completeness (Gall et al., 2010). Maxwell (2013) stated that member checking is an important way of ruling out the possibility of the researcher misinterpreting the meaning of what participants say and do and the perspective they have on the phenomenon being described. It is also an important way of identifying the researchers own biases and misunderstanding of what is being observed and communicated (Maxwell, 2013). Participants were asked to review and validate their particular data that was collected and transcribed to check for accuracy and completeness. Member checking added to the confirmability to ensure the data is communicated from the participants' perspective and not tainted or fabricated by the researcher.

Transferability

Size and sample of this qualitative study does not lead to generalization of findings to all populations. Generalization is thus limited to these findings (Creswell, 2013). Results are potentially valuable to school administrators who are considering implementing or revising a 1:1 technology program. In that regard the rich descriptions of the participants' high school educational experiences in an established 1:1 technology program will serve as valuable data for those administrators. It will be through these thick, rich descriptions that the participants' lived educational experiences are conveyed and allow for the results to be applied to other populations related to technology integration and students' educational experiences in established 1:1 technology programs (Lincoln & Guba, 1986).

Ethical Considerations

This research study was conducted with integrity and honesty. Prior to any research data being collected, IRB approval process was received. Permission from the targeted site schools was granted prior to soliciting student participants. Once student participants were identified, participant informed assent/consent forms were obtained along with parental consent. Participant informed assent/consent forms informed potential participants about the study and let them know about their rights as participants (Creswell, 2013). Participation was voluntary and could end anytime throughout the study. In order to protect the identity of the site schools as well as the student participants, pseudonyms were used throughout this study. In addition, all data was securely stored on a password protected computer and backed up on an external hard drive by the researcher.

Summary

The purpose of this qualitative transcendental phenomenological study was to seek understanding as to the impact of an established 1:1 technology program on the educational experiences of high school students. The research questions sought to provide information to describe high school students' perceptions and educational experiences throughout high school in an established 1:1 technology learning environment. A qualitative research method was used using a transcendental phenomenological study design to collect and analyze data to address the three research questions. The research was conducted in three private high schools that have an established 1:1 technology program. Participants in the study were purposefully selected due to their years of 1:1 technology experience in the same high school. My role as the researcher was identified as data gatherer and analyzer of data for the purpose of developing a unified story that represents the lived educational experiences of the participants in a 1:1 technology program.

Upon Institutional Review Board (IRB) and site approval, three types of data were collected: individual interviews, a focus group discussion, and participant journals. Data analysis was conducted by following a simplified version of Moustakas' (1994) guidelines for organizing and analyzing data of transcendental phenomenology. The steps that were followed included: bracketing out my own perceptions and experiences so that I could represent an unbiased description of the lived educational experiences of the participants while developing textual and structural descriptions that provide a synthesis of meanings and essences of the lived educational experiences of the participants in high schools with established 1:1 technology programs.

This study fills a gap in the research on high schools with 1:1 technology programs and assists in understanding the lived educational experiences of students in high schools with an

established 1:1 technology program. Hearing the voices of these students may lead to an improved understanding of the impact 1:1 school technology programs have on students' educational experiences. Such knowledge could benefit school leaders contemplating initial 1:1 technology program development and implementation or could benefit administrators of an existing 1:1 technology program as they seek to assess and improve students' educational experiences.

CHAPTER FOUR: FINDINGS

Overview

This chapter contains a review of the purpose of the study as well as a review of the research questions. All participants in the study are introduced through a descriptive student profile. The results are presented under two headings, arranged in narratives to highlight the described educational experiences of the participants. The first heading, theme development, describes the data analysis process as well as the themes that emerged. The second heading, research question responses, provides descriptive answers to the three research questions based on the themes that emerged from the lived educational experiences of the participants. A summary concludes chapter four and includes the composite textual, structural, and essence descriptions of the participants' educational experiences in an established 1:1 technology program.

The purpose of this qualitative transcendental phenomenological study was to seek understanding as to the impact of an established 1:1 technology program on the educational experiences of high school students. The following research questions were used to guide this qualitative study and to provide information to describe students' perceptions and experiences throughout high school in an established 1:1 technology learning environment:

Research Question One: How do high school students describe their overall educational experiences in an established 1:1 technology program?

Research Question Two: What are high school students' perceptions of how 1:1 technology is integrated in their school learning environment?

Research Question Three: What benefits and challenges do high school students encounter as a result of being educated in a school with an established 1:1 technology program?

Participants

Fifteen high school seniors from three private schools in a mid-Atlantic state that have an established 1:1 technology program participated in this study. The first school, the Orange School (pseudonym), is a private PreK through twelfth grade school that has had an established 1:1 technology program for eight years. The Orange School has used MacBook Airs as the chosen device for their 1:1 technology program. Although there have been several versions of the MacBook Air since the implementation of the school's 1:1 technology program, the Orange School chooses the latest MacBook Air updating devices. The second school, the Blue School (pseudonym), is a private sixth through twelfth grade school that has had an established 1:1 technology program for the past seven years. The Blue School has chosen to use the Lenovo ThinkPad X380 Yoga Tablet as the device for their 1:1 technology program. The third school, the Green School (pseudonym), is an independent, private PreK through twelfth grade day school that has had an established 1:1 technology program for eight years. The Green School has chosen to use Lenovo Chromebooks for their 1:1 technology program.

Participants for this study were purposefully selected based on how long they have been enrolled in their school's 1:1 technology program. In order to participate in the study, participants had to complete an intake survey and an informed consent form. All 15 participants completed the intake survey and returned a signed informed consent form, with a parent or guardian signature. All 15 participants are Caucasian with eight participants being males and seven participants being females. Students from different ethnic backgrounds were invited to participate in the study but chose not to respond to the intake survey that was required for participation. All 15 participants for this study were classified as high school seniors for the 2018-2019 school year, and all 15 participants had been enrolled in their school's 1:1 technology

program throughout their high school career. There were no participants that withdrew from the study.

Gavin

Gavin (pseudonym) is 18 years old and has attended the Orange school for 13 years. Gavin's mother is an employee of the Orange School, which Gavin said has been both a positive and a negative experience throughout his time at the Orange School. Academically, Gavin ranks in the top 20% of his class, which earned him the academic award of being a Junior Honor Guard. Athletically, Gavin enjoys playing football and running track for the Orange School's varsity programs. Unlike some of the other participants, Gavin did not take any technology electives during high school and is not as passionate about technology as some of the other participants. However, Gavin filled out his participant journal with the most detail, and I appreciated his transparency when discussing his educational experiences in the Orange School's 1:1 technology program.

Gary

Gary (pseudonym) is 18 years old and has attended the Orange school for four years. Gary attended a public middle school, without a 1:1 technology program, prior to enrolling in the Orange School for high school. Gary and his family chose the Orange School, in part, because of its established 1:1 technology program. Gary has excelled academically at the Orange School and is a member of the National Honor Society and an AP Scholar. He is also a member of his school's chess club and considers that his only extracurricular activity. He has taken only one technology elective during high school and it was Intro to Python, which is a programming course. Gary desires to have a career in Finance or Economics and will major in one of those two areas in college.

Genny

Genny (pseudonym) is 17 years old and has attended the Orange school for 12 years. Genny's mother is an elementary teacher at the Orange School. Genny has a sweet spirit and a desire to help others. It was that desire that led her to participate in this study and was one of the first participants to sign up for this study. She was even gracious enough to encourage some of her classmates to fill out the intake survey to participate in this study. Genny is a member of the Orange School's National Honor Society and Student Council. Genny enjoys running, and she has been a member of her school's varsity Cross Country and Track teams. Throughout the study Genny was a participant that I could always count on to provide genuine feedback regarding the study.

Gabi

Gabi (pseudonym) is 17 years old and has attended the Orange school for 13 years, since she was in kindergarten. Gabi is a strong student and has been on the A/B Honor Roll throughout high school as well as a member of the National Honor Society. She enjoys playing basketball and has been a member of the girls' varsity basketball team throughout high school. Gabi also enjoys photography, especially editing photographs using photoshop on her school-issued laptop. Gabi is a member of her school's art club and service club. Attending the Orange School since kindergarten has had a positive impact on Gabi as she plans on becoming a teacher and majoring in elementary education in college.

Greg

Greg (pseudonym) is 17 years old and has attended the Orange school for 11 years. Greg is a well-rounded student being a member of the National Honor Society, a member of the Student Council, and runs Cross Country and Track for The Orange School. As I got to know

Greg throughout this study, he revealed that unlike most of his peers, he did not get his own cell phone until Christmas of his junior year. Greg frequently used his school-issued laptop to communicate with his peers prior to receiving his own cell phone. Although Greg is not a fan of coding, he took an Introduction to Java, which is a computer programming elective at his school. Greg also took a Computer Build elective that turned out to be his favorite technology elective. It was through these two technology electives that Greg developed a passion for technology and intends on majoring in Information Technology in college after graduating from high school.

Curtis

Curtis (pseudonym) is 17 years old and enrolled at the Blue School four years ago as he was entering high school. Curtis came from a private middle school that did not have an established technology program therefore his insights about his educational experiences throughout high school in the Blue School's 1:1 technology program was useful. Curtis is an academically-minded student as he has been on the Headmaster's Honor Roll throughout high school as well as a Science Olympiad. Curtis has taken two technology elective courses, Intro to Programming and a robotics course, but the Robotics was his favorite. Curtis intends on majoring in Mechanical Engineering in college after graduation.

Ciera

Ciera (pseudonym) is 17 years old and has attended the Blue School for seven years, enrolling at the beginning of middle school. Ciera is a Science Olympiad, winning two third place awards and is a member of her school's Beta Club and WISE Club. Ciera is also a Girl Scout and a gold award recipient. She plays varsity field hockey and varsity lacrosse as her extracurricular activities. Ciera intends on majoring in Biology or Spanish in college after graduation. Despite the Blue School's focus on technology, Ciera has only taken one technology

elective in high school, Introduction to Computer Programming. It was evident as I got to know Ciera throughout this research study that she viewed her school-issued device as a resource for educational purposes. She also made it clear that she has enjoyed her educational experiences in the Blue School's 1:1 technology program.

Cami

Cami (pseudonym) is 17 years old and has attended the Blue School for seven years from sixth grade through her senior year. Cami was one of the first participants to sign up for this study at the Blue School. She was even gracious enough to encourage some of her classmates to participate in the study by filling out the intake survey. Cami is a well-rounded student at the Blue School with a balance of academics, athletics, and extracurricular activities. She is a member of the National Honors Society, an AP Scholar, a member of the Blue School's leadership academy, and has earned the President's Volunteer Service Award. Cami is a competitive swimmer and enjoys swimming on her school's varsity swim team. She also enjoys scuba diving in her free time, although she admits there is not much free time in her life as a senior at the Blue School. The Blue School has many technology electives, and Cami has taken several of them throughout high school. They have included: Intro to Programming 1 & 2, Intermediate Programming, Computer and Networking Essentials. Computer and Networking Essentials has been her favorite technology elective, and she is considering majoring in computer engineering in college because of her technology experiences at the Blue School.

Carly

Carly (pseudonym) is 17 years old and has attended the Blue School for the past seven years, enrolling in sixth grade. Carly is academically driven and has earned high marks in all of her classes throughout high school. She has been on the Headmaster's Honor Roll for all seven

years. She has also earned the Collaboration Award in English and the RPI Award for STEM. She is a member of the Blue School's National Honor Society, Key Club, Women in Science and Engineering, and the Christian Fellowship Organization. Carly has taken several technology classes throughout high school that have included: Intro to Computer Science 1 and 2 and AP Computer Science. Her favorite technology class was her first Introduction to Computer Science class because she had never coded before, and it sparked a new passion of hers. Although she has enjoyed taking her technology electives, she plans on majoring in economics and mathematics in college.

Creighton

Creighton (pseudonym) is 17 years old and has attended the Blue School for seven years. Creighton is very conscientious about his grades. He has consistently been on the Blue School's Headmaster's Honor Roll throughout high school career and has earned a score of five on both AP Chemistry and AP Calculus exams. Creighton also enjoys being a member of the Blue School's indoor track club, as he is the captain for shotput. Creighton has a passion for technology as well as helping his fellow students. His passion has served him well as he volunteers in the middle school, repairing broken tablet devices, which gives him a unique insight as to how students care for their devices. Creighton has a reputation among his peers of being very knowledgeable when it comes to fixing both software and hardware issues with technology, and his peers tend to go to him first with device issues before going to the IT Help Desk. Creighton has taken several technology courses throughout his high school career that have included: Intermediate Programming, AP Computer Science, Advanced Studies in Computer Science, and Computer and Networking Essentials. Creighton will be pursuing a dual degree, after graduating from high school, in systems engineering and computer engineering with

a minor in math. Due to Creighton's extensive technology background and passion for technology, he was always willing to give thoughts about his educational experiences in his school's established 1:1 technology program. He was one of the participants that contributed quite a bit to the focus group discussion.

Railey

Railey (pseudonym) is 17 years old and has attended the Green School for four years, enrolling at the start of her high school career. She is a member of the Green School's Key Club, but that is her only extracurricular activity. Railey's former school did not have technology, and she was excited to be attending the Green School for high school because of its 1:1 technology program. Railey has a passion for technology and has taken several technology courses throughout high school that have included: Intro to Computer Science, Honors Computer Science, and AP Computer Science. However, AP Computer Science has been her favorite technology elective. It was through her technology experiences at the Green School that she developed a passion for technology and is planning on pursuing a career in managing information systems while majoring in Computer Science in college. She is very appreciative of her educational experiences in the Green School's 1:1 technology program.

Reagan

Reagan (pseudonym) is 17 years old and has attended the Green School for four years, enrolling at the Green School at the beginning of her freshman year of high school. Reagan's previous school did not have a 1:1 technology program in middle school. She said that students either brought their own devices or didn’t have one. Reagan has enjoyed using her school-issued device in high school and said that it has helped her maintain good grades, earning her honor roll distinctions throughout her high school career. Reagan enjoys running cross country for the

Green School and being a member of the Ecology Club. She enjoys art and participating in community service projects. Reagan is planning on pursuing a career in media after majoring in communications in college.

Rick

Rick (pseudonym) is 18 years old and has attended the Green School for 13 years since kindergarten. Rick remembers when the Green School implemented their 1:1 technology program eight years ago and how much it has added to his educational experiences. Rick is a member of the Green School's varsity golf team and enjoys being a member of his local boy scout troop. Rick has enjoyed taking several technology courses throughout high school that have included: Intro to Computer Science, Honors Computer Science, AP Computer Science, and Webpage Design. Webpage Design was his favorite technology elective out of all of them because he enjoyed the creative aspect of designing webpages. Rick is planning on pursuing a career as an accountant and will major in accounting and finance in college.

Ryan

Ryan (pseudonym) is 18 years old and has attended the Green School for four years, enrolling in the Green School as a freshman. As I got to know Ryan during this study, it was interesting to find out that although his school has chosen the Chromebook as the device for their 1:1 technology program, Ryan chooses to use his personal Microsoft Surface book. He says that his personal device is much better than the school-issued device. Ryan is an active student at the Green School, being a member of the National Honor Society, Spanish National Honor Society, Computer National Honor Society, Science National Honor Society, and the Key Club. He has also earned the Academic Achievement Award in Math. Ryan also enjoys athletics and is a member of his school's varsity soccer team and track team. Ryan has enjoyed taking several

technology courses throughout high school that have included: Intro to Computer Science, Honors Computer Science, and AP Computer Science Innovations. He has enjoyed all of them and could not identify a favorite. Ryan has plans to pursue a career in the engineering field and will major in that in college.

Ray

Ray (pseudonym) is 17 years old and has attended the Green School for 13 years. Ray loves being a student at the Green School and the school's 1:1 technology program has influenced Ray to pursue a career in computer science. Ray has devoted most of his time throughout high school to technology by taking several technology courses that have included: Intro to Computer Science, Computer Aided Drafting (CAD), Computer Engineering, and AP Computer Science Innovations. Ray could not identify a favorite technology course, as he enjoyed them all. He looks forward to continuing his love for technology in college as he plans on majoring in computer science.

Results

The participants in this phenomenological study are considered co-researchers, as they provide the meaning of their experiences (Moustakas, 1994). The field work spanned a total of eight months and began in the spring of 2018 with one-on-one interviews and participant journals from 10 participants from two partner schools. The third partner school requested to wait until the fall of 2018 before collecting data from its participants due to the busyness of the spring semester. Therefore, I lost three months of field work during the summer of 2018 due to the remaining five participants from the third school not being accessible.

The data collection process began with a one-on-one interview with each participant at their convenience and at their school’s campus in an assigned room that was reserved by the

school's administration. All 15 participants participated in their individual, one-on-one interviews. A focus group meeting was conducted on a designated Saturday morning at a neutral location that was convenient for the majority of participants. Attendance was either in person or via an online Zoom meeting platform. Seven participants interacted in the scheduled focus group discussion. The culminating activity was participant journals that were completed at the participant's convenience for a period of no less than one week. All participants submitted their journals.

During the member checking process, all 15 participants were sent a transcript of their individual, one-on-one interviews and were instructed that they could modify their original answers, or they could expound upon their original answers, if they desired. During the member checking process, I wanted to verify the accuracy of the transcripts as well as capture any additional thoughts the participants may have had since the time their one-on-one interview was conducted. All 15 participants returned their interview transcripts without any additional comments.

Following the focus group discussion, transcriptions of the group interactions were submitted to all 15 of the study's participants. My desire was to verify the textual record with the seven focus group attendees and to allow the eight non-attendees an opportunity to add thoughts and thus enrich the content. Two additional participants chose to contribute to the focus group discussion during the member-checking process, bringing the total student involvement to nine participants.

The data analysis process included a thorough review of transcripts from 15 semi-structured one-on-one interviews, the transcript from the focus group discussion, and 15 participant journals. Throughout the data analysis process, I followed a simplified version of

Moustakas' (1994) guidelines for organizing and analyzing data of transcendental phenomenology. The steps that were followed included: bracketing out my own perceptions and experiences so that the actual experiential voices of the participants were heard; identifying significant words and phrases of the participants through coding; organizing the codes into classifications; and developing themes that answer the "what" and "how" of the study's research questions.

Theme Development

The transcripts from the one-on-one interviews and focus group discussion as well as the individual participant journals provided a wealth of data for analysis. Throughout the data collection and data analysis process, I sought to bracket my personal thoughts and feelings by making notes that identified my possible views. The process of bracketing allowed me to identify possible bias in an effort to remove the influence of that bias so I could openly hear the experiences of the participants in creating their collective story. I maintained the notes in the researcher's reflective journal (Appendix E). The process of bracketing proved to be a practical method to make me aware of my own biases and allowed me to remain reflective of the participants' perspectives (Appendix F).

Data analysis started with the coding process, but prior to coding all unnecessary notes and documentation that were not relevant to the educational experiences of the participants in an established 1:1 technology program were removed (Moustakas, 1994). I began the coding process by immersing myself in reading and re-reading the transcribed data while using horizonalization to read each statement with equal value. It was important during this process to view the data with equal consideration so that the coding would produce the horizons necessary to represent the phenomena through the eyes of the participants. Fifty-two codes were identified

during the analysis of the interview transcripts, journals, and the focus group transcript (see Appendix G).

Using axial coding methodology, I linked the codes to categories (see Chapter 4 Appendix H). Table 4.1 shows the 52 codes represented in eight categories as well as their total number of occurrences found in the data.

Table 4.1

Development and Identification of 8 Categories from 52 Codes

Category Label	Codes Represented	Total Number of Occurrences
Educational Tool	Apps, Assignment, Educate/tional, Homework, Information, Learn/ing, Notes, Research	321
Personal Device	Device, Friend/s, Game/s, Home, Personal	108
Benefits	Access, College, Experience, Opportunity, Resource, Tool	181
Challenges/Barriers	Battery, Challenge, Distraction, Filter, Problem	58
Student Emotions	Beneficial, Different, Easier, Enjoy, Frustrate/ion, Help/s/ful, Important	177
Student Development	Ability, Future, Improve, Organize, Present/ation, Skill, Training, Type/ing	144
Learning Environment	Classroom, Orientation, Paper, Screen, Student/s, Teacher/s	285
Being Connected	Collaborate, Communicate, Email, Interact, Internet, Online, WiFi	199

The final step in the data analysis process after transcribing, reading, horizonalizing, coding, and axial coding was to develop themes. The five main themes that emerged from the data analysis process were: (a) access, (b) skills, (c) communication, (d) challenges, and (e) attitudes. Table 4.2 shows the five themes and their subthemes that emerged from the data analysis process.

Table 4.2

Themes

Theme Number	Theme Title	Subthemes	RQ Correlation
Theme 1	Access	Information Resources	All
Theme 2	Skills	Experience Responsibility	All
Theme 3	Communication	Communicating with Teachers Collaborating with Students	All
Theme 4	Challenges	Reliability/Connectivity Distractions	All
Theme 5	Attitudes	Positive Negative	All

The following section provides a narrative of each theme and subtheme that is reflective of the participants' experiences and perceptions regarding their educational experiences in their high school's established 1:1 technology program.

Access. Students have instant access to virtually an unlimited amount of information via the Internet. The theme of access was described by the participants across all three of the data collection methods. During the one-on-one interviews, participants shared 58 comments regarding their educational experiences related to the access of information and resources. The focus group discussion added seven comments regarding experiences related to the access of information and resources. Out of the 15 participant journals, 12 of the journals had 46 comments in the journal entries related to the access of information and resources.

The theme access relates to students being able to have access to information and resources through their devices both inside and outside of school. During Creighton's one-on-one interview, Creighton expressed that "having the ability to use a computer at home is really amazing." Carly enriched Creighton's thoughts, during her one-on-one interview, as she

described her educational experiences of having access to information beyond the classroom as "invaluable":

> I get to explore interests that I have that are beyond the classroom setting, being able to access the Internet on a computer at home is so important when I have a subject at school that I am interested in. I want to research more about it, and anything like that, that I get to continue at home and really just expand my education past the worksheets and quizzes.

Greg's participant journal documented that he "used his computer to study on the school bus" while traveling to an away track meet. Cami expressed, during the focus group discussion, that access to information and resources was the greatest benefit of her school's 1:1 technology program by saying,

> Access to online resources and documents and research papers (is the greatest benefit). We have access to traditional libraries, but there is a real limitation and sometimes the information (in a library) is a bit dated. So, having access, really access to an infinite amount of resources, on the Internet is really nice for research or personal interests or something to learn more about.

Within the descriptions of access, two subthemes emerged. The first subtheme of *information* described students' abilities to access information through their technology. The second subtheme of *resources* describes students' abilities to have access to educational resources through their device.

Information. Information is defined by Merriam Webster as "knowledge obtained from investigation, study, or instruction." The 15 participants were unanimous in sharing that access to unlimited information through the Internet is one of the greatest examples of how 1:1 technology enhances their educational experiences. Railey stated:

> The teachers teaching in our 1:1 technology program definitely helped improve my experience because I have the information that they are teaching every day, and I can actually go back with my device and look at things I missed, and go back and relearn everything. So, I would say it definitely enhances just because we get more access to the information that they are teaching us, and we also can expand beyond what they are teaching us and Google the information that we need.

Rick shared during his one-on-one interview that "doing any research, technology makes it very easy because you can go through it and you can have all the documents that you want to read all online right there." Cami affirmed that notion in her interview by saying she likes to "research her own topics and discover new things that she is passionate about." She said that "it was really cool to go to Google search and look up things that I am curious about" and expressed that "technology opened my mind to like new possibilities".

When describing the difference between a traditional learning environment and the learning environment of a 1:1 technology program Carly said,

> The major differences that I have noticed is that you don't get nearly as deep of an understanding, and the education isn't so much about your natural curiosity as it is about mastering material. So, they will do worksheets and things, but I don't find that many students have the drive to find the resources to learn more about the information. So, if I am doing a worksheet on my computer, and I say 'Oh that sounds interesting' then I will switch over to Google Chrome and I can Google it. So, I just get the opportunity to do a much more in-depth kind of look at anything that I am doing.

Ryan added, "Technology helps students learn, like if you don't understand something, and if you have any clarifying questions you can go online and find those, whereas without technology you are kind of lost and you need a teacher to help you or you have to go and ask."

Ryan felt that technology allows students instant access to information by saying that technology allows him to "to pull up specific facts instantly as opposed to looking through a book." One of Ryan's participant journal entries described using technology in his Government and Politics course to "quickly find information relevant to the topic being discussed" as a plus for learning, and the ability to "quickly find information relevant to the topic at hand" was listed as a "necessity". Gary agreed with Ryan as he described his technology use in his participant journal by having two entries that stated he used his technology to access information for his classes. Curtis enhanced the practicality view of instant information access in sharing that "having direct access to information without the requirement to live in a library is definitely a pro to technology." Gary's participant journal described "using the Internet to look up information and quickly get back to work is a lot better than using paper and reference books."

Although the participants described access to information as a positive educational experience during involvement in their school's 1:1 technology program, one participant, Railey, expressed the amount of information found on the Internet was a negative due to the need to filter out useless information. In addition, participants expressed that access to information on the Internet that was not related to their educational research could be distracting. One example entry was from Gavin's participant journal described a "downside as it can cause people to get sidetracked and less focused when researching."

Resources. In addition to having access to an unlimited amount of information, participants expressed having access to resources also added to their educational experiences in

an established 1:1 technology program. Ciera shared during her one-on-one interview that "access to a plethora of resources both inside the school and outside the school" was an advantage to her school's 1:1 technology program. Ciera described in her one-on-one interview the difference between a traditional learning environment and her 1:1 technology program's learning environment.

> I think it would be a lot harder for me to access the resources that companies and various people around the world are making for students because a lot of the educational resources today, like Kahn Academy are there to help students; and without technology I wouldn't be able to access those resources, and then that would further go on to affect classes, like math, where I sometimes rely on Kahn Academy to get me through a lesson. Our teachers are great, but I also think that you know having technology at home as a resource can really help.

Railey expressed one of the main benefits of her school's 1:1 technology program was being able to use technology as a resource to do research, an advantage over the limitations she experienced in her previous school.

> I think technology is definitely beneficial and the reason that is, is because we like get experiences that I didn't per se have at my old school, or we didn't have the same program because we could research into the things that I couldn't at my old school. Because we didn't have the resources for it, so I would say it's definitely beneficial.

Gavin's participant journal included an entry that described technology as "more than just something to enjoy, it is an endless resource to information. Instead of just having books in the library to rely on for research, we have nearly infinite access to the Internet for papers or what

not." Cami's participant journal entry: "Many more resources were available to me than if I did not participate in this 1:1 program."

During the focus group discussion, Creighton said that "access to resources" was not only an advantage for students but students viewed access as an advantage for teachers. Railey, in her one-on-one interview commented that "we download a lot of different apps and resources and then specific resources teachers will share with us too." Rick echoed Railey's comments by saying, "Teachers can send different materials they want us to access easily through our devices." Rick felt that technology "puts less stress on the teachers because they can make one document and click send to all their students and they will have it. It really helps the teacher and student get a better grasp of what they are doing."

Although the participants described having technology as a resource to research information, they sometimes wished teachers would take a more traditional approach to teaching. Genny expressed those sentiments during the focus group discussion and said, "Sometimes the teachers want to try this whole thing of here is the website where you will find the information, and it is great that we have the technology to do that, but sometimes I would rather teachers just teach it to us instead of relying on technology and our research skills."

Skills. The data analysis of the participants' educational experiences provided feedback that 1:1 technology programs develop the technological skills necessary for individuals to succeed in a digital world beyond high school. This theme was described by the participants across all three of the data collection methods. During the one-on-one interviews, participants shared 47 comments regarding their educational experiences related to technological skills they developed during their 1:1 technology program. The focus group discussion added 19 comments regarding their educational experiences related to the skills they developed in their 1:1

technology program. Out of the 15 participant journals, nine journals had 24 comments in the journal entries related to the skills they developed of their 1:1 technology program.

During the focus group discussion, Gavin summarized his feelings about being prepared for the future because his school's 1:1 technology program helped him develop technology skills he will use after high school.

> I'm sure that when we go into college or when we get a real job we will be having used a computer or a tablet or something like that, and I guess having them now is equipping us for later when we will be wanting to understand it better, and we will probably be better prepared.

Carly agreed by saying, "I one hundred percent think that I'm better prepared." Her rationale was based on interactions with friends who attended college without 1:1 experience.

> I know some friends who have transitioned from high school to college and had to use a computer, and they just don't know the same kind of tips and tricks that I do. They had quite a learning curve going into their classes. Instead of being able to focus all of their energy on adjusting to college, they had to have this extra layer of learning new technology. As far as in the workplace and the office in the future, I think that I will be far better prepared, because I have had the opportunity to explore new technology and learn how to learn about it. So, even if I do have to learn about new technology, I think that I will have been prepared.

Ciera shared the importance of her educational experiences using technology by being able to navigate new applications. "I think that in almost every one of my classes I have been introduced to a specific application or program that will, in turn, go on and help me in college and in the professional setting."

Participants felt strongly that their 1:1 technology program experience had positive impact on their preparation to be successful in a digital world. Gavin illustrated this point in the focus group discussion in sharing that learning to type, as a result of their school's 1:1 technology program, was a benefit that will help him after high school. Several other participants agreed. Genny said that typing and learning how to write a proper email have been two of the greatest skills she developed from her school's 1:1 technology program she will carry with her after high school graduation.

Ray summed up the sentiments of the group:

> The world after graduation is largely tech-based, and for me, I probably will want to do something business related or engineering related and that will involve online use. The 1:1 technology program has introduced us to technology at a very young age, so we can get used to how it works and also learn the basics of it in advance and to further apply it to better uses. You need to know how to use technology and use it efficiently and use it to better yourself and better wherever you work, and I feel if you don't have those skills then you are going to get kind of left behind.

Reviews of this theme noted the emergence of two subthemes related to skills: experience and responsibility.

Experience. The development of technology skills is a common value touted for implementing 1:1 technology in educational programs, but the participants in this study felt the experience using technology was a greater value than just developing skills. During Carly's one-on-one interview, she described that experience with the technology is what will prepare her for the future.

> I think that I will be far better prepared because I have had the opportunity to explore new technology and learn how to learn about it. So, even if I do have to learn about new technology, I think that I will have been prepared.

Greg echoed Carly's comments during his one-on-one interview when he said,

> I think the world outside my school is like super technology driven and getting even more advanced in technology, so being familiar with the technology from school once we get into the outside world is definitely going to help a lot. It will make transitioning into a real job so much faster by learning the tricks that you already know to make your job even faster and more efficient.

Gary also agreed by saying, "I think it (1:1 technology program) has prepared me pretty well because so many work environments and colleges obviously have moved to putting documents and work and important records online and other things you access using the Internet. So, it is important to gain that type of experience."

During the focus group discussion Creighton said, "I very much appreciate the organization that technology brings." Gavin added, "I think it has been valuable to learn how to operate the programs used on a daily basis." It was interesting that Carly added to the focus group discussion by saying, "It is not the device itself, but the applications that are critical to how we learn."

Reagan added during her one-on-one interview,

> I think even after graduation every year there is something new that is added to our technology field so, by being kind of a couple of steps ahead of what is going on it keeps you up to speed with what will happen in the future. If I was still going to a school where we sat at desks and no one was able to access the internet freely, maybe that might have

been fine ten years ago, but now I feel like to keep up with everything it will make the transition easier in a setting where technology is becoming more and more advanced. During the focus group discussion, Carly said, "being really comfortable with a computer" was the greatest benefit of her experience in a 1:1 technology program. She went on during the discussion to add, "At this point if there is a new thing with technology, I think all of us can agree that we are at the point where we can figure it out."

The participant journals documented the day-to-day usage of technology as the foundational value of the program. In a journal entry, Carly said that "the technology has become so natural that I barely think of it as unordinary." The list of digital applications the participants experientially used for educational purposes on a regular basis during their four years of high school included: Microsoft Products (Word, Excel, and Powerpoint), Google Applications (Documents, Sheets, and Presentation), Apple Applications (Pages, Numbers, and Keynote), Web Browsers, Search Engines, as well as their school's Learning Management System.

Responsibility. The participants expressed that taking responsibility of their own educational experiences was also something that they developed as a result of their 1:1 technology program. Learning to care for technology is a continual emphasis. Creighton, who works for his school's middle school help desk, commented on the need for students to learn how and to practice being responsible for their school issued devices. "I don't even know what people do. A lot of people spill stuff all over their computers, so that has been an issue. Another issue is people leave their laptop in a backpack or something, and people don't know it and will step on it." Greg also acknowledged that students were responsible for their school-issued technology.

In his participant journal, he made an entry that if he lost his school-issued technology that he would be responsible for replacing it.

Ray said during his interview that his school's 1:1 technology program "forces you to be responsible every year with the technology." He went on and said,

> Even though we have our own help desk that repairs the Chromebooks, I would expect that we are on our own with the current condition of the Chromebooks, and so in college we are going to have our own laptops that can be our own, so we don't want to ruin those. So, it definitely helps us with getting used to having our own technology to carry around.

When asked, "What advice would you offer to a potential student considering attending a private high school with an established 1:1 technology program?" Gary answered in his interview by saying,

> I would say make sure you keep track of the technology that you have so that you can turn it back in at the end of the year. This way you don't get yourself into any trouble. Keep the computer charged. Make sure you charge it 100% before you come to school in the morning.

Gary also noted on his participant journal that his computer's battery charge almost became an issue on Day Four. Ciera made a similar journal entry in her participant journal regarding her computer's battery charge. Her journal entry read,

> I had some problems today with keeping my computer charged. If I do not charge my computer at home overnight, I frequently have trouble finding time to charge during the day. Although a 45-minute class period can be used to charge my battery, we quickly use

> it back up again in other classes. However, the bright side to this is I learn to be responsible for my device to take care of it.

Cierra's journal entry clearly expressed her opinion that technology teaches students how to be responsible in caring for their technology in keeping it charged.

Agreement among the participants regarding valuing their devices was evident from both the individual interviews and the focus group discussion.

Participants did not just view responsibility as taking care of devices. The participants also expressed that their school's 1:1 technology program taught them to be responsible in using technology appropriately, specifically in the areas of accountability and academic integrity. Gavin said during his interview that technology "gives us more accountability… it provides more for us to check, like our homework is generally posted online so we can check as opposed to checking in class." Gary echoed that same sentiment during his interview by saying, "The use of technology has helped maintain accountability on assignments and makes doing assignments much faster than if we were doing them on paper." Carly said, "I think it has helped my development as a person as well as a student."

Reagan noted in her one-on-one interview: "I think with more opportunity (with technology) there is more pressure to uphold what they have given you, and they always say that having this technology is a privilege not a right." Reagan, while answering another interview question, described her concerns about the academic integrity of using technology. She said that her school uses a specific program "that basically checks for plagiarism and compares your work with other students in school as well, so it may scare students that misuse the technology at school. But at least for me it shows that the school really cares about the integrity of the students

to uphold the standards of the school." Railey also described a similar experience during her one-on-one interview related to academic integrity by saying,

> A lot of people when asked to do a presentation, like through their own thinking, will immediately go to Google and find something and copy that information. While we do have parameters to try to restrict that, it's hard because when the information is presented to them, it seems like everyone wants to grab it when they're not necessarily supposed to. So, I would say the most difficult things are definitely cheating, and you'll see we have an Honor Council to try to prevent it, but people will go in and look at other people's essays instead of trying to write them and everything, which is a specific problem.

Communication. Communication was articulated in various expressions by all 15 participants during the individual interviews and emerged as a theme through the data analysis process of the participant interviews, the focus group discussion, and the participant journals. The theme of communication was described by the participants across all three of the data collection methods. During the one-on-one interviews, participants shared 47 comments regarding their educational experiences related to communication. The focus group discussion added six comments regarding their educational experiences related to communication. Out of the 15 participant journals, 12 of the journals had 46 comments in the journal entries related to communication.

Participants, during their one-on-one interviews, expressed the value of being able to communicate with their teachers and their classmates through their devices. Cami, during her interview, mentioned, “The most common way that I like to communicate with both my classmates and my teachers is Outlook as an email. I can also have it as an app on my phone so I can access it anytime and anywhere, and that is really helpful." During the focus group

discussion, Genny added that the communication skills learned regarding protocol in emailing teachers and students on a daily basis was the greatest benefit she experienced from her school's 1:1 technology program.

The general theme of communication is best articulated in the data shared by all 15 participants in the two supporting subthemes of communicating with teachers and collaborating with students as taught in an established 1:1 technology program.

Communicating with Teachers. All 15 participants said that they used email as the primary method of communicating with their teachers, whether via a traditional email service or their school's email platform. Genny said during her interview that she "emails her teachers whenever she needs help on assignments or just for anything else she needs for them to know." Gavin summarized his use of technology to communicate with his teachers by saying,

> If I miss a day of school or I miss a class for a field trip or anything like that, then I am able to email my teachers as opposed to going directly to them and asking them if I missed anything in class. So, it (technology) definitely opens up the timing and the availability that I am able to communicate with teachers. Sometimes, I am even able to be home and email my teachers if I missed a day to see what work that I missed, that way I can make it up that day as opposed to the next day.

Ciera shared during her interview that being able to email her teachers was one of her favorite things about her school's 1:1 technology program.

> When I want to talk to a teacher, I shoot them an email and I think there are very few teachers that will take no longer than an hour to respond, and I think that is one of my favorite parts about the computer system because when I take my computer home, I can

> still communicate to them at night and if I have a pressing question about a homework assignment or even about a project I can just shoot them an email.

Although technology benefits students by enabling them to communicate with their teachers, not all students find the need for relationship development through email. Ryan shared through a journal entry that technology allowed him to find the solution to a problem on his own rather than developing a relationship with his teacher. The participant journal entry said, "Con: Didn't build relationship with my teacher because I found the solution to my problem online."

Collaborating with Students. All 15 participants said that they also appreciated being able to collaborate with classmates as a result of their school's 1:1 technology program. Participants either used email or a cloud-based sharing application as the two primary methods of collaborating with their classmates. The participant journals revealed several entries where students used technology to collaborate with classmates on assignments and presentations. Gavin's journal contained an entry associated with an AP Physics project "where we made a presentation on Google Slides". He expressed that technology access made it "easier to collaborate with other students as we are able to work on the same project at the same time without being together."

Ray said that it was "really cool" to use Google Drive to be able collaborate with classmates on the same document. Ryan affirmed the same sentiment.

> In order to do collaboration, everything is Google based, so we will use Google Docs, and we will get eight or so people on the same document and everyone will edit it and it can help us learn because what one person learns from a lesson may be different from what another person remembers, and they can all bring together good points and help the class as a whole and help the whole as a group succeed as a class.

Gary added.

> In collaborating with other students, obviously we communicate back and forth, but we also use Google Drive in the programs associated with the like Google Docs and Sheets and Slides. This is the presentation format and we would just use those to collaborate on things because you can share those documents with other people and have multiple people working on the same thing at the same time.

The focus group discussion broadened the communication discussion from school projects to relationship applications. Gavin said, "Yeah, to communicate with other students has kind of widened our range to like who we can communicate with, and I guess it helps us learn." Participants explained that their school's 1:1 technology program trained students how to collaborate with each other appropriately. Each school had a zero-tolerance policy for cyberbullying. Cami shared, "We had a long discussion that was focused on the proper way to communicate with others. I've only had a couple of interactions with people that wasn't up to those standards, however, I generally don't see any cyberbullying." Gabi also explained that her school had "their cyberbullying policy, like it is a zero-tolerance thing." Gavin agreed with Gabi and said, "Yeah, with cyberbullying at school, I haven't really ever heard of it happening at our school." Although Creighton did not add to the discussion during the focus group, he did mention during his one-on-one interview that he had "issues with other students that don't know how to properly manage themselves online and sent vulgar messages." He went on to say, "People tend to take out frustrations on others using the tables in ways I don't think were exactly predicted." Creighton did not go into any further details about his personal cyberbullying experiences. However, I found it interesting that Creighton was the only participant that shared a

personal experience of cyberbullying during the 1:1 interview when asked to share about frustrations and problems encountered as a result of their 1:1 technology program.

Challenges. Participants described challenges related to their involvement in their school's established 1:1 technology program across all three data collection methods. During the one-on-one interviews, participants shared 41 comments regarding the challenges related to their educational experiences. The focus group discussion added 11 comments regarding the challenges related to their educational experiences. Out of the 15 participant journals, 12 journals had 22 comments in the journal entries related to the challenges related to their educational experiences. One third of the participants reported in their journals that their technology could be a distraction when using the Internet or Applications. In addition, three participant journals reported that the use of technology is only beneficial when the technology is working properly. Additional challenges to using technology reported by the participants in their journals included battery issues, internet connectivity issues, and web filtering issues. During analysis of the data associated with this theme, I realized their challenges were categorized and best articulated in two subthemes: reliability and connectivity of their technology and distractions that are associated with technology.

Reliability/Connectivity. A critical challenge that participants shared throughout the study was that their school's network reliability was a frustration. Nine out of the 15 participants expressed during their one-on-one interviews that a common challenge in their school's 1:1 technology program is when the WIFI was not working or their device had issues. During Railey's one-on-one interview, she confirmed that WIFI reliability was a challenge in her school's 1:1 technology program.

> Personally, being a person that likes technology a lot, and wants to go into the technology field, it hasn't been the actual usage that's been a challenge for me, but rather it's been when the Internet goes down or the WIFI goes down. Then it seems like the entire school is almost useless for that day. While we have other methods to try to teach, it's just when you take it away, and it kind of seems like the worlds flipped, so I don't think it's the actual students learning how to use it because we are in the 21st century and kids know how to use everything. I think rather it's a problem when it is taken away for a day.

Gary made a similar comment in his interview. "Occasionally if a lot of people are doing things at the same time, the WIFI can be a little slow and it takes time for assignments to load on our computers." Reagan gave a specific example that happened to her the week of her one-on-one interview.

> Well, there was an issue with the WIFI at school yesterday. For example, we were supposed to do a class discussion on one of the databases and weren't able to access it, so basically the whole class was shot. I guess that is what comes with technologies that we take the Internet for granted when it crashes, or it is not working for a minute. It feels like everything goes dead, and I think it is important because it is so crucial to our learning in the lesson plans that teachers make. It so hard to think since we have come so far from doing everything on paper and on the white board that it is kind of frustrating that the day is kind of shot when the Internet is out.

The focus group discussion reiterated the challenges associated with WIFI reliability. Gavin said, "If something doesn't work, then it really throws everything off. So, either the WIFI goes out or the computer just shuts down." Gavin's participant journal also had an entry on Day

Four that read, "The computer is only as useful as the Internet connection. Whenever we have a failure of the power of Internet connection in the school, learning nearly comes to a halt."

Although participants expressed frustration with WIFI reliability and connectivity issues, the focus group discussion also revealed that WIFI issues give teachers and students the opportunity to adapt and overcome the issues related to connectivity to the Internet. During the focus group discussion, Ciera said, "If you are in class and the WIFI goes down, teachers just would write on the board or just kind of have you do something else." Gary added, "It usually changes the lesson plan." Carly responded to a follow-up question of "How do you feel when the WIFI goes down? How do you react? What do you typically do?"

> Sometimes, I don't always have a piece of paper because you are always just writing on the computer, and then you kind of have to scramble a little bit; but I don't think that is bad at all. It is just a change of pace, and that is okay.

The focus group participants felt that when their school's WIFI went down, although it was an inconvenience to both teachers and students, everyone adapted and adjusted to the learning environment. Gavin summarized the comments of the group: "It is more of a minor annoyance than like a major disruption."

Related to connectivity to WIFI is web filtering and firewalls. Participants expressed challenges with their school's web filtering and firewalls. Greg made a comment during his interview that he would change his school's web filtering policies. "They put huge censorship on all the computers for blocking almost everything. I would change that as the students get older. I would lessen that blocking and give them more responsibility and independence because they are more grown, and they can handle themselves and they can make their own choices." Rick added, "I would restrict less websites, they over restrict everything to the point of sometimes

assigning work on a website and the website will be blocked." Ciera expressed, "Our school filters are super strict, so sometimes you just can't get what you need." Genny's participant journal had an entry that commented on her school's web filter noting a con that read, "Some YouTube videos were blocked".

Distractions. Participants expressed the challenge of technology becoming a distraction in their learning environment. During Gary's one-on-one interview, he acknowledged that "there's always the distraction on the computer, but the computer provides so many extra tools that we would not have. But emailing friends or working on different assignments, as opposed to the class that we are in, can actually be a hindrance or distraction." Cami also said the distraction that technology brings is an issue. "I feel like having exposure to these computers on a day-to-day basis is pretty nice except for the fact that we can get distracted really easily like email, Skype, and any social media that pulls your attention away from the class, which is not the best." Gavin had a similar view: "Sometimes the computer can become distracting in class as students may check their emails or play games or something on the computer."

During Gabi's one-on-one interview she said that she can become distracted by her technology and gave this example:

> Technology can be a distraction in class, especially a pop up, and I am like, "Oh, what is this?" So, then I am online shopping and like "Oh no! What is going on?" So, it can distract you and you just have to know your boundaries and have self-control.

A follow up question was asked during Gabi's interview inquiring about her school's controls regarding pop ups, and she responded by saying, "Yes, they do have filters on them, and they cut out gaming websites." Ryan also expressed that classmates use their technology to stay off task in class. He said, "Sometimes in class kids will be using their Chromebooks or laptops on stuff

that isn't applicable to class or what we are doing, in that in class some will be playing games or doing shopping and doing that stuff."

The participant journals also made reference to distractions. Gavin's participant journal listed on Day One a con that read, "Some cons of the computers are the endless distractions that are online." Gabi also made an entry in her participant journal that said, "can be easily distracted" and listed that statement as a con across all five days. Cami made an insightful entry in her participant journal that read,

> I really enjoyed having the ability to look up information and to find study guides, and engaging videos to help me learn information for each course. A con that came with having a computer within arm's reach was that distracting YouTube videos were one click away. Even though I was looking for educational videos on YouTube, YouTube sometimes put cartoons, clickbait, etc. on the side which becomes extremely tempting.

During her interview Genny offered advice to potential students considering a school with a 1:1 technology program: "Don't let it be a distraction;, it is really up to the student as to whether the technology becomes a hindrance to their education or not… focus on what needs to get done."

Attitudes. Participants spoke in various ways about the overwhelming positive attitude toward their educational experiences throughout high school as a result of their school's established 1:1 technology program. However, their educational experiences in an established 1:1 technology program were not without negative comments related to their educational experiences as well.

The theme of attitudes emerged from participants sharing their feelings about their educational experiences in an established 1:1 technology program across all of the three data collection methods. During the one-on-one interviews, participants shared 61 comments about

their attitudes regarding their educational experiences related to their educational experience related to their 1:1 technology program. The focus group discussion added 11 comments regarding their educational experiences related to their educational experiences in their 1:1 technology program. Out of the 15 participant journals, ten of the journals had 14 comments in the journal entries related to attitudes about their educational experiences related to their 1:1 technology program. As the data was analyzed, two subthemes emerged regarding participants' attitudes regarding their educational experiences in an established 1:1 technology program: positive attitudes and negative attitudes.

Positive Attitudes. All participants expressed positive attitudes about their school's 1:1 technology program at some point during the study but especially during the one-on-one interviews. Gary said that his educational experience "has been a positive experience because technology makes doing the assignments much faster than if we were doing them on paper." Gabi said that her educational experience could be described "as very beneficial because it is a lot easier for teachers to communicate with students." Reagan shared a similar feeling during her one-on-one interview by sharing, "I think that it has been overall positive because it provides a connection with all of us and it makes it easier to do things from home."

Ciera described her educational experiences by saying, "I think having my own technology has improved my educational experience because my teachers can show us really cool programs, and while their (teachers) technology allows them to show us cool things, my technology allows me to explore based on what they showed me." Railey also made a similar comment:

> The 1:1 technology experience definitely helped improve my experience because I have the information that they (teachers) are teaching every day, and I can actually go back

with my device and look at things I missed and go back and relearn everything. So, I would say it definitely enhances just because we get more access to the information that they are teaching us, and we also can expand beyond what they are teaching us.

Genny said, "Yes, I have enjoyed it because we use our computers every day in the majority of my classes to take notes and do online interactive computer games and quizzes to test our knowledge of the material." Curtis shared his feelings during his one-on-one interview by saying, "I think it is very beneficial because it is a lot easier to take notes, study, and to integrate myself into the actual learning."

Cami described her experiences. "I think that it has been really great. Because of this 1:1 technology I have been able to have a lot more experiences than just the old textbooks would provide me. Because every day I can research my own topics and discover new things." Cami shared a similar feeling to another question during her one-on-one interview. "I believe that like having this opportunity is really nice because we have the opportunity to look up new things and be able to expand and discover what you want to discover." Carly echoed those feelings. “There are things I get done at home and am able to explore with my tablet and better understand it. I just wouldn’t get the opportunity to if I was only using it in a classroom."

Two focus group participants specifically mentioned they appreciated the organization that technology brings to their educational experiences. Cami said, "Technology makes things really organized because all our stuff is on the computer and that makes it easy." Creighton added that he "very much appreciates what technology brought to my educational experiences."

The participant journals included entries that described their positive attitudes toward technology and their school's 1:1 technology program. Gavin's participant journal had an entry that said, "The technology makes the learning experience different than a typical classroom." He

listed that journal entry as a pro related to his educational experiences. Creighton's participant journal had an entry that said, "Overall, the school-provided tablet streamlined learning and allowed for better data/note organization." Carly's participant journal had an entry that said, "The technology was incredibly useful and has become so natural that I barely think of it as unordinary." She had another journal entry that said, "So lucky to have personal technology, use it for organization."

Negative Attitudes. This subtheme emerged through the data analysis process of the participant interviews, the focus group discussion, and the participant journals. Participants shared negative attitudes, related to their educational experiences, that their school's 1:1 technology program caused at times throughout their educational experiences in an established 1:1 technology program.

Participants described common negative attitudes that were related to the technology device itself. Creighton shared during his one-on-one interview that his school-issued technology did not meet his expectations, causing a negative attitude toward his initial educational experience.

> My computer tended to have a bunch of ailments to it, processors that could hardly work, not to mention technological limitations. So, there were times that it impacted my ability to learn at the time because of how slow it was or there would be issues where I couldn't turn the screen around. We had the type of computer where the screen would swivel, and you could turn it over. It was a bunch of issues like that, that came up, but ever since we went to the new tablets, I would say that it has been relatively issue free.

During the focus group discussion participants shared stories of technology not working properly. Carly shared, "Our computers sometimes used to shut down spontaneously, and they

re-started spontaneously." She went on to share an example that happened to one of her classmates. "So, there is a specific example that didn't happen to me, thank God, but we were sitting in a class analyzing a paragraph where you got to sit down and write it all on your computer and you have 45 minutes to do it. One girl's computer said I'm going to restart right now and do all of our updates right now. She had to handwrite her paragraph and that was really hard. So, I think the spontaneous shutting down is a big frustration." Creighton added, "On a similar note, I have not really enjoyed restarting my computer when I get to school and at the beginning of class just so I can reconnect to the WIFI, and then all of a sudden Window updates." Genny's participant journal had an entry that said her "computer died in the middle of class." Creighton's participant journal entry noted, "Computer is out-of-date, so occasional freezing occurred."

During Ray's one-on-one interview he described a situation that in his words was a "nuisance" related to software being compatible with his school issued device.

> Well, the Chromebooks run off of Google Chrome and not Windows, like OS or Mac OS, so there is a lot of software that we are limited to because we can only use online stuff. So, being like a technology person, there is a lot of software that I would love to use on my Chromebook, but I have to use them only at home or at our science classrooms where we have computers there, so we can use other software. So, that is kind of a nuisance, but there are ways around it because there are online websites that teachers can explain software. They can ask us to go home and download it if we have a computer at home because most of us do have computers of some sort, but definitely not having access to software is like a big limitation.

Ciera's participant journal contained a similar attitude expression when she had to move pictures for school from her iPhone to her computer via email because her computer was not compatible with her phone. Her entry noted, "The whole process would be easier if we had an iPad that automatically connects to our photos."

Ciera shared a frustration that only occurs when her school collects their devices. "One of the problems that I am about to face is our computers are being taken away from us for the summer and then we get new computers. Students should be able to keep their computers right up until the moment where they get a new one."

Ryan shared an observation related to his teachers' attitudes toward technology and hesitancy using technology in the classroom. "I find that teachers are more hesitant to bring out technology in the class when they catch someone playing games. I mean, I understand them being mad because people are playing games as a whole. If only a couple of people are doing that, then it is better to let everyone use their technology than to shut it down for everyone."

Genny shared an interesting observation that is an outgrowth of the move to greater and greater use of technology.

> Ok, there is one negative. However, it is not a really big negative. My mom is a kindergarten teacher. Like handwriting, we have had computer since fifth grade. Slowly our computer usage has gone up throughout the years and handwriting usage has gone down and our penmanship is not great. So, that is a negative, but it is not a huge one.

Research Question Responses

In the following section, I will draw summary participant views expressed in each of the five themes to address and answer this study’s original three guiding research questions.

Research Question One: How do high school students describe their overall educational experiences in an established 1:1 technology program?

Participants used the following words to describe their overall educational experiences in an established 1:1 technology program: "amazing", "better", "positive", "beneficial", "helpful", "invaluable", and "prepared". Participants also used the word "frustrating" to describe their experiences when WIFI was not working properly or when their device was either not charged or not working properly.

Access. Participants described having instant access to information and resources beyond what is available in traditional educational environments as a benefit to their educational experiences in an established 1:1 technology program. Cami's participant journal contained an entry that described the data collected from each of the participants. "I really enjoyed having the ability to look up information, find study guides, and engaging videos to help me learn information for each course." Gary's participant journal had a similar entry that said, "using the Internet to look up information and quickly get back to work is a lot better than using paper and reference books."

Skills. Participants described their educational experiences in 1:1 technology programs developed the technological skills necessary for individuals to succeed in a digital world beyond high school. Gavin summed up his feelings and, from my data analysis, the thoughts of the other participants in his belief that his educational experience in a 1:1 technology program has prepared him for the future through developing his technology skills.

> I'm sure that when we go into college or when we get a real job, we will be having used a computer or a tablet or something like that; and I guess having them now is equipping us

> for later when we will be wanting to understand it better and we will probably be better prepared.

During Carly's one-on-one interview, she described her educational experiences in an established 1:1 technology program by saying,

> I think that I will be far better prepared because I have had the opportunity to explore new technology to learn how to learn about it. So, even if I do have to learn about new technology, I think that I will have been prepared.

Communication. Participants described using technology in an established 1:1 technology program to communicate with teachers and collaborate with other students was beneficial to their overall educational experience. Ray said that it was "really cool" to use Google Drive to be able to collaborate with classmates on the same document. Ciera shared in her one-on-one interview that "When I talk to a teacher, I shoot them an email and I think there are very few teachers that will take no longer than one hour to respond, and I think that is one of my favorite parts about the computer system." Gavin said during the focus group discussion that, "Yeah, to communicate with other students has kind of widened our range to like who we can communicate with, and I guess it helps us learn." Gavin's participant journal also had an entry that said, "The computer makes it easier to collaborate with other students as we are able to work on the same project at the same time without being together."

Challenges. Participants described that using technology challenges them to adapt to their learning environment when technology fails or when it becomes a distraction to learning. Ciera's participant journal noted on Day One that, "I had some problems today with keeping my computer charged. If I do not charge my computer at home overnight, I frequently have trouble finding time to charge during the day." Additionally, participants described the issue of

technology becoming a distraction in the learning environment as a challenge. During Gary's one-on-one interview he acknowledged that "there's always the distraction on the computer, but the computer provides so many extra tools that we would not have. But emailing friends or working on different assignments as opposed to the class that we are in can actually be a hindrance or distraction."

Attitudes. All participants expressed positive attitudes when describing their overall educational experiences in an established 1:1 technology program. The focus group discussion added comments related to the attitudes generated because of the experiences with their school's 1:1 technology program. Two focus group participants specifically mentioned they appreciated the organization that technology brings to their educational experiences. Cami said, "Technology makes things really organized because all our stuff is on the computer and that makes it easy." Creighton added that he "very much appreciates what technology brought to my educational experiences."

Ciera described her educational experiences by saying, "I think having my own technology has improved my educational experience because my teachers can show us really cool programs, and while their (teachers) technology allows them to show us cool things, my technology allows me to explore based on what they showed me." Railey also made a similar comment:

> The 1:1 technology experience definitely helped improve my experience because I have the information that they (teachers) are teaching every day and I can actually go back with my device and look at things I missed and go back and relearn everything. So, I would say it definitely enhances just because we get more access to the information that they are teaching us, and we also can expand beyond what they are teaching us.

Genny said, "Yes, I have enjoyed it because we use our computers ever day in the majority of my classes to take notes and do online interactive computer games and quizzes to test our knowledge of the material." Curtis shared his feelings during his one-on-one interview by saying, "I think it is very beneficial," and went on to explain several reasons why he thought it was beneficial by saying, "It is a lot easier to take notes, study, and it made it a lot easier to integrate myself into the actual learning."

Although participants had overall positive attitudes toward their overall educational experiences in an established 1:1 technology program, participants also shared negative attitudes caused, at times, by their 1:1 technology program. Common negative attitudes participants described were related to the technology device itself. Creighton shared during his one-on-one interview that his school-issued technology did not meet his expectations, causing a negative attitude toward his initial educational experience. He said,

> My computer tended to have a bunch of ailments to it, processors that could hardly work, not to mention technological limitations. So, there were times that it impacted my ability to learn, at the time, because of how slow it was or there would be issues where I couldn't turn the screen around. We had the type of computer where the screen would swivel, and you could turn it over. It was a bunch of issues like that, that came up, but ever since we went to the new tablets, I would say that it has been relatively issue free.

Creighton's participant journal had an entry noting, "Computer is out-of-date, so occasional freezing occurred."

Research Question Two: What are high school students' perceptions of how 1:1 technology is integrated in their school learning environment?

From the thematic data, all five themes contained participant experiences that described their perceptions as to how 1:1 technology was integrated in their school learning environment.

Access. The participants agreed that using technology in an established 1:1 technology program gave them instant access to information and resources beyond what is available in a traditional learning environment. Participants noted that their program broadened their access to curriculum offerings by using technology to explore concepts, ideas, or topics beyond what their teacher initiated in the classroom. Railey described how technology is integrated in her school's learning environment.

> The teachers teaching in our 1:1 technology program definitely helped improve my experience because I have the information that they are teaching every day, and I can actually go back with my device and look at things I missed and go back and relearn everything. I would say it definitely enhances just because we get more access to the information that they are teaching us, and we also can expand beyond what they are teaching us and Google the information that we need.

Carly added,

> The major differences that I have noticed is that you don't get nearly as deep of an understanding and the education isn't so much about your natural curiosity as it is about mastering material. So, they will do worksheets and things, but I don't find that many students have the drive to find the resources to learn more about the information. So, if I am doing a worksheet on my computer, and I say, 'Oh that sounds interesting!' I will then switch over to Google Chrome and I can Google it. So, I just get the opportunity to do a much more in-depth kind of look at anything that I am doing.

Railey shared in her one-on-one interview that "We download a lot of different apps and resources and then specific resources teachers will share with us too." Rick echoed Railey's comments about teachers sharing resources with students by saying, "Teachers can send different materials they want us to access easily through our devices." Rick explained that technology makes things easier on the teacher by saying, "It puts less stress on the teachers because they can make one document and click send to all their students and they will have it." He concluded his answer by saying, "It really helps the teacher and student get a better grasp of what they are doing."

Skills. The participants illustrated shared that their 1:1 technology program motivates them to take responsibility for their own educational experiences. This was evident from the individual interviews, the focus group discussion, and the participant journals. Gavin said during his interview that technology "gives us more accountability… it provides more for us to check. Our homework is generally posted online so we can check as opposed to checking in class." Gary echoed that same sentiment during his interview by saying, "The use of technology has helped maintain accountability on assignments and makes doing assignments much faster than if we were doing them on paper." Gavin added, "I think it has been valuable to learn how to operate the programs used on a daily basis." Reagan agreed.

> I think even after graduation every year there is something new that is added to our technology field, so by being kind of a couple of steps ahead of what is going on it keeps you up to speed with what will happen in the future. If I was still going to a school where we sat at desks and no one was able to access the internet freely, maybe that might have been fine ten years ago, but now I feel like to keep up with everything it will make the transition easier in a setting where technology is becoming more and more advanced.

It was interesting that Carly added to the focus group discussion by saying, "It is not the device itself, but the applications that are critical to how we learn." Ciera shared the importance of her educational experiences using technology by being able to navigate new applications by saying, "I think that in almost every one of my classes, I have been introduced to a specific application or program that will, in turn, go on and help me in college and in the professional setting."

The digital applications that participants used during the participant journal portion of the data collection process included: Microsoft Products (Word, Excel, and Powerpoint), Google Applications (Documents, Sheets, and Presentation), Apple Applications (Pages, Numbers, and Keynote), Web Browsers, Search Engines, as well as their school's Learning Management System. The participant journals reflect the participant's working knowledge of the applications that were used throughout the week.

Communication. All 15 participants in this study affirmed that they used technology to communicate with their teachers and collaborate with students, as described in the third theme of communication. All three schools used a learning management system (LMS) as a platform for teachers and students to communicate with each other outside of the classroom for educational purposes. The participants in this study also affirmed that they used technology to collaborate with other students. All three schools used some type of online, cloud-based platform like Microsoft or Google for students to share and collaborate on documents or presentations for educational purposes. Ryan affirmed the advantage of collaboration via a cloud-based platform by saying,

> In order to do collaboration, everything is Google-based, so we will use Google Docs, and we will get eight or so people on the same document, and everyone will edit it and it

> can help us learn because what one person learns from a lesson may be different from what another person remembers. They can all bring together good points and help the class as a whole and help the whole as a group succeed as a class.

The participant journals further revealed experiences where students used technology to collaborate with classmates on assignments and presentations. Gavin's participant journal contained an entry associated with an AP Physics project "where we made a presentation on Google Slides." He expressed that his computer made it "easier to collaborate with other students as we are able to work on the same project at the same time without being together."

Many participants expressed the advantage of having technology to communicate with teachers and collaborate with classmates when they miss school on make-up assignments or be able to receive notes from the classes they missed. Gavin summarized, in his interview, his use of technology to communicate with his teachers.

> If I miss a day of school or I miss a class for a field trip or anything like that, then I am able to email my teachers as opposed to going directly to them and asking them if I missed anything in class. So, it (technology) definitely opens up the timing and the availability that I am able to communicate with teachers. Sometimes, I am even able to be home and email my teachers if I missed a day to see what work that I missed, that way I can make it up that day as opposed to the next day.

Challenges. Participants shared that technology is such a part of their school's learning environment that when technology fails due to connectivity issues or technology issues that both students and teachers have to adapt and adjust until the issues are resolved. The focus group discussion revealed that WIFI issues give teachers and students the opportunity to adapt and overcome the issues related to connectivity to the Internet. During the focus group discussion,

Ciera said, "if you are in class and the WIFI goes down, teachers just would write on the board or just kind of have you do something else." Gary added, "It usually changes the lesson plan." Carly responded to follow-up questions of "How do you feel when the WIFI goes down? How do you react? What do you typically do?" by saying,

> Sometimes, I don't always have a piece of paper because you are always just writing on the computer, and then you kind of have to scramble a little bit, but I don't think that is bad at all. It is just a change of pace, and that is okay.

The focus group participants felt that when their school's WIFI went down, although it was an inconvenience to both teachers and students, everyone just adapts and adjusts to the learning environment without WIFI.

Attitudes. Participants described both positive and negative attitudes toward technology being integrated in their school's learning environment. Ray added, "I definitely think that it has improved our experience in class." Cami shared her feelings about using technology daily by saying, "I feel like having exposure to these computers like on a day-to-day basis is pretty nice." Gavin's participant journal had an entry that said, "The technology makes the learning experience different than a typical classroom." He listed that journal entry as a pro related to his educational experiences. Creighton's participant journal had an entry that said, "Overall, the school-provided tablet streamlined learning and allowed for better data/note organization."

While participants unanimously perceived the use of technology applications as enhancing their educational learning experiences, they also shared stories in the focus group discussion of frustrations when technology did not work properly, causing negative attitudes toward the programs. Carly shared, "Our computers sometimes used to shut down spontaneously, and they re-start spontaneously." She went on to share an example that happened

to one of her classmates. "So, there is a specific example that didn't happen to me, thank God, but we were sitting in a class analyzing a paragraph where you got to sit down and write it all on your computer and you have 45 minutes to do it. One girl's computer said, 'I'm going to restart right now and do all of our updates right now.' She had to handwrite her paragraph and that was really hard. So, I think the spontaneous shutting down is a big frustration." Creighton added to the focus group discussion by saying, "On a similar note, I have really not enjoyed restarting my computer when I get to school and at the beginning of class, just so I can reconnect to the WIFI and then all of a sudden Window updates." Genny's participant journal contained an applicable comment to this perspective when her "computer died in the middle of class."

Research Question Three: What benefits and challenges do high school students encounter as a result of being educated in a school with an established 1:1 technology program?

To answer this study's research question, a review of the data in all five themes described challenges and benefits high school students encounter as a result of being educated in a school with an established 1:1 technology program.

Access. Participants described that being able to access information and resources both at school and outside of school was one of the greatest benefits of being educated in a school with an established 1:1 technology program. During Creighton's one-on-one interview, he expressed that "having the ability to use a computer at home is really amazing." Carly enriched Creighton's thoughts, during her one-on-one interview, as she described her educational experiences of having access to information beyond the classroom as "invaluable".

> I get to explore interests that I have that are beyond the classroom setting, being able to access the Internet on a computer at home, um, is so important when I have a subject at school that I am interested in and I want to research more about it, and anything like that,

that I get to continue at home and really just expand my education past the worksheets and quizzes.

Although all participants, at some point during the study, expressed that having access to information and recourses benefited their educational experiences, one participant expressed the challenges of having unlimited access to information. During her one-on-one interview, Railey, shared that the amount of information found on the Internet was a negative when searching the content because of the volume of information that did the students had to read that did not apply to their research. This sentiment was noted as other participants that expressed access to information on the Internet that was not related to their educational research could be distracting in causing them to review content that did not pertain to their inquiry and thus waste time. One example entry from Gavin's participant journal summarized this feeling. "A down side is that it can cause people to get sidetracked and less focused when researching."

Skills. Participants expressed throughout the study that their 1:1 technology program developed technological skills that include: organizational skills, communication skills, problem solving skills, collaborative skills, and research skills. The skills that the participants shared as a result of their educational experiences in an established 1:1 technology program benefited them as high school students. Carly said, "being really comfortable with a computer" was the greatest benefit of her experience in a 1:1 technology program. She went on during the discussion to say, "At this point if there is a new thing with technology, I think all of us can agree, that we are at the point where we can figure it out."

The participants reflected that technology skills were practiced throughout the week. A journal entry from Carly noted, "The technology was incredibly useful and has become so natural that I barely think of it as unordinary." However, three participant journals reported that

the use of technology is only beneficial when the technology is working properly. Some barriers to technology skill practice and proficiency development reported by the participants in their journals included battery issues, internet connectivity issues, and web filtering issues.

Communication. Participants described communication with teachers and collaboration with other students as beneficial. Genny said that the communication skills learned by emailing teachers and students on a daily basis was the greatest benefit she experienced from their school's 1:1 technology program. Participants explained that each of their school's 1:1 technology program trained students how to collaborate with each other appropriately, and each school had a zero-tolerance policy for cyberbullying. Cami shared, "We had a long discussion that was focused on the proper way to communicate with others. I've only had a couple of interactions with people that weren't up to those standards." Only one participant shared a personal experience related to Cyberbullying. Creighton mentioned during his one-on-one interview that he had "issues with other students that don't know how to properly manage themselves online and sent vulgar messages." He went on to say, "People tend to take out frustrations on others using the tablets in ways I don't think were exactly predicted." Ciera shared during her interview that being able to email her teachers was one of her favorite things about her school's 1:1 technology program.

> When I want to talk to a teacher, I shoot them an email and I think there are very few teachers that will take no longer than an hour to respond. I think that is one of my favorite parts about the computer system, because when I take my computer home I can still communicate to them at night, and if I have a pressing question about a homework assignment or even about a project, I can just shoot them an email.

Although technology benefits students in allowing them to communicate with their teachers and peers, Ryan's participant journal contained an interesting comment, noting that technology access actually functioned as a barrier in building relationships with his teacher. His journal entry read, "Con: Didn't build relationship with my teacher because I found the solution to my problem online."

Challenges. The most common challenges described by the participants were the following: connectivity issues to WIFI, technology devices not being charged, and hardware failures due to age or damage. Although participants described several challenges they encountered as a result of being educated in a school with an established 1:1 technology program, one of the many benefits they cited was that all schools had plans in place to address the common challenges. Teachers and students had back-up plans for when WIFI was down. Students used external batteries or charging chord in the classrooms to recharge their devices. Participants all three schools had Help Desks to assist in fixing damaged devices or offered loaner devices while their device was being fixed.

Attitudes. Participants expressed positive attitudes about their school's 1:1 technology program. Gary said that his educational experience "has been a positive experience." Gabi said that her educational experience could be described "as very beneficial." Curtis had the same sentiment when he said, "I think it is very beneficial." Cami said, "I think that it has been really great because of this 1:1 technology. I have been able to have a lot more experiences." Carly echoed those feelings by sharing, "My experience with the 1:1 technology program is that I have gotten invaluable experiences."

However, the participants shared that their educational experiences in an established 1:1 technology program were not without challenges. Participants shared some common challenges

related to their school's 1:1 technology program, at times, were related to software updates, batteries not being charged, or programs not being compatible with their device. Ray illustrated this form of challenge as being a "nuisance" rather than a frustration that would ruin the 1:1 technology experience.

> Well, the Chromebooks run off of Google Chrome and not Windows, like OS or Mac OS, so there is a lot of software that we are limited to because we can only use online stuff. So, being like a technology person, there is a lot of software that I would love to use on my Chromebook, but I have to use them only at home or at our science classrooms where we have computers there, so we can use other software. So, that is kind of a nuisance but there are ways around it because there are online websites that teachers can explain software, and they can ask us to go home and download it if we have a computer at home because most of us do have computers of some sort, but definitely not having access to software is like a big limitation.

Summary

The purpose of this qualitative transcendental phenomenological study was to seek understanding as to the impact of an established 1:1 technology program on the educational experiences of high school students. This chapter described the lived educational experiences of 15 high school students in an established 1:1 technology program. Seven students participated in the focus group discussion either in person or via an online Zoom platform the day it was conducted. All participants, including those who were not able to attend the focus group discussion, in person or online, had the opportunity to add comments to the focus group discussion during the member-checking process. Two additional participants chose to contribute to the focus group discussion during the member-checking process, for a total of nine

participants contributing to the focus group discussion. Each participant completed a week-long journal documenting their use of technology in their school's 1:1 technology program and participated in a semi-structured interview.

Through a thorough analysis of the textual transcripts and use of coding processes to deconstruct and then reconstruct the data, five themes emerged. The five themes regarding students' educational experiences in an established 1:1 technology program that emerged were: (a) access, (b) skills, (c) communication, (d) challenges, and (e) attitudes. All five themes described the personal educational experiences of the participants in an established 1:1 technology program from students' perspectives throughout high school. The participants shared similar positive attitudes when sharing their educational experiences in an established 1:1 technology program throughout high school. They shared stories of becoming better students through organizing classroom notes, researching topics, accessing information, communicating with teachers, and collaborating with students all by using their technology and enhancing their educational experience. All 15 participants shared the perception of being more engaged and motivated at school as a result of their 1:1 technology program. All five themes contributed to answering the three research questions for this study. Each theme used the words of the participants that described their overall educational experiences in an established 1:1 technology program and shared how technology was integrated in their learning environments and described both the benefits and challenges they encountered as a result of their 1:1 technology program.

The following chapter will provide a review of the findings and share how they relate to the literature that was presented. Additionally, the implications related to the study's learning theories that include practical implications for students and administrators will also be discussed.

Finally, the limitations and delimitations will be presented, as well as recommendations for future research that will conclude the chapter.

CHAPTER FIVE: CONCLUSION

Overview

As technology integration changes the learning environment for students, their educational experiences are also changing (Aagaard, 2015). The purpose of this qualitative transcendental phenomenological study was to seek understanding as to the impact of an established 1:1 technology program on the educational experiences of high school students. Chapter five includes a summary of the study's findings and a discussion of the five themes responses as they applied to the three research questions and added to the body of the literature. The chapter includes theoretical, empirical, and practical implications learned from the study and concludes with the study's delimitations and limitations and recommendations for future research.

Summary of Findings

An understanding of the impact of an established 1:1 technology program on the educational experiences of high school students was accomplished by extrapolating student perceptions and experiences through one-on-one interviews, a focus group discussion, and participant journals. Analysis of the data led to the emergence of five major themes: access, skills, communication, challenges, and attitudes. Answers to each of the original three research questions were substantively addressed as a collective voice for the study in chapter four as participants thematically described their perceptions and experiences throughout high school in an established 1:1 technology learning environment. The research questions that guided this study were as follows:

Research Question One: How do high school students describe their overall educational experiences in an established 1:1 technology program?

Research Question Two: What are high school students' perceptions of how 1:1 technology is integrated in their school learning environment?

Research Question Three: What benefits and challenges do high school students encounter as a result of being educated in a school with an established 1:1 technology program?

The first research question was answered using participants' own words to describe their overall educational experiences in an established 1:1 technology program: "amazing", "better", "positive", "beneficial", "helpful", "invaluable", and "prepared". The word "frustrating" was used to describe the participants educational experiences when WIFI was not working properly or when their device was either not charged or not working properly. Having instant access to information and resources beyond what is available in traditional educational environments was described by the participants as beneficial to their educational experiences in their established 1:1 technology program. Communicating with teachers and collaborating with other students was also beneficial to the participants overall educational experiences. However, participants shared that when technology fails or when technology became a distraction to their learning that their 1:1 technology program challenged them to adapt to their learning environment. All participants expressed positive attitudes when describing their overall educational experiences in an established 1:1 technology program.

From the thematic data, all five themes contained participant experiences that answered the second research question in describing their perceptions as to how 1:1 technology was integrated in their school learning environment. The participants agreed that using technology in an established 1:1 technology program gave them instant access to information and resources beyond what is available in a traditional learning environment. Participants noted that their

program broadened their access to curriculum offerings by using technology to explore concepts, ideas, or topics beyond what their teacher initiated in the classroom. Participants shared that technology is such a part of their school's learning environment that when technology fails due to connectivity issues or technology issues, then both students and teachers have to adapt and adjust until the issues are resolved. Participants described both positive and negative attitudes toward technology being integrated in their school's learning environment.

All five themes were used to answer the third research question and were used to describe both challenges and benefits participants encountered as a result of being educated in a school with an established 1:1 technology program. The most common challenges described by the participants were: connectivity issues to WIFI, technology devices not being charged, and hardware failures due to age or damage. Although participants described several challenges they encountered with their school's established 1:1 technology program, one of the many benefits they cited was that all of their schools had plans in place to address the common challenges and resolve issues in a timely manner. Participants also explained that when issues arise as a result of WIFI issues, that both teachers and students usually had back-up plans. Overall, participants described their high school educational experiences in an established 1:1 technology program as positive. The results of this study revealed that the participants developed many skills as a result of being educated in an established 1:1 program that include: organizational skills, communication skills, problem solving skills, collaborative skills, and research skills. The skills that the participants developed as a result of their educational experiences in an established 1:1 technology program benefited them as high school students.

Discussion

Because 1:1 technology programs provide an improved means to individualize instruction, one of the critical issues for the planning and implementation of a 1:1 technology program is the importance of understanding students' educational experiences (Argueta et al., 2011). However, existing literature did not adequately reflect students' perspectives of their educational experiences related to this growing phenomenon of being educated in a 1:1 technology program (Bebell & O'Dwyer, 2010; Carver, 2016; Flutter, 2006; Montrieux, Vanderlinde, Schellens, & De Marez, 2015). This study gave students a voice regarding their high school educational experiences in an established 1:1 technology program.

Empirical Literature Discussion

Although there is research that explores student achievement, there is little research that explores students' perceptions of 21st century learning environments that meet the unique learning needs of 21st century students at the secondary level. The lack of research on student perceptions of 21st century learning environments and their effect on learning necessitates further research that addresses which learning environment meets the needs of 21st century students (Flutter, 2006). This study's research helps fill the gap in literature related to students' perceptions of their educational experiences in an established 1:1 technology program. The results in this study's thematic description provide a platform for discussion related between the findings and the existing literature.

Access. Technology is a part of students' everyday experiences, and they have instant access to virtually an unlimited amount of information via the Internet (Grunmeyer & Peters, 2016). The theme of access discussed in chapter four from this study aligns with the existing literature related to student experiences in an established 1:1 technology program. Stone (2016)

also reported that students will benefit from 1:1 technology because it gives them greater access to information and resources. All participants expressed that having access to information and resources was a great benefit of being educated in an established 1:1 technology program. Cami confirmed that having access to information and resources was the greatest benefit during the focus group discussion when she added to the discussion that access to information and resources was the greatest benefit of her school's 1:1 technology program. Cami said,

> Access to online resources and documents and research papers (is the greatest benefit). We have access to traditional libraries, but there is a real limitation, and sometimes the information (in a library) is a bit dated. So, having access, really access to an infinite amount of resources on the Internet is really nice for research or personal interests or something to learn more about.

The Internet has become an essential learning tool that has been used by students to gather information as a resource, (Oum & Han, 2011). All the participants in this study agreed with the literature and expressed that having access to the Internet is an essential learning tool for their educational experiences.

Learning environments with an implemented 1:1 technology program are no longer dependent on the school as a building or the learning environment as a classroom, but rather open a whole new world of learning possibilities that involve an unlimited amount of information and data from the Internet (Kroksmark, 2016). All of the participants agreed with the literature by making at least one entry in their participant journals that confirmed they used the Internet as a resource for information and data. Schools that effectively implemented 1:1 technology programs have taken the limitations off the teachers, textbooks, and curriculum by giving students digital resources and access to the information of the Internet to improve the

learning process and students' overall learning experience (Grundmeyer & Peters, 2016; Tang & Austin, 2009). Several participants during their one-on-one interview described the benefits of having access resources and information outside of school through their technology. Carly affirmed the current literature related to the theme of access during her one-on-one interview, as she described her educational experiences of having access to information beyond the classroom as "invaluable".

Skills. Current literature revealed that the use and integration of technology in education is an appropriate and natural way to help students develop 21st century skills to prepare them for a computerized society and provide a major advantage for both teachers and students (Gaitanaru, 2014). The findings from this study revealed the theme of skills. The data analysis of the participants' educational experiences provided feedback that an established 1:1 technology program develops the technological skills necessary for individuals to succeed in a digital world beyond high school. The implementation of a 1:1 technology program offers many benefits to students and in developing technology skills necessary in a digital world (Schnellert & Keengwe, 2012; Stone, 2016). The participants in this study affirmed the research and described many benefits of their 1:1 technology program that helped them develop technology skills. The skills theme aligned with research by Argueta et al. (2011); Gaitanaru (2014); Lowther, et al. (2007); and Shapley, et al. (2008) reporting that students in schools with implemented 1:1 technology programs shared that they felt that they had developed 21st century skills that better prepared them for the future in college and the workforce. Gaitanaru (2014) added that integrating technology in education is an appropriate and natural way to help students develop 21st century skills to prepare them for a computerized society. Participants felt strongly that their 1:1 technology program experience had positive impact on their preparation to be successful in a

digital world. Gavin illustrated this point in the focus group discussion in sharing that learning to type, as a result of their school's 1:1 technology program, was a benefit that will help him after high school. Several other participants agreed.

Communication. Kong's et al. (2014) noted that one of the benefits of a 1:1 technology program is the ability for students to communicate with teachers and collaborate with their peers through the use of their technology. Participants confirmed the research during their interviews and the focus group discussion by explaining how they use their device to communicate with teachers and collaborate with students. Ciera shared during her interview that being able to email her teachers was one of her favorite things about her school's 1:1 technology program. Several participants also had entries in their participant journals that also confirmed their use of technology to communicate with teachers and collaborate with other students.

As more schools implement a 1:1 technology program, the current literature shared that teaching digital communication etiquette is necessary, and it is also a natural extension of the schools 1:1 technology program. (Grundmeyer & Peters, 2016). The findings of this study affirmed the necessity of teaching digital communication etiquette. Each school in this study addressed digital communication etiquette during an orientation to their school's 1:1 technology program. All three schools in this study addressed communication etiquette in their orientation programs, and the majority of participants expressed that cyberbullying was not an issue at their school. Cami shared what her school discusses in orientation related to communication by saying, "We had a long discussion that was focused on the proper way to communicate with others. I've only had a couple of interactions with people that weren't up to those standards." However, one participant shared a personal experience related to cyberbullying. Creighton mentioned during his one-on-one interview that he had "issues with other students that don't

know how to properly manage themselves online and sent vulgar messages." He went on to say, "People tend to take out frustrations on others using the tablets in ways I don't think were exactly predicted."

The literature review from chapter two found that the excessive use of technology in education in the context of individualized learning can lead to the deterioration of student-teacher and/or student-student relationships and cause isolation regarding social relationships (Gaitanaru, 2014). Although the majority of the participants in this study did not confirm the deterioration of relationships, there was one participant, that shared through a journal entry, a similar feeling. Ryan shared, through a journal entry, that technology allowed him to find the solution to a problem on his own rather than developing a relationship with his teacher. The participant journal entry said, "Con: Didn't build relationship with my teacher because I found the solution to my problem online."

Challenges. Reviewing the literature revealed that one of the greatest challenges for students in a 1:1 technology program is simply staying on task. Although technology can be an extremely useful tool in the learning process, it can also be a distraction. The data analysis from the study confirmed across all three data collection methods that the greatest challenge students face in an established 1:1 technology program is not allowing technology to become a distraction. A quantitative study by Donovan et al. (2010) explored configurations of technology use in a 1:1 learning environment, and showed a range of off-task behaviors as a result of technology use, concluding that increased access to technology does not always equate to increased student engagement (Donovan, Green, & Hartley, 2010). In chapter four the participants described the theme of challenges in greater detail which confirms the literature findings. Participants agreed with the current literature and shared throughout this study that

technology being a distraction is one of their greatest challenges of being educated in an established 1:1 technology program.

Another challenge for students in a 1:1 technology program referenced in current literature is that students' perception regarding technology is often associated with playing games. Klaus (2013) reported 21st century students often use technology for games. Although this was not a common theme or subtheme in this study, Ryan did share an observation during his one-on-one interview related to his teachers' attitudes toward technology and hesitancy using technology in the classroom. "I find that teachers are more hesitant to bring out technology in the class when they catch someone playing games. I mean I understand them being mad because people are playing games as a whole. If only a couple of people are doing that, then it is better to let everyone use their technology than to shut it down for everyone."

A challenge that participants shared throughout the study was that their school's network reliability was a common frustration. Literature warns that prior to the implementation of a 1:1 technology program, schools must invest in an IT infrastructure that is capable of supporting the needs of a 1:1 technology program (Stone, 2016). Technical issues in a 1:1 technology program that are associated with issues with technology are devices, wireless network reliability, and timely access to IT support staff. All can be a barrier to a 1:1 technology program implementation. These technical issues can cause frustration among both teachers and students in a 1:1 technology program (Tatar et al., 2003). The participants in the focus group discussion confirmed the literature findings. Gavin said, "If something doesn't work then it really throws everything off. So, either the WIFI goes out or the computer just shuts down." Gavin's participant journal also had an entry on day four that read, "The computer is only as useful as the

Internet connection. Whenever we have a failure of the power of Internet connection in the school, learning nearly comes to a halt."

Attitudes. Zhengm Warschauer, Lin, & Chang (2016) reported that today's students experience a much more positive attitude toward learning while using technology than traditional approaches with paper, pencils, and textbooks. All participants expressed positive attitudes about their school's 1:1 technology program at some point during the study, but especially during the one-on-one interviews. This expression was not a surprise because it aligns with findings in the literature. Gary said that his educational experience "has been a positive experience because technology makes doing the assignments much faster than if we were doing them on paper." Gabi said that her educational experience could be described "as very beneficial because it is a lot easier for teachers to communicate with students." Reagan shared a similar feeling during her one-on-one interview by sharing, "I think that it has been overall positive because it provides a connection with all of us and it makes it easier to do things from home."

Armstrong (2014) and Short and Greer (2002) credited technology as the primary method to empower students to take control of their own learning, making students in a technologically-rich learning environment explorers and teachers as their guides. The participants expressed that taking responsibility of their own educational experiences was also something that they developed as a result of their 1:1 technology program. Studies of 1:1 technology programs have found increases in student learning and student engagement as a result of implementing 1:1 technology programs (Bebell & Kay, 2010; Keengwe, Schnellert & Mills, 2012). Participants agreed with the literature. Gavin said during his interview that technology "gives us more accountability… it provides more for us to check, like our homework is generally posted online so we can check as opposed to checking in class." Gary echoed that same sentiment during his

interview by saying, "The use of technology has helped maintain accountability on assignments and makes doing assignments much faster than if we were doing them on paper." Carly said, "I think it has helped my development as a person as well as a student."

Theoretical Literature Discussion

This study was guided by two major theories related to the educational experiences of high school students in an established 1:1 technology program: Constructivism developed by theorists Piaget and Vygotsky as well as Connectivism that was developed by Siemens. Both constructivism and connectivism theories were explored in greater detail in Chapter Two and are used in this research study because an established 1:1 technology program promotes both of the theories' teaching and learning philosophies.

Constructivism. According to Dewey (1916) there are two major pillars for education: continuity and interaction. Continuity refers to the experiences of students which influences their learning, and interaction refers to how past experiences interact with the current learning experience. Dewey's premise takes a constructivist approach and suggests that students will learn something through every experience. The participants affirmed Dewey's premise in their educational experiences in an established 1:1 technology program by saying in the focus group that, "using technology now is equipping us for later when we will be wanting to understand it better." Therefore, every experience will affect future learning, which makes the learning experience unique to the individual (Andersson, Wiklund, & Hatakka, 2016). Constructivism emphasizes hands-on, activity-based teaching and learning in which students develop their own frames of thought and knowledge based on their own unique learning experiences (Keengwe, Onchwari, & Agamba, 2014). All 15 participants in this study emphasized the benefit of having access to information and resources at their fingertips through their technology beyond what was

being presented in the classroom. Cami answered one of her one-on-one interview questions by saying, "Having the opportunity to look up new things is nice and being able to discover what you want to discover and expand on anything, really, is quite nice because of the 1:1 technology program."

Piaget (1952) proposed that learners construct new knowledge from their own experiences through the processes of assimilation and accommodation. Gavin explained during his one-on-one interview that his educational experiences with technology have taught him to "distinguish between things that are reliable online and not reliable online and be able to use the different applications and know which applications to use in certain situations." Bell (2011) stated that constructivism emphasizes a collaborative learning environment in education that promotes social interactions regarding knowledge or facts about the world. Kissinger (2013) asserted that mobile technologies promote constructivist teaching and collaborative learning, and mobile technologies allow for learner-centered and situated learning experiences to take place.

Constructivists hold to the premise that students' learning habits affect the way future learning advances. Ramsden (2003) stressed the importance of understanding the unique educational experiences of students and argued that the differences in educational experiences are due to the differences in the ways that students experience learning. Based on the constructivist theory of learning, the implementation of a 1:1 technology program, such as collaborative and cooperative learning, should be introduced earlier in order for students' learning experiences to be established for future learning experiences in 1:1 technology programs (Andersson et al., 2016). During Gavin's one-on-one interview he said, "I would implement the usage of computers at a younger age", affirming that the earlier use of computers would enhance students' future learning experiences.

Connectivism. Siemens (2005) reported that the emergence of technology in education has impacted learning so significantly that a new learning theory was required, and he introduced connectivism as that learning theory. Connectivism is a learning theory that takes into account that learning takes place when the learner makes connections between ideas composed from information resources and technologies that make up a student's personal learning network (Dunaway, 2011).

With the integration of technology in classrooms, students must adapt and develop new ways to learn and understand the content that is being taught. Students engage in the process of assimilation or accommodation to make sense of their experiences of learning with the integration of technology in the classroom (Dunaway, 2011). The participants expressed that one of the benefits of a 1:1 technology program is the integration of technology in the classroom. The participants said that their schools did a good job of training teachers to integrate the technology into their classrooms thereby enhancing the learning experiences of the students. However, the participants also indicated that students seemed to adapt to the changes in technology easier than their teachers. The participants said that technology enhanced their educational experiences through note taking applications, online learning through videos and resources, and learning management systems that streamlined teacher feedback on assignments and assessments. During Cami's one-on-one interview, she suggested to other students that "they should be prepared to experience new ways of using technology in the classroom and outside the classroom, and you need to know how to use it correctly."

Connectivism takes into account that learning takes place when the learner makes connections between ideas composed from information resources and technologies that make up a student's personal learning network (Dunaway, 2011). Knowledge is therefore attained from

students' personal learning networks as they recognize connections between concepts, opinions, and perspectives that are gathered by the learner through technology via the Internet through web search engines, electronic databases, and online information resources (Dunaway, 2011). Several of the participants said that their 1:1 technology program has allowed them access to additional resources beyond the classroom to make connections using technology to find new resources. Ciera summed it up in her interview by saying, "My high school experience has really allowed me to access a plethora of resources both inside and outside of school, and the most important part about what I have gained is not only the resources to help me learn every day, but also the skills to use those resources and to find new resources every day to help me with what I am doing and that will help me in the future in college and in a professional setting."

Connectivism takes into account the ever-changing educational environment due to technology integration. The following are the major principles of connectivism:

- Learning and knowledge rest in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- The capacity to know more is more critical than what is currently known.
- Nurturing and maintaining connections are needed to facilitate continual learning.
- The ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision making is itself a learning process. Choosing what to learn and meaning of incoming information is seen through the lens of a shifting reality. While there is a

> right answer now, it may be wrong tomorrow due to alterations in the information climate that impacts the decision (Siemens, 2005).

The above connectivism principles were all confirmed at one time or another by the participants across all three forms of data collected during this study. For example, all participants said that technology allowed students to collaborate with other students during the learning process. Another example of this is when Reagan said, "It has been a positive experience because technology provides a connection with all of us." A connectivism perspective takes into account the need for making connections to acquire knowledge. The technology used in an established 1:1 technology program helps students make those connections to acquire knowledge. This concept was affirmed by all 15 participants throughout the study by using technology as a resource to learn things beyond classroom instruction through Internet searches, collaboration with classmates, and applications designed to enhance their educational experiences.

Implications

The results of this study in examining the lived educational experiences of high school seniors in an established 1:1 technology program throughout their high school career produced findings that have empirical, theoretical, and practical implications for individuals involved in education. The following section addresses the implications related to the findings of this qualitative study.

Empirical Implications

As schools continue to implement a 1:1 technology program in the classroom, technology will continue to change and improve. As technology improves, it will create new learning opportunities for students (Collins & Halverson, 2010). In order to comprehend technology's impact on society and on education regarding teaching and learning, it is important to continue to

understand students' experiences with using technology (Cilesiz, 2010). This study helped to fill the gap in literature relating to students' experiences with using technology in an established 1:1 technology program. However, as technology continues to change, it will be important to continue this research in order to understand the changes in students' educational experiences in an established 1:1 technology program.

Current literature revealed that 21st century teaching and learning goes beyond technology integration in the classroom; it is also about fostering a new way of thinking and promoting dispositions that support success in an age driven by rapidly changing and expanding technologies. Therefore, 21st century teaching requires educators to create a learning environment that provides experiences to 21st century learners that encourage exploration and inquiry, and nurture creativity and curiosity (Ramey, 2016). This study confirmed the literature, as participants noted throughout this study, that their program broadened their access to curriculum offerings by using technology to explore concepts, ideas, or topics beyond what their teacher initiated in the classroom. Railey described how technology is integrated in her school's learning environment.

> The teachers teaching in our 1:1 technology program definitely helped improve my experience because I have the information that they are teaching every day, and I can actually go back with my device and look at things I missed and go back and relearn everything so I would say it definitely enhances just because we get more access to the information that they are teaching us and we also can expand beyond what they are teaching us and Google the information that we need.

However, as technology continues to change there will always be the need for teachers to continue to look for new and improved ways to implement technology in their classrooms.

Time used for teaching and learning can be limited if the teacher or students are not fully trained in using the technology. Students' skill levels in using technology are different, and teachers are tasked with the difficult challenge of implementing technology in the classroom, when not all students have the same skills and ability in using that technology. While it is important to educate students to use technology, it must be done at a pace that is appropriate for all students' skill levels, otherwise more teaching and learning time will be wasted in the classroom (Klaus, 2013). Although this study did not specifically address the training of teachers and students in the use of technology, Gavin agreed with the literature by saying he would encourage "practicing to become familiar with the computers before coming (to his school)… otherwise you will probably get behind in your classes, and it will be more difficult for you to catch up. So, if you become familiar with software in Apple products and you know how to type without looking and things like that, then you should be ok."

According to Gallow and Lasley (2010) classroom learning environments are changing due to the integration of technology, therefore teachers and students must adapt in order to keep pace with the changes in education caused by technology. Carly's participant journal had an entry that said, "The technology was incredibly useful and has become so natural that I barely think of it as unordinary." However, as technology and learning environments continue to change, additional training for teachers and students is needed to help them adapt to the continued changing learning environments due to changing technology.

Cyberbullying and proper communication using technology was discussed in current literature. Grundmeyer & Peters (2016) shared that teaching digital communication etiquette is necessary, and should also be a natural extension of the schools' 1:1 technology program. Although this study did not reveal a serious problem related to cyberbullying, Creighton was

only one participant in the study that mentioned during his one-on-one interview that he had "issues with other students that don't know how to properly manage themselves online and sent vulgar messages." He went on to say, "people tend to take out frustrations on others using the tables in ways I don't think were exactly predicted." Creighton did not go into any further details about his personal cyberbullying experiences. However, I found it interesting that Creighton was the only participant that shared a personal experience of cyberbullying during the 1:1 interview when asked to share about frustrations and problems encountered as a result of their 1:1 technology program. Administrators of 1:1 technology programs must continue to explore preventive measures of cyberbullying as well as the negative impact of cyberbullying in established 1:1 technology programs.

Theoretical Implications

Constructivists hold to the premise that students' learning habits affect the way future learning advances. Ramsden (2003) stressed the importance of understanding the unique educational experiences of students and argued that the differences in educational experiences are due to the differences in the ways that students experience learning. Based on the constructivist theory of learning, the implementation of a 1:1 technology program, to promote collaborative and cooperative learning, should be introduced earlier in order for students' learning experiences to be established for future learning experiences in a 1:1 technology program (Andersson et al., 2016). During Gavin's one-on-one interview he said, "I would implement the usage of computers at a younger age", affirming that the use of computers earlier would enhance students' future learning experiences.

Reagan said, "it has been a positive experience because technology provides a connection with all of us." A connectivism perspective takes into account the need for making connections

to acquire knowledge. The technology used in an established 1:1 technology program helps students make those connections to acquire knowledge. This concept was affirmed by all 15 participants throughout the study by using technology as a resource to learn things beyond classroom instruction through Internet searches, collaboration with classmates, and applications designed to enhance their educational experiences.

Practical Implications

The results of this study provide students facing the transition from conventional schools to alternative online schools valuable information regarding their educational experiences in 1:1 technology programs. Furthermore, the results provide valuable feedback, from a student's perspective, for school leaders with 1:1 technology programs or school leaders considering implementing a 1:1 technology program.

Implications for Students. This study provides students with the knowledge of how to make the most of their educational experiences throughout high school in an established 1:1 technology program. All the participants in this study affirmed the benefits of being educated in an established 1:1 technology program, especially the benefit of having access to information and resources that led to developing technology skills that will prepare them for college and life beyond high school.

The participants from this study expressed the challenge of potential distractions that come with being educated in a 1:1 technology program. All participants admitted that their technology can be used for things other than educational purposes. Although many participants expressed frustration when other students were distracted with the technology, they also said the educational experiences and benefits of a 1:1 technology program exceeded the potential distractions associated with the technology in a 1:1 technology program.

The participants were all asked about the advice they would give to potential students considering attending a school with an established 1:1 technology program. Many participants expressed the need to improve typing skills in order to be more efficient with notetaking and navigating the device. Another piece of advice the participants shared was using the technology as often as possible and using it to its potential. There is definitely a learning curve, so become familiar with the device as quickly as possible in order to take advantage of its capabilities to enhance your overall educational experience. Lastly, Carly summed it up best in her interview when she said, "Just do it. I cannot explain the extent that having a 1:1 technology program has helped me. I think it has done more for me on shaping how I perceive learning in general, and I am definitely more excited about learning and all the opportunities. Having technology is an invaluable resource, and you will understand almost immediately the affect it will have on your life."

Recommendations for Students. Based on the findings in this study, students must be aware of the potential distractions that are associated with technology and be prepared to avoid potential distractions while using technology for educational purposes. Additionally, students should become familiar with technology earlier, including improving typing skills, in order to take advantage of all the functions and capabilities of the technology provided and thus enhance the overall educational experiences in the 1:1 technology program.

Implications for School Leaders. This study provides schools with valuable feedback, from students in an established 1:1 technology program, that both affirms the benefits of implementing a 1:1 technology program as well as the challenges associated with a 1:1 technology program. Participants shared many benefits from an established 1:1 technology program. However, some of the benefits shared by the participants were dependent on how

technology was integrated in the learning environment. All participants shared that some teachers implement technology more than others. The participants also expressed that their educational experiences were better in the classrooms where teachers implemented the technology over traditional learning environments. Based on the participants' feedback, it is evident that schools need to invest in continued professional development for teachers to better integrate technology into the learning environment.

Participants shared frustrations when the school's WIFI was down, especially when their school's 1:1 technology program was dependent on a reliable Internet connection. However, some participants shared that their teachers are prepared with back-up plans in case of technology failure. It is evident that a school's infrastructure and teacher training is crucial to the positive educational experiences of students in an established 1:1 technology program. In addition to WIFI reliability, participants were frustrated with outdated technology. Many participants shared that their technology was old and had issues functioning properly. Although all three schools had capable IT Help Desks, participants desired the best technology devices to improve their educational experiences. In addition to outdated technology, participants were frustrated by their schools' firewall restrictions. Participants from all three schools expressed frustrations regarding the restricted access to websites. Although those participants understood the need to restrict certain websites from a school's perspective, it still didn't alleviate their frustrations. Based on the participants' feedback, it is evident that schools need to invest in technology infrastructure to ensure WIFI reliability, up-to-date technology devices, as well as continued monitoring of website restrictions via the school's firewall.

Recommendations for School Leaders. Based on the findings in this study, it is recommended that school leaders invest in professional development for their teachers to better

integrate technology into the learning environment so that a better learning experience is provided for their students in their 1:1 technology program. It is also recommended that school leaders invest in technology infrastructure to ensure WIFI reliability, up-to-date technology devices, as well as continued monitoring of website restrictions via the school's firewall so that student frustration is reduced and an improved 1:1 learning environment is achieved.

Delimitations and Limitations

The purpose of this qualitative transcendental phenomenological study was to seek understanding as to the impact of an established 1:1 technology program on the educational experiences of high school students. This section discusses the delimitation and limitations present in this qualitative research study.

Delimitations

The first delimitation associated with this study is that it was conducted in three private schools with an established 1:1 technology program. Two of the three schools implemented their 1:1 technology program eight years ago, while the third implemented their 1:1 technology program seven years ago. Using convenience sampling methodology, I researched public and private high schools in a desired mid-Atlantic state. The private schools in this region appeared to be further developed in the use of 1:1 technology compared to the public schools in the same region. By 2014, the private schools in this region reported a fully implemented 1:1 technology program in their high schools, whereas the public schools in this area were just beginning to implement rudimentary “Bring Your Own Device” programs. Students’ experiences in a fully implemented and established 1:1 technology program will be richer due to the private schools’ programs being implemented and established longer than four years. It is possible that choosing schools with a recently implemented 1:1 technology program would yield different data results.

The second delimitation associated with this study is that purposeful sampling was used to identify participants who have the most experience with the phenomenon being studied of high school students' educational experiences in an established 1:1 technology program. The participants who attended the same high school were targeted because they would be able to give the most information regarding as to how the 1:1 technology program has benefited their overall educational experience throughout high school. All 15 participants in this study were seniors and had attended their respective schools all four years of their high school careers. It is possible that choosing students that did not attend the same school all four years of high school would yield different data results.

Limitations

There were several limitations associated with this study. The first limitation to this study was the subjective memories of each participant and the honesty of the participants. Furthermore, this study was dependent on the participants' willingness to engage and provide meaningful data, especially related to the focus group discussion and participant journals. Although several dates and times were offered to the participants when scheduling the focus group discussion, the date and time was determined by the availability of the majority of participants. However, leading up to the agreed upon date and time, several participants backed out with scheduling conflicts resulting in five participants attending the face-to-face focus group discussion. While the participation of the face-to-face focus group discussion was sufficient, an online option was added to include additional participants resulting in an additional two participants attending the focus group discussion via a Zoom conference for a total of seven participants contributing to the scheduled focus group discussion. Although all participants completed a participant journal, some were more detailed and provided more meaningful data

than others.

Another limitation associated with this study was the limited number of participants and the researcher being the only one to code the data; therefore, it is presumed that another researcher might have noted other codes developing into additional themes. Although a qualitative approach was appropriate for the number of participants and the analytical methods used by the researcher, the findings may not be generalized to other populations or settings.

Recommendations for Future Research

This study sought to understand the impact of an established 1:1 technology program on the educational experiences of high school students by hearing their voices as they described their lived educational experiences throughout high school in their school's established 1:1 technology program. The implementation of a 1:1 technology program offers many benefits to both students and educators in a digital world (Schnellert & Keengwe, 2012; Stone, 2016). Unfortunately, few studies have focused on benefits of an established 1:1 technology program from a student's perspective. While this study helps to fill the gap in the literature on understanding the impact of an established 1:1 technology program on the educational experiences of high school students, replicating this study with a larger sample across multiple educational settings would provide a richer description of the phenomenon.

The initial empirical research showed that the excessive use of technology in a 1:1 technology program can lead to the deterioration of the student-teacher relationship (Gaitanaru, 2014). Although all participants shared that 1:1 technology being integrated in their learning environment benefited their educational experiences, there was one student, Ryan, who shared, through a journal entry, that he used his technology to grasp a concept in physics without help from the teacher, and noted through his technology experience he did not build a relationship

with his teacher because he was able to find the solution to his problem online. Additional research is recommended to further determine whether 1:1 technology in learning environments leads to the deterioration of the student-teacher relationship.

One of the themes presented in this study was that a 1:1 technology program develops the technological skills necessary to succeed in a digital world beyond high school. Future research is recommended involving high school graduates of an established 1:1 technology program to determine if, in fact, their educational experiences in an established 1:1 technology program developed the technological skills necessary to succeed in a digital world beyond high school.

Summary

Utilizing the theoretical frameworks of constructivism and connectivism, this transcendental phenomenological study sought to understand the impact of an established 1:1 technology program on the educational experiences of high school students. In conducting the research, I examined the shared lived experiences of 15 high school seniors who attended schools with established 1:1 technology programs throughout their entire high school careers, and through listening to their voices and shared educational experiences, five main themes emerged from the data analysis process included: (a) access, (b) skills, (c) communication, (d) challenges, and (e) attitudes. Although there has been much research regarding 1:1 technology programs, there were few studies that examined the educational experiences of high school students in established 1:1 technology programs. By addressing the three research questions, the data gathered from the participants contributed important findings to address the gap in the literature by giving voice to these high school students regarding their educational experiences in an established 1:1 technology program. This study also provides valuable information and data

to teachers, administrators, and school IT directors to help inform them of the benefits and challenges from students' perspectives of a 1:1 technology program.

It is the conclusion of this researcher that an established 1:1 technology program enhances the unique educational experiences of high school students by using technology as a learning tool and resource both inside and outside the classroom. Students in an established 1:1 technology program have instant access to information and resources beyond what is available in traditional educational environments. Students in an established 1:1 technology program have the ability to communicate with teachers and collaborate with other students effectively and efficiently. Students in an established 1:1 technology program develop the technological skills necessary to succeed in a digital world beyond high school. Although students face challenges related to their school's established 1:1 technology program, the participants in this study shared that their school's established 1:1 technology program taught them to adapt to their learning environment when the technology fails or when technology becomes a distraction to their learning. The participants all agreed that their educational experiences in an established 1:1 technology program throughout high school was a positive experience and better prepared them for a technology-driven world beyond high school.

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APPENDIX A: LIBERTY UNIVERSITY IRB APPROVAL LETTER

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

May 9, 2018

Kevin Mathes
IRB Approval 3250.050918: A Phenomenological Study of the Experiences of High School Students Attending a Private School with a 1:1 Technology Program

Dear Kevin Mathes,

We are pleased to inform you that your study has been approved by the Liberty University IRB. This approval is extended to you for one year from the date provided above with your protocol number. If data collection proceeds past one year, or if you make changes in the methodology as it pertains to human subjects, you must submit an appropriate update form to the IRB. The forms for these cases were attached to your approval email.

Thank you for your cooperation with the IRB, and we wish you well with your research project. Sincerely,

G. Michele Baker, MA, CIP

Administrative Chair of Institutional Research

The Graduate School

Liberty University | Training Champions for Christ since 1971

APPENDIX B: PARTICIPANT INTAKE SURVEY

The purpose of this qualitative transcendental phenomenological study is to seek understanding as to the impact of an established 1:1 technology program on the educational experiences of high school students.

Thank you for consenting to be a possible participant in the study. I would ask that you complete and return the following questionnaire at your earliest convenience to verify your eligibility to be a participant in this study. Thank you for taking the time to consider being a participant and completing and returning this questionnaire in a timely manner.

Question #1: First Name and Last Name:

Question #2: Gender:

Question #3: Grade in High School (example: Freshman, Sophomore, Junior, or Senior):

Question #4: How many consecutive years have you attended your current high school?

Question #5: How many total years have you participated in a 1:1 technology program?

APPENDIX C: INFORMED CONSENT

STUDENT/PARENT/GUARDIAN CONSENT FORM

A PHENOMENOLOGICAL STUDY OF THE EXPERIENCES OF HIGH SCHOOL STUDENTS ATTENDING A PRIVATE SCHOOL WITH A 1:1 TECHNOLOGY PROGRAM

Kevin M. Mathes
Liberty University
School of Education

You are invited to be in a research study to understand the lived experiences of high school students as they engaged in an established 1:1 technology integrated educational program. You were selected as a possible participant because you have experience of attending a high school with an established 1:1 technology program. Please read this form and ask any questions you may have before agreeing to be in the study.

Kevin M. Mathes, a doctoral candidate in the School of Education Department at Liberty University, is conducting this study.

Background Information: The purpose of this study is to seek understanding as to the impact of an established 1:1 technology program on the educational experiences of high school students.

Procedures: If you agree to be in this study, I would ask you to do the following things:

1. You and your parents must sign this consent form and turn it in to the researcher.
2. Participants will be asked to participate in an online journal that will be shared with only the researcher. Participants will be asked to use the journal as a reflection tool with dated entries each time they use technology as part of their educational experience in their high school's 1:1 technology program over the course of one week.
3. Participate in an individual interview where the audio will be recorded and transcribed. Participants will be asked to review the transcribed transcript for accuracy and suggest comment on revisions. Interviews will take no longer than one hour.
4. Participate in a focus group discussion where audio will be recorded and transcribed. Participants will be asked to review the transcribed transcript for accuracy and to provide comments. Focus Group Interviews will take no longer than one hour.

Risks and Benefits of Participation: The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

Participants should not expect to receive a direct benefit from taking part in this study. However, as a participant, you can have the satisfaction of having contributed your assistance to the furthering study of the experiences of high students engaged in an established 1:1 technology program.

Compensation: Participants will not be compensated for participating in this study.

Confidentiality: The records of this study will be kept private. In any sort of report, I might publish, I will not include any information that will make it possible to identify a subject. Research records will be stored securely, and only the researcher will have access to the records.

- I will conduct the interviews on the campus of the participant's high school in a location approved by the school's administrator. Although, the location needs to be a quiet place due to the audio recording, the location will be visible by others through windows.
- The school and participant names will be replaced with pseudonyms to ensure confidentiality.
- All data will be backed up on a password protected computer and external hard drive and written accounts with field notes will be stored in a locked cabinet. Note: Per federal regulations, data must be retained for three years upon completion of the study.
- Audio recordings will be stored on a password protected audio recording device and stored in a locked cabinet. Only the researcher will have access to the recording device.
- Focus groups will be conducted, and participants will be known to each other from attending the same high school that are within the focus group. I cannot assure participants that other members of the focus group will not share what was discussed with persons outside of the group, but instructions of keeping the information confidential will be given.
- After the federal regulations of the three-year period has passed all materials will be shredded and the external hard drive and audio recorder will be permanently erased.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with anyone involved in this study. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships. If you withdraw from the study, any printed and/or recorded data pertaining to your previous involvement in the study will be removed from our data set and destroyed/erased.

Contacts and Questions:

The researcher conducting this study is: Mr. Kevin M. Mathes. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact Mr. Kevin M. Mathes at kmmathes@liberty.edu

If you have any questions or concerns regarding this study and would like to talk to someone other than the researchers, **you are encouraged** to contact the Institutional Review Board, 1971 University Blvd, Suite 1837, Lynchburg, VA 24515 or email at irb@liberty.edu.

Please notify the researcher if you would like a copy of this information to keep for your records.

Statement of Consent:

_____ Yes, I am over the age of 18.

_____ No, I am not over the age of 18.

I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study, as indicated below.

Please check the following box as applicable.

☐ I agree to participate in the audio recorded, one-on-one, face-to-face interview portion of the study and the audio recorded focus group discussion, if needed.

Signature of High School Student Date

Signature of Parent Date

Signature of Investigator Date

IRB Code Numbers: Protocol # 3250.050918

IRB Expiration Date: 5/9/2018 to 5/8/2019

APPENDIX D: PARTICIPANT JOURNAL PROMPT TEMPLATE

Journal Prompt Template

Instructions: Please reflect on your daily use of technology in your school's 1:1 technology program. At the end of each day, make a journal entry describing your educational experience using technology. Please include both pros and cons when describing your educational experience using technology.

NAME:

Date:	**Please describe your educational experience using technology and include how technology was used in your classes.**	**What Applications were used? (Web Browser, Google/Microsoft Apps, Moodle, Canvas, etc.)**	**Reflect on your use of using the technology and share some pros & cons related to your experience.**
Week 1 Day 1			
Day 2			
Day 3			
Day 4			
Day 5			
Week 2 (if needed) Day 6			
Day 7			
Day 8			
Day 9			
Day 10			

APPENDIX E: RESEARCHER'S REFLECTIVE JOURNAL

Description: After each major activity throughout the qualitative research process, I reviewed my bracketing notes and made reflective journal entries in this Word Document as a way to make me aware of my own biases and allow me to remain reflective of the participants' perspectives.

Data Collection Method: One-on-One Interviews

Researcher's Activity: Bracketing

Reflective Journal Entry: Setting aside my own opinion is an important element of a transcendental study. I thought this process was going to be challenging, but throughout the interview process, I acknowledged that my experiences and opinions were primarily related to teachers' experiences integrating 1:1 technology. I found myself wanting to ask follow-up questions related to how teachers integrate technology in their classes, but then quickly realized this study's focus is from a student's perspective and their educational experiences. I will continue to set my expectations aside and really listen to the participants in trying to understand their educational experiences in their established 1:1 technology program. I am sure this process will get easier as I conduct more interviews.

Data Collection Method: Focus Group Discussion

Researcher's Activity: Bracketing

Reflective Journal Entry: Setting aside my own opinion is an important element of a transcendental study. Through the interview process, I acknowledged that my experiences and opinions were primarily related to teachers' experiences integrating 1:1 technology. I felt this was not an issue during the focus group discussion as the participants were engaging and eager to tell about their educational experiences during the discussion. The questions were designed as follow-up questions from the one-on-one interviews. One challenge mentioned during the discussion was Web Filtering. Participants expressed negativity that their school limited the web access via a firewall/filtering system. I found myself wanting to provide an explanation from an administrator perspective but refrained and focused on their educational experiences. I knew saturation was occurring when the Focus Group Discussion was producing similar answers from some of the one-on-one interview sessions.

Data Collection Method: Participant Journals

Researcher's Activity: Bracketing

Reflective Journal Entry: Setting aside my own opinion is an important element of a transcendental study. As I reflected on the Journal Entries, I found myself comparing the

applications being used by the participants to applications that students use at my school. I recognized that there are many applications available to students and they are more willing to adapt to a new application than teachers.

Data Analysis: Coding

Researcher's Activity: Bracketing

Reflective Journal Entry: After printing out all the transcriptions of the collected data, I went through each sentence, line by line, to identify codes. This is a long and laborious process, but it is also very interesting as I read the transcripts over and over that the participant's statements and journal entries are revealing codes that describe the participants' educational experiences in their established 1:1 technology program.

Data Analysis: Axial Coding

Researcher's Activity: Bracketing

Reflective Journal Entry: After reviewing the codes that were developed from the open coding process, it is very interesting as I begin the axial coding process that the codes from the data are able to be grouped into categories that describe the participants' educational experiences in their established 1:1 technology programs.

Data Analysis: Theme Development

Researcher's Activity: Bracketing

Reflective Journal Entry: My school uses iPads for our 1:1 technology program and throughout the data collection process, I expected participants to focus on the type of technological device being used in their 1:1 technology program, but I was pleasantly surprised that the participants focused on how they used the technology to impact their educational experiences rather than the device itself impacting their educational experiences. In addition, my experiences have focused on 1:1 technology from an administrator's or teacher's perspective. I am excited to be clearing my mind and focusing on this data from a student's perspective as themes emerge.

APPENDIX F: SAMPLE JOURNAL WITH BRACKETING

Instructions: Please reflect on your daily use of technology in your school's 1:1 technology program. At the end of each day, make a journal entry describing your educational experience using technology. Please include both pros and cons when describing your educational experience using technology.

Participant Pseudonym: **GAVIN**

Date:	**Please describe your educational experience using technology and include how technology was used in your classes.**	**What Applications were used? (Web Browser, Google/Microsoft Apps, Moodle, Canvas, etc.)**	**Reflect on your use of using the technology and share some pros & cons related to your experience.**
Week 1 Day 1	Today we had an English project due where we created a presentation on our computer in class and presented it to our class. Many of my classes are review this week and next week, so we use many review websites such as Quizlet to review. We also watched videos online that our teacher made for us to review for an upcoming exam.	Keynote Google docs Google Chrome Pages	The technology provides many more ways to review and it makes the learning experience different than a typical classroom. Some cons of the computers are the endless distractions that there are online. There is a filter, but if someone is willing, they can find some sort of entertainment on the computer.
Day 2	Today in Pre-Calculus we used a website to review previous material in order to prepare for our final in a week. I also presented a project in my AP Physics class where we made a presentation on google slides which we used. In Bible we continued to watch the videos that our teacher made for us. We generally use pages to take notes, so we used that in class to look back on what we had studied.	Google slides Pages Google Chrome	The computer makes it easier to collaborate with other students as we are able to work on the same project at the same time without being together. This also puts more responsibility on others as people tend to rely on others more when there is a group project. This also provides a quicker learning experience because note taking speed is increased.
Day 3	My teacher in English class assigns work called "Bell Work" to us which is to be done at the beginning of class as a warm up for the class. We generally do this every day. We again used our computers to review in math and in Bible. Many of these classes are the same all week. I have a group project that is due on Thursday where we present statistics to a non-profit of our choosing. The Statistics are based off of data that the organization gave us. My group has been working on	google slides Pages Google Chrome	I now see that the technology is more than just something to enjoy, it is endless resources. Instead of just having the books in the library to rely on for research, we have nearly infinite access to the internet for papers or what not. This also has a down side as it can cause people to get sidetracked and less focused when researching.

	putting the finishing touches on our presentation.		
Day 4	Today in Spanish we used a website called Quizlet.live to review for our exam which is next Monday. We continued to work on our AP Statistics project and the Bible videos for review. I also used my computer to study for my AP Statistics exam which I have tomorrow. In order to review I used keynotes and other notes that my teacher put on our school website to look over everything we have done this year.	Preview Google slides Pages Google Chrome Keynote	The computer is only as useful as the internet connection. Whenever we have a failure of power of internet connection in the school, learning nearly comes to a halt. Many students and teachers rely on the usage of computers for everyday class, so when we are unable to use them the lesson plan is completely messed up.
Day 5	I did not use my computer much today because I had an AP Statistics Final exam. I did use my computer a little though. Today was also the day I needed to present my Statistics project to the non-profit, so we used Google slides to present our data.	Google slides Google Chrome	I have nothing else to say about the usage of computers.

Researcher's Notes and Bracketing:
(Gavin provided a lot of useful data regarding his educational experiences using technology. As a school administrator, I am happy to see that his teachers integrate technology in multiple ways. However, I noticed that on Day 4 there was an issue with the WIFI, and Gavin noted that the lesson plan was completely messed up. I tell my teachers all the time to have a backup plan in the event of technology issues. I am surprised that Gavin's teachers did not seamlessly transition to their backup plans. It also seems that Gavin is making the most of his technology by using it in several different ways. I appreciated his comments on Day 3 when he recognized that "technology is more than just something to enjoy, it is endless resources." I also found it interesting that there were a couple of times Gavin mentioned the technology as a distraction. He is not the first participant to mention that, but Gavin also noted that technology might be a distraction for someone else instead of admitting that the technology was a distraction for him. As an administrator in a 1:1 technology school, technology as a distraction is always a concern. I will have to be careful not to let my concerns related to technology being a distraction to students cloud my judgement and let the voices of the participants speak to this issue.)

APPENDIX G: OPEN CODING

Identifying Common Words Used for Development of Codes

(Based on interpretations through readings of participant interview and focus group transcripts)

Ability
Access
Apps
Assignment
Battery
Beneficial
Challenge
Classroom
Collaborate
College
Communicate
Device
Different
Distraction
Easier
Educate/tional
Email
Enjoy
Experience
Filter
Friend/s
Frustrate/ion
Future
Game/s
Helps/ful
Homework
Important
Improve
Information
Interact
Internet
Learn/ing
Notes
Online
Opportunity
Organize
Orientation
Paper
Personal
Present
Problem
Research
Resource
Screen
Skill
Software
Student/s
Teacher/s
Tool
Training
Type/ing
WiFi

APPENDIX H: AXIAL CODING

Axial Coding: Interpreting Open Codes by Linking to Categories

(Results of analytical interpretation of primary classifications)

Being Connected
Collaborate
Communicate
Email
Interact
Internet
Online
WIFI

Benefits
Access
College
Experience
Opportunity
Resource
Tool

Challenges/Barriers
Battery
Challenge
Distraction
Filter
Problem

Educational Tool
Apps
Assignment
Educate/tional
Homework
Information
Learn/ing
Notes
Research

Learning Environment
Classroom
Orientation
Paper
Screen
Student/s
Teacher/s

Personal Device
Device
Friend/s
Game/s
Home
Personal

Student Development
Ability
Future
Improve
Organize
Present/ation
Skill
Training
Type/ing

Student Emotions
Beneficial
Different
Easier
Enjoy
Frustrate/ion
Help/s/ful
Important